Building Data: Architecture, Memory, and New Imaginaries

Proceedings of the 9th Annual Conference of the Jaap Bakema Study Centre

van den Heuvel, D.; Tanis, F.; Van der Meer, B.R.

Publication date
2022

Document Version
Final published version

Citation (APA)
van den Heuvel, D., Tanis, F., & Van der Meer, B. R. (Eds.) (2022). *Building Data: Architecture, Memory, and New Imaginaries: Proceedings of the 9th Annual Conference of the Jaap Bakema Study Centre*. TU Delft and Het Nieuwe Instituut.

Jaap Bakema Study Centre

BUILDING DATA: Architecture, Memory, and New Imaginaries

Ninth Annual Conference
November 2022

Building Data: Architecture, Memory, and New Imaginaries

Paula Strunden, *Alison's Room.* © Johannes Schwartz.

Dirk van den Heuvel (Head of the Jaap Bakema Study Centre)

Opening Data: Recalibrating Architecture with New Narratives

This year's annual conference of the Jaap Bakema Study Centre (JBSC) revisits the broad topic of the digital. This time the focus is on the vast amount of data that are being generated and stored, and how to view this overload in light of new possibilities for architectural design and construction, archival and heritage practices, knowledge curation and dissemination through storytelling.

The questions around digital data and especially open data leave much to explore and discover, specifically at the scale level of the building. Even if urban and media studies have completely embraced the discourse around data, what remains an open question is the impact on architectural design and the building project. The intermediary object between the scale of the user carrying around and interacting with the massively available micro-technologies and the larger territorial scale of interconnected urban spaces, both public and private, has largely been disregarded.

This became also clear from the responses to our call that we sent out. It generated surprising propositions opening up new avenues we had not quite expected, from building analysis to co-creation formats as design tools, diversity and inclusion questions and data curation as historical research. The selected papers are clustered under the headings of Subjectivities, Hybridisation, Inclusions, and Precedents.

Contributors do not address data and its collection as an autonomous field, they all discuss data in relation to contextualisation and alternative operativity, beyond the conventional questions of optimisation. Data are not a given, or a neutral outcome of surveillance, measuring and research, they are always curated. Data need narratives and narrators, to make sense. How to curate data, and by whom exactly and why, thus become crucial questions to assess the potential of data for architectural design, their value and meaning.

Next to the paper sessions, a special 'behind the scenes workshop' is organised together with the collection department of Het Nieuwe Instituut, looking into data research and AI possibilities. Three exhibitions are discussed through curatorial group tours: the third installment of Open Archive 3.0 which brings artistic research to digitised and born-digital archives; the outcome of the research project Vertical Atlas, which maps the planetary relations between the new technological networks; and Alison's Room: An Extended Reality Archive, an XR installation created by

Paula Strunden, which is part of the project Prototypes for a Virtual CIAM Museum as developed by the Jaap Bakema Study Centre. The concluding keynote is by Georg Vrachliotis with a focus on the historical institution of the Bouwcentrum Rotterdam, an early example of data research in building construction which surprisingly resonates with the questions of today.

The conference builds on the 7th edition of the JBSC conference ‘Repositioning Architecture in the Digital’. In 2020, we explored the emergence of the data society in the 1970s, mining the pre-history of the digital in architecture so to speak, and its traces in the built production and the archives. The results are available through the conference proceedings, which are available open access through the webdossiers of Jaap Bakema Study Centre and Het Nieuwe Instituut.

Then and now we teamed up with Georg Vrachliotis who is the newly appointed professor of Theory of Architecture and Digital Culture at our Faculty of Architecture and the Built Environment at the TU Delft. As a kick-off of his tenure, he organised the conference ‘The New Open’ on the urgency of open data in relation to the built environment, and in which the Jaap Bakema Study Centre and Het Nieuwe Instituut also participated. Our current conference ‘Building Data: Architecture, Memory, and New Narratives’ aims to further explore the conversations at these interrelated events, combining historical-theoretical research with questions of architectural design.

The conference would not be possible without the help of many people. It was organised by a working committee. Next to Georg Vrachliotis, it included our colleague Dennis Pohl, who is a postdoctoral researcher with the Theory of Architecture and Digital Culture group at TU Delft, and Fatma Tanış, the coordinator of the Jaap Bakema Study Centre. The Advisory Board and its members Tom Avermaete, Hetty Berens, Maristella Casciato, Carola Hein, and Georg Vrachliotis, helped and supported the committee throughout the reviewing and selection process. In conclusion, I would like to thank everyone for their work, just as I want to express my gratitude to the participants, the authors of the papers included in these proceedings to the two involved institutions, the Faculty of Architecture and the Built Environment of TU Delft, and Het Nieuwe Instituut in Rotterdam, who enable the work of the Jaap Bakema Study Centre.

Subjectivities

An attempt to programme an indeterminate digital survey using and array of sensors, overlaid with excerpts from an alternative model of site through computational algorithms adopted as text. Image by author.

Alex Blanchard (Newcastle University)

Programming a Record of Site: Between Coding and Writing / Real-Time and Orthographic Time

Hitting compile to the four USB ports in succession, I carefully loaded the laptop into my backpack, taking care not to dislodge a tangled mass of wires. Grasping a wooden baton as mount for an array of digital sensors, I fixed the position of my right arm parallel to the ground and began to pace along the perimeter of Bamburgh House. My laptop's low battery capacity necessitated an electrical cable running back into the basement, uncoiling from my backpack like an aquanaut's oxygen supply.

My movements were measured and slow, dulled not by water but the latency of the sensors—some reading at a rate of 50 hertz, others once every two seconds. I aimed to record a subjective digital survey of the site. A pair of gyroscope and accelerometer units mounted to my shoes gathered data to re-construct my steps by 'dead reckoning'. They were coupled with a series of distance sensors tracing the contours of the fabric as I walked, mapping it according to my position. I was interested in how digital modelling—which is typically comprised of highly ordered, labelled, and discrete data—could be turned toward indeterminate mediation. The survey aimed to register ephemeral conditions outside the fold of Euclidean geometry. Data sets including temperature and humidity, light and audio, my heart rate and perspiration would be logged alongside my relative position to guide the translation of site into a computational form.

Turning from the wall of Buz Nightclub to that of Dex Garage opposite, the distance scanner was dispatched into open air. It was probably fully decayed by air resistance before reaching City Library around 40 metres away. The false reading returned as a measure of 1 mm was eventually parsed from the working data set as I sifted through the log of data to isolate information from a backdrop of glitches, errors, and unreliable readings.

I was infatuated at the time with a drastically slowed down version of Grimes' album *Halfaxa*. A fast tempo, high pitched track becomes low rolling thunder. Playing the album at its original speed it now sounds alien. My consciousness has been re-coded by the slowed version, which has assumed default. Like the discrete forms of digital data that can be filtered, re-sampled, and transformed by computational means,[1] my body holds a plasticity, moulded according to the technical apparatus I engage with.

1 David Berry, *The Philosophy of Software: Code and Mediation in the Digital Age* (Basingstoke, Hampshire; New York: Palgrave Macmillan, 2011), 14.

THE DIGITAL ARCHITECT

While the architect employs Building Information Modelling applications to programme a digital model, they translate their idea of building through a set of methods and classes scripted by the application's original developers according to a series of ontological positions.[2]

While I engage with modelling software such as Autodesk Revit, I inherit a past that I have not lived, but is mine.[3] Depending on use, the automation performed by contemporary digital methods can be situated adjacent to industrial currents coursing through evolving building practices. The limited set of forms offered by Revit's graphical interface sometimes seem to be a kind of decay. I feel my role occupy a position between a designer and Revit-operator, calling upon automated methods packaged by the interface to develop a model.[4] Like the finite distance scanning beam of my survey, gradually being eroded by particulate matter in the atmosphere, my ability to conceptualise other ideas of building is effaced by the limited lexicon of architectural types.

Our digitally mediated existence fuses the material, energetic and virtual.[5] Computational ontologies are imparted to the built fabric.[6] A cybernetic meadow. As with my attempts to programme a digital survey, digital computation encodes radically new phenomenal experiences, involving the reconfiguration of cognition, perception, and sense into algorithm, pattern, and process.[7] *Writing in Beautiful Data: A History of Vision and Reason Since 1945*, Orit Halpern suggests the resulting data can 'be mined for wealth [and, like the natural resources of another era might] produce the infrastructure for a new way of life'.[8]

The technical apparatus we engage in constitute particular means of relating with building practices and modes of consciousness. In *Signal, Image, Architecture.* architect John May suggests that the predominant character of orthographic technical apparatus, where one labours over a drawing, drafting an implement across its surface, has shifted toward one of computational automation. May claims the contemporary architect's task, is one of *processing* images—streams of data—according to the structures of a given interface, and we have witnessed a 'technical collapse of historical consciousness' as a result.[9]

ELECTRICAL-STATISTICAL COMPUTATION: REAL-TIME

The 'real-time' of computational processing re-codes the individual. Through the translation of design into electrical-statistical media, May asserts the 'historical consciousness of hand-mechanical orthography [is traded] for the statistical consciousness of real-time computational images.'[10] We no longer *draw*, we *process*. Writing is recast as typing. The act of wandering a site is radically re-composed through 'signalised' electrical statistical technologies such as Google Street View. The fabric is re-sampled through digital imagery comprised of fluctuating signals as the basis of data sets.[11] Both wandering and wondering are co-constituted by the technical apparatus we engage.

May posits that '[u]nder the technical conditions of real-time, signalisation takes command, initiating an exhaustive reformatting of all previous thought and language—resulting in an entirely new orientation toward the world.'[12] The 'real-time' constructed by electrical-statistical apparatus seeks to relate the present to all the possible futures that can be recorded and computed at once.[13] However, for the architect such as the Revit-architect, cast partly as an operator of an application's methods rather than an active programmer, these futures are determined by a set of computational ontologies that prescribe the possible—typically as a series of discrete objects with codified parameters and means of interaction.[14]

2 Thinkers such as Bernard Stiegler assert that while operating technical apparatus such as Autodesk Revit's BIM application, an individual's thoughts become routinised according to its structures. For example, the Revit-engaged architect's notion of building is made compulsive according to conceptual structure of the application. In the sense of computation ontologies refer to meta-data—a set of parameters to classify other data according to type. Parameters such as levels, reference planes, along with view types such as plan, section, elevation and becoming the means to engage architectural types such as a wall, floor, door and stair, all coded as discrete objects. See Bernard Stiegler, *For a New Critique of Political Economy* (Cambridge ; Malden, MA: Polity, 2010) and Bernard Stiegler, "Anamnesis and Hypomnesis: Plato as the First Thinker of the Proletarianisation," in *Ars Industrialis*, n.d., https://arsindustrialis.org/anamnesis-and-hypomnesis [accessed 15 April 2022].

3 Stiegler posits that technical apparatus carry a vector of memory, using the term epiphylogenesis to denote the process of a human evolving through exteriorised (tertiary) memory. Derived from epigenetic memory (denoting an individual's acquired memory of the brain through lived experience), and phylogenetic memory (denoting the biological evolutionary memory that is inherited from our ancestors), both are supplemented by tertiary memory—exterior media in the shape of organised inert matter. See Bernard Stiegler, *Technics and Time, 1: The Fault of Epimetheus*, trans. by George Collins and Richard Beardsworth (Stanford: Stanford University Press, 1998), 140.

4 BIM applications such as Revit can be considered according to wider trends of industrialisation engaged through a critical theory of technology. For an account of the industrial currents read through programmed apparatus such as the Jacquard Loom, and through media such as the cinema, see for example Stiegler, "Anamnesis and Hypomnesis: Plato as the First Thinker of the Proletarianisation".

5 Speculative research proposes builds on the use of 'digital twin' model that mirrors the 'physical' in an isolated virtual environment' to propose the extraction of data from physical inspection of a built artefact in combination with the 'Internet of Things'. See Yue Pan and Limao Zhang, "A BIM-Data Mining Integrated Digital Twin Framework for Advanced Project Management," *Automation in Construction* 124 (April 2021): 103564, https://doi.org/10.1016/j.autcon.2021.103564.

6 Contemporary BIM methods are envisioned as a 'digital twin' to construction, extended as a means to manage the built artefact through its use and material life. Examples of the claims made for Autodesk Revit by its developers can be viewed at "Revit Modeling for Successful Facilities Management | Autodesk University", https://www.autodesk.com/autodesk-university/class/Revit-Modeling-Successful-Facilities-Management-2014 [accessed 28 July 2022].

7 Orit Halpern shows the design of the smart city Songdo-dong, in Incheon, South Korea anticipates a close integration between material fabric and computational networks, with substantial engineering of tunnels for fibre optic cables to comprise a data infrastructure for some of the highest bandwidth on earth. Orit Halpern, *Beautiful Data: A History of Vision and Reason Since 1945* (Durham: Duke University Press Books, 2015), 1, 80.

8 Halpern, *Beautiful Data: A History of Vision and Reason Since 1945*, 3, 80.

9 John May, *Signal. Image. Architecture.* (Columbia Books on Architecture and the City, 2019), 27.

10 May, *Signal. Image. Architecture.*, 97.

11 May differentiates signalised media from the relatively fixed forms of orthographic media. The image constituted as a series of values captured by a 'digital camera' is structurally different to the chemical process of a photographic exposure, and the term 'digital camera' is a misnomer that occludes the differing technical schematics involved. May, *Signal. Image. Architecture.*, 43–52.

12 May, *Signal. Image. Architecture.*, 81.

13 May, *Signal. Image. Architecture.*, 83.

14 The Revit-architect can be situated partly as a consumer of methods packaged by the application, which is offered as a run-time programme. With limited capacity to modify the conceptual structure of building, their work becomes compulsive while automated by computation. They consume the forms of labour encoded as algorithmic methods produced by the application's original developers.

ON ORTHOGRAPHIC TIME

May links the 'hand-mechanical orthography' of drafting and writing to a differing historical consciousness, shaped by alternate means of engaging media as 'orthographic time'.[15] Walter Benjamin conceptualises another notion of time through a reading of Paul Klee's drawing 'Angelus Novus'. Klee's figure seems to drift into the distance, and the future, while gazing directly back at us, the viewers.[16] Klee's figure simultaneously regards us and the past, and for Benjamin, our movement through time is composed as a double play: walking backward into the future. Our relation with the past is constituted by Benjamin according to the experience of operating a camera: history is thought as a series of non-linear, fragmentary moments akin to the shock of a camera shutter coursing through the photographer while capturing a discrete snapshot.[17]

BETWEEN ORTHOGRAPHIC AND REAL-TIME

While the parameters, logic and rationale programmed through digital applications configure production of the built environment, the real-time of electrical statistical computational methods is turned toward a simulation of (all) possible futures. Benjamin's conceptualisation of walking backwards into the future offers means to think and materialise other possibilities.

In *What We Owe The Future: A Million-Year View*, William MacAskill writes that we should not regard ourselves as the last of the humans, situated at the close of an epoch. Rather, provided we avert climate and ecological catastrophe, we should consider ourselves as ancients to those who follow.[18] Re-situating the present anthropocene as the ground for those that follow, Benjamin's proposition that 'memory is not an instrument for exploring the past, but rather a medium' offers a means to re-configure the industrialised technical forms.[19] The different apparatus and languages we use structure technical forms of memory, configuring the means by

15 May, *Signal. Image. Architecture.*, 97.

16 Walter Benjamin, "On the Concept of History", in *Walter Benjamin: 1938–1940 v. 4: Selected Writings*, ed. by Michael W. Jennings and Howard Eiland (Cambridge, Mass: Harvard University Press, 2006), 392.

17 Benjamin situates the posthumous shock of pressing a camera shutter alongside the haptic and optic experiences 'supplied by the advertising pages of a newspaper or the traffic of a big city. […] nervous impulses flow through [an individual] in rapid succession, like the energy from a battery.' Walter Benjamin, "On Some Motifs in Baudelaire," in *Walter Benjamin: 1938–1940 v. 4: Selected Writings*, 328; An emancipatory potential can be read into Benjamin's notion of history as a series of catastrophes, as the capacity to re-work the present and future is maintained through a process of excavating the past and its lost voices. For Benjamin, the task for the historical materialist is to 'brush history against the grain' in order to supply 'a unique experience with the past.' They diverge from the linear teleological narrative of historicism, 'telling the sequence of events like the beads of a rosary.' Rather, 'He [sic] grasps the constellation into which his own era has entered, along with a very specific earlier one.' Benjamin, "On the Concept of History," 392, 397.

18 William MacAskill, *What We Owe The Future: A Million-Year View* (London: Oneworld Publications, 2022); John May's question of how we can become nonmodern, that is 'less unknowingly immersed, and more deeply aware of ourselves as permanently and originally technical beings' can be read in a similar spirit to the shift in conception offered by MacAskill. May, *Signal. Image. Architecture.*, 27.

19 Walter Benjamin, "Excavation and Memory," in *Walter Benjamin: Selected Writings: 2, Part 2 1931–1934*, n.d.. ed. by Michael W. Jennings, Howard Eiland and Gary Smith (Cambridge, Mass: Harvard University Press, 2005), 576.

which we dig in order to confront our past while also sedimenting into the ground themselves.[20]

Drawing from Benjamin and May's critique, I posit a hybrid digital method, unearthing lost voices through a combination of orthographic and real-time, developing a medium that is situated between writing and programming.

CONSTRUCTING ANOTHER APPARATUS

Surveying the site of Bamburgh House, my digital apparatus was a precarious assemblage of sensory equipment, prone to malfunction. Only logging fragmentary data sets, I was unable to compile a comprehensive model.[21] I have since departed from my studios, but continue to inhabit site through another form of modelling—employing the procedural nature of algorithmic programming to write a material record of the fabric I knew alongside the things and events witnessed.

Adopting computational algorithms as text, between writing and programming, I return again and again to the same matter via its presentation in written form, performing a double play of re-collection and re-production. Writing code as text, the modes of the material word and the procedural computational programme are combined. Their ontologies merge into one another. My memory and attention adheres to the fabric of site while being moulded by re-contextualised computational methods. Developing a composite apparatus between orthographic methods and electrical statistical forms, I wonder how to *ethically* reconfigure cognition, perception, and sense into algorithm, pattern, and process; exceeding formal terms while paying close attention to site.

Writing programming code in print, or reading it aloud, its re-contextualisation as text or speech alters its technical schematic. Other possible interpretations and meaning are materialised, with attendant capacities to take care, which for Bernard Stiegler is coupled with technically-mediated means of paying attention.[22]

A demolition notice was affixed to the south façade of Dex Garage.

demolitionnotice equals new class()
ticketmachine.deconstructor.affix(smileyfaceemoticon, demnotice4)

While inhabiting a studio in Bamburgh House, each afternoon I felt the rumble of cars running down the levels of the Garage through the floor slabs.

20 For Stiegler, the present milieu is formed by a sedimentation of the culture, memory, technical objects, and knowledges of prior epochs. The human is coupled with tertiary memory in the form of external technical supplements. They co-evolve with them in co-constitution with external, organised inert matter (ephiphylogenetically). They access technically-exteriorised memory of past experience 'that are not lost, contrary to what occurs in a strictly biological species.' Stiegler, *Technics and Time, 1*, 159, 254.

21 The limited processing capacity of my laptop also reduced the fidelity of the data I did manage to record, skipping fragments, creating blind spots and generating new artefacts from glitches.

22 Bernard Stiegler, 'Relational Ecology and the Digital Pharmakon', *Culture Machine*, 7 January 2012.

```
material.oscillation()
{
    fabric[i].resonate(location)
```

Eleven days ahead of eviction, music from my two neighbouring studios permeated through the partition walls. A clarinet whistle fused with improvised drums. In Georges Braques painting *Studio III* a studio wall brings forth a bird, and the bird brings forth a wall. The Siren is a hybrid between a deity and seabird—a product of multiples, fused through glitching ontologies. This siren called from behind, perched upon the industrialised demolition to come. Sounding new means of engaging the past in order to construct languages as a future medium of memory.

Looking back at the history of the site through a hybrid modelling apparatus, I reminisce on the care taken for its fabric by others. On prior demolition of another studio building, some unwieldy masonry fragments threaded together with rebar could not be processed by the rubble crusher. An artist and former inhabitant carried them away, to be placed in safe keeping and unearthed again later.

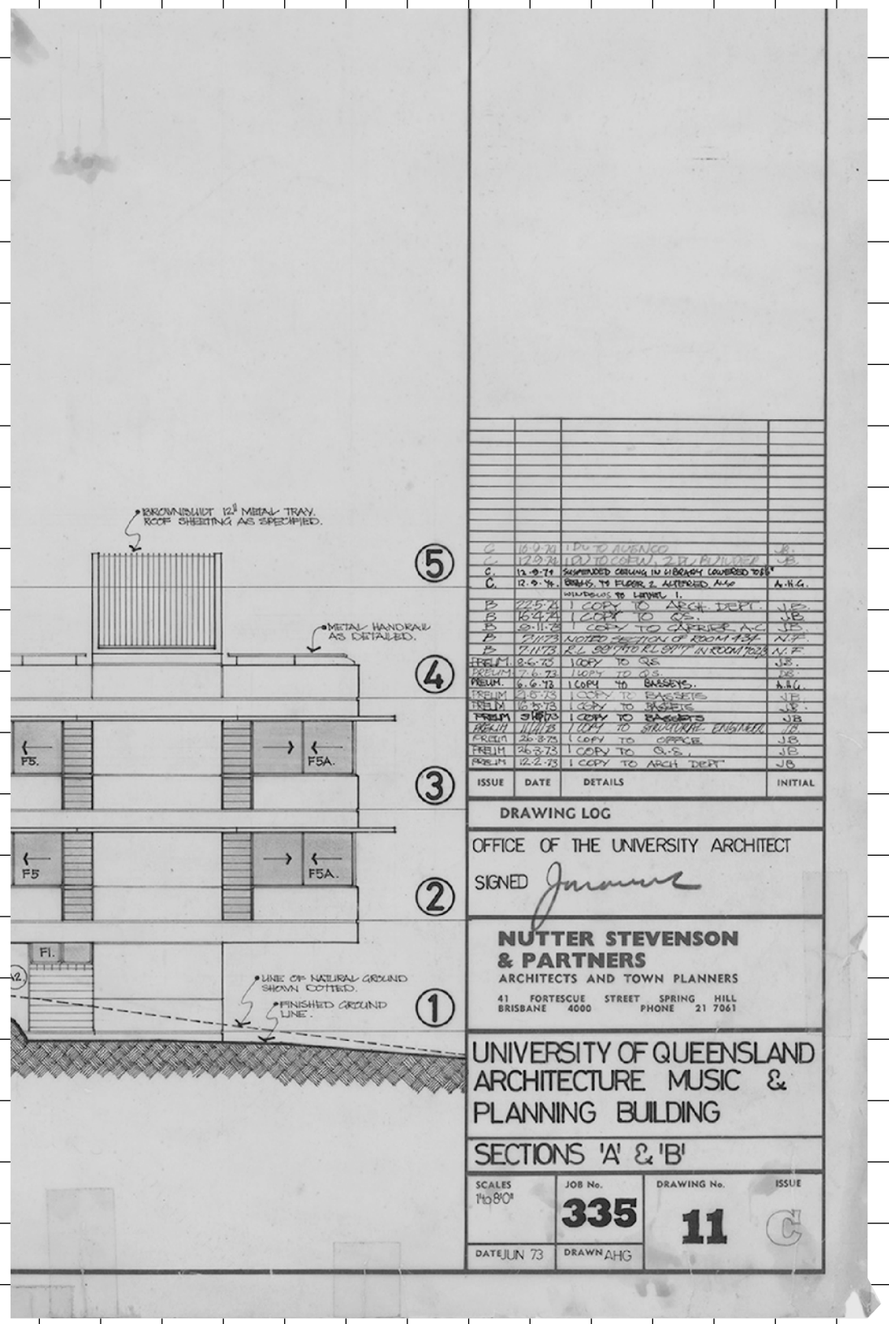
```
RubbleCrusher.operator.set.rundrill(TRUE)
RubbleCrusher.operator(feed.material(hopperin))

if (material.maybepulverised equals FALSE)
   RubbleCrusher.operator.retrieve.material(hopperin)
     .dicard(site)

   for (NorhamHouse.fabric.extents)
   {
     if (fabric.maybepulverised equals equals FALSE)
     {
       person AG.collect.discarded(fabric)
```

The masonry fragments comprised a stubborn material glitch, defying processing by the apparatus, they were discarded by its operator and carefully carried away by *person AG*. Through my own modelling apparatus, occupying a glitch between writing and coding, I find myself taking a similar care for the fabric of site. I carry away fragments in the shape of digital archiving—photographs, film, and audio recordings, alongside strings of text, material reconstructions, and reminiscences on events through the procedural terms of the algorithm. Constructing a mnemonic record of site, I am placed in proximity to the fabric and experiences it played host to before demolition, while simultaneously anticipating its future.

I simulate another building model through a reading and re-reading of the past, while simultaneously re-constituting my modelling apparatus. The fabric of site, the events played out, and the people and things it held were unanticipated, while coming to assume a weight in the model which exceeds terms of Euclidean Space. I am fused in prosthetic relation with the modelling apparatus I develop, as an exteriorised, technical form of memory that co-constitutes my conceptualisation of site.

Contemporary processes of digital archiving and modelling extend prior forms of memory technologies such as writing. Combining programming code with writing—collapsing one into the other—demonstrates the contingency of programmed digital applications, which remain indeterminate. In a place between, an integration between technic and human, computation and writing, their ontologies bleed into one another. Writing this paper, I accidentally deleted a segment. Holding down the cntrl key and hitting *Z* several dozen times, I cycled backwards through the history of the document. Finding the segment, I copied it and held down cntrl+Y, scrubbing forward again to return to my place and materialise an altered manuscript.

I imagine myself hitting cntrl+*Z* over the site, cycling back to its earlier material form. I select some discarded fragments, and they highlight in blue. I hit copy, then hold down cntrl+Y.
cntrl+V.



Nutter Stevenson & Partners. Detail of drawing for Job no.335, University of Queensland Architecture Music & Planning Building, Sections 'A' & 'B,' drawing no. 11, Issue C, 1973–74. Courtesy of Fryer Library and Properties and Facilities, University of Queensland, 2022.

Ashley Paine and Kelly Greenop (The University of Queensland)

Archives and Authorship: A Case Study on the Impact of Digital Architectural Collections

RECORDING ARCHITECTURAL HISTORY: AUTHORSHIP AND THE DIGITAL

In recent decades, the emergence of building information models (BIMs), digital twins and other tools for the storage and management of building data have radically changed the design and production processes of architecture. But as Antoine Picon argues, one of the most interesting dimensions of this digital turn has been its impact on authorship, and the breaking down of conventions of authorial control and attribution.[1] In particular, Picon highlights the emergence of new digital tools for collaboration, the availability of open-source software and online stores of sharable building components, as well as the prospect of AI systems as co-authors in design. Indeed, his essay is part of a growing body of scholarship on architecture and authorship in a digital context that is reimagining the future of the profession beyond the concept of the architect as auteur.[2] If, as Roland Barthes pronounced in 1967 the author is dead, questions of authorship remain very much alive in the digital world.[3]

While the issues that Picon addresses will continue to unfold and shape the discipline for years to come, less attention has been placed on how the same building information technologies might also be used to interrogate questions of authorship in fields of architectural research, history and archives. These questions come into focus with the still experimental use of 3D and 4D interactive building models—incorporating the use of BIM, photogrammetry, AR and VR technologies—as repositories and interfaces for architectural, social and cultural histories.[4] This paper is the result of one such project that looks at the use of BIM to record the successive changes and authored contributions to buildings over their lifespans—part of what Bruno Latour and Albena Yaneva have described as the 'flight' of

1 Antoine Picon, "The Ownership Revolution: Digital Culture and the Transformation of Architectural Practice and Ideals," in *Authorship*, ed. Mónica Pónce de Leon, Discourse, A Series on Architecture (Princeton, NJ: Princeton University Press, 2019).

2 See, for example Brendan Cormier's edited volume, *Copy Culture: Sharing in the Age of Digital Reproduction* from 2018 and the recent 2022 publication of the journal *Log* dedicated to Coauthoring.

3 Ellie Abrons, "Author After Author," in *Authorship*, ed. Mónica Pónce de Leon, Discourse, A Series on Architecture (Princeton, NJ: Princeton University Press, 2019), 4.

4 The Manchester Reform Synagogue project led by Dr. Richard Brook at the Manchester School of Architecture is one example. See: "The Life of Buildings," Manchester School of Architecture, https://www.thelifeofbuildings.org.uk/.

a building in time.[5] By adding architectural drawings, historic photographs, interviews, and other media to a 4D building environment, our ambition is to find ways to document more complete histories of building projects made by an expanded range of actors including architects, building owners, preservationists, artists, managers, and users.[6] We suggest that recording such complex and layered authorships using digital building models creates new possibilities for architectural archives and historical research. In particular, it promises more accessible cultural heritage collections that, when combined with construction and material information, as well as quantifiable building data, establish holistic building histories with benefits for architectural researchers and building managers alike. Certainly, if the future of building management is rests in the use of BIM and digital twins, the integration of information within a common platform will help non-expert custodians of buildings to make decisions on maintenance and change that are informed by cultural interests and heritage values. We also see the value of such resources in the administration of heritage, particularly through the association of cultural histories with specific building elements in digital heritage management plans and statements of significance.

All of this sets up challenges, including many practical questions concerning the standards and requirements for recording complex chronologies of information and data. At the same time, such digital archives also present theoretical challenges with implications that extend deep into the heart of the discipline, eroding the authority that is traditionally attributed to architects-as-authors. While there is no consensus on the software and standards used for the integration of cultural heritage information with digital building models, our purpose in this paper is to tease out just some of the bigger questions and challenges of authorship that arise at this nexus ofarchitectural history and digital archives.

DIGITAL ARCHIVES AND LIMITS: A CASE STUDY

To explore this topic, the following discussion focuses on a modest built work: the Zelman Cowan Building at the University of Queensland in Brisbane, Australia, occupied for nearly 50 years by the Schools of Architecture and Music.[7] Opened in 1976, the building is attributed to the local practice of Nutter Stevenson & Partners whose name appears prominently on the contract drawings, seen in the accompanying image. This ordinary title block is a useful starting point for this paper because it highlights the opportunities we see in the integration of cultural records with digital building models, as well as its many challenges. For example, it is useful to point out that the identification of the author as ‘Nutter Stevenson & Partners’ obscures a range of details that are of likely interest to researchers. For one, the name stands for a larger collection of individual contributors whose identities are not recorded. It also erases certain historical information: the early design of the project was completed under the name of ‘Nutter Charlton & Partners’ in 1972, while later (unbuilt?) modifications were proposed under the name of a third instantiation of the practice, ‘Nutter & Bridges’ in 1985. But these shifting combinations of practice names are only a small part of the archival challenge presented by this building.[8] There are also other names associated with the project through the title block: the initials of four different individuals populate the drawing log, alongside an undecipherable signature by an authorised individual from the Office of the University Architect. All have made contributions to the project—creative or administrative—and almost none of the individuals are known to us. Here, the limits of the title block as an archival record are made plain to see.

While further research is likely to identify at least some of these contributors to the building in its earliest form, the task of recording all those involved in the building design and construction in our digital model is complicated by the sheer number of changes that the structure has witnessed over nearly five decades. The building that stands today is the cumulative result of no less than six major stages of building and renovation work by at least five local practices, as well as countless other minor modifications, additions, repairs, replacements and maintenance works.[9] And, while this multiplying number of authors and interventions compounds the tedious task of uncovering and modelling a complete architectural and constructional history of the building, it also exposes other challenges.

Beyond tracing the names and contributions of these individuals, the bigger question that arises for digital archives is one of scope; of where and when to stop collecting and recording information. (The obsessive creation of a 1:1 map described by Borges in his often cited fictional tale, ‘On Exactitude in Science’ offers a cautionary parable for the compulsion to record everything.)[10] Acknowledging the need for limits, it seems obvious to state that only information pertaining to ‘significant’ contributions and building alterations should be recorded, but this requires that certain thresholds and criteria of significance be defined and consensus reached for their application. Our case of the Zelman Cowan Building amply illustrates of the problems faced. For example, the location of a drainage pipe hidden in a cavity wall (and the identity of those responsible for its design and installation) is likely to be of little interest to historians, but of major interest to building managers on the occasion that it leaks. Likewise, the presence of the large mural painted on a stair wall by the renowned

5 Bruno Latour and Albena Yaneva, ““Give Me a Gun and I Will Make all Buildings Move”: An Ant’s View of Architecture,” in *Explorations in Architecture: Teaching Design Research*, ed. Reto Geiser (Bern: Birkhauser, 2008).

6 The research team includes Dr. Kelly Greenop, Dr. Susan Holden, Dr. Ashley Paine and Dr. Steven Chaddock from the School of Architecture at The University of Queensland (UQ).

7 The building is also the focus of our larger 4D BIM archive project.

8 Another research project associated with the School of Architecture at UQ, the *Digital Archive of Queensland Architecture* (DAQA) has already begun to find ways to address this known problem. See: https://qldarch.net/

9 In addition to the original design by Nutter Stevenson & Partners, the practices of Wilson Architects, Donovan Hill, m3architecture, and Conrad Gargett have significantly reshaped the Zelman Cowan Building.

10 Anaïs Aguerre and Brendan Cormier, “Introduction,” in *Copy Culture: Sharing in the Age of Digital Reproduction*, ed. Brendan Cormier (London: Victoria and Albert Museum, 2018), 26.

artist-architect Amâncio d'Alpoim Miranda 'Pancho' Guedes (1925–2015) in 1979 is of minimal concern to administrators, but of major importance to the architectural history of the building. If the inherent opportunity of combining such distinct sets of information is that the intersecting systems of value attached to the building's fabric can be brought together and evaluated when changes are proposed, precisely what constitutes significant information is an open and perhaps impossible question—its answer will always be contingent and without obvious limits.[11]

THE AUTHORITY OF THE AUTHOR

In addition to understanding these limits of information to be recorded in perpetuity, agreement is also needed on the kind of information recorded, and the format for recording it.[12] In relation to authorship, standards need to be established that define which individuals, and which roles, become part of the digital record of a building history. Applied to newly created 3D and 4D models of extant historical buildings, this task is difficult enough with all the challenges of researching complex authorships already outlined. By contrast, collating such data for archival records in the context of architectural practice today presents a different challenge given that a large-scale building might involve many hundreds of individuals, across multiple disciplines, each with varying degrees of influence and input. To record them would require not only a consistently applied set of role descriptions and titles, but a major shift in the culture of the discipline as well. This is because conventionally only a single author—an architect or architectural practice—is named. Until recently, a lack of means to publicly record long lists of contributors and contributions might be blamed for this limitation. But the attribution of architectural authorship is also frequently controlled by other factors: copyright, moral rights, employment contracts, commercial agreements and associated branding agendas frequently conspire to reinforce individuals as authors. Digital records of authored contributions to buildings, therefore, may open up new legal minefields that place commercial and historical research interests into opposition to one another. This also raises what is, in the end, a more difficult question: not of who should be attributed, but who determines those attributions. As Jorge Otero-Pailos has commented: 'Every work of architecture is a work of co-authorship, even if some co-authors often remain structurally hidden. The question is not who is the author? but who creates the creator?'[13]

11 The accidental loss of a different painting in the Zelman Cowan stair during renovation works in 2020 only underscores the need for such consolidated knowledge.

12 The association of dates with buildings is another perennial problem. In the past, a single date (or date range) has typically been provided, but whether those dates refer to a competition win, the contractual commissioning of the project, the commencement of a design, the period of construction, the building completion, or an official date of opening, is often left undefined. While digital platforms enable more detailed and complete records to be documented, such data becomes most powerful when common conventions are used.

13 David Adjaye, Nikolaus Hirsch, and Jorge Otero-Pailos, "On Architecture and Authorship: A Conversation," *Places Journal* (October 2011). https://placesjournal.org/article/on-architecture-and-authorship-a-conversation/#0.

We are not seeking to offer concrete answers to these big questions. However, if we assume that new standards and conventions for attribution can be determined, what is most interesting about the ability to document detailed histories of building authorship is the way in which these records threaten to break down the persistent idea of the architect-auteur. Whether this idea manifests as a signature brand, or in the cult-like celebration of the 'starchitect,' the construction of digital archives of contributors makes it hard to maintain such outdated concepts of authorship. Hence, the same digital tools that have today enabled new forms of collaborative practice, also have the capacity to re-write overlooked histories of co-authorship—to recover the identity of those structurally hidden authors and their largely invisible labour. Arguably, these kinds of archival activities also lend support to the growing number of employee-owned co-operative architectural practices emerging today—practices that are actively disrupting the identity and authority of the architect as author.

It is also worth noting the consequences and implications of digital archives for other allied disciplines, such as architectural conservation, where authorship is often invisible. Indeed, many preservation practices are complicit in the self-effacement of authorship—the most celebrated examples are those in which the hand of the conservator-as-author is not seen.[14] This denial of authorship, however, is different to that suggested by Barthes. As Salvador Muñoz Viñas summarises, preservation's rejection of the author is due to its interference with an assumed 'correct' reading of a building, while Barthes' rejection was of the very idea that a 'correct' reading could exist at all.[15] As hidden contributors to architecture and built heritage, conservators names are rarely known to us. The recording of their authorship in digital building models is therefore an opportunity to re-assess such structural imbalances, at a time in which experimental—and authored—preservation approaches are beginning to be explored.[16]

THE AUTHORITY OF THE BUILDING

Given the conjectural nature of this paper, and the open questions it raises, we offer a final speculation in lieu of a conclusion. In particular, we would like to argue that the capacity of digital building models to incorporate a broad range of archival artefacts—from process drawings and study models, to construction specifications, builder correspondence, unbuilt proposals, concept sketches and documentation of attempted or abandoned ideas—they also begin to challenge the authority of the building as a historical document. Whereas a built work is often treated as a definitive source of information, and a final statement of the architect's intent, such documents produced in

14 Jorge Otero-Pailos, "On Self-Effacement: The Aesthetics of Preservation," in *Place and Displacement: Exhibiting Architecture*, ed. Thordis Arrhenius et al. (Zurich: Lars Müller Publishers, 2014).

15 Salvador Muñoz Viñas, "Authorship," in Tabula Plena: Forms of Urban Preservation, ed. Bryony Roberts (Zurich: Lars Muller, 2016), 69. Preservation, however, does not reject authorship outright: it rejects its own authorship only to re-establish that of the architect or designer.

16 Jorge Otero-Pailos, Erik Langdalen, and Thordis Arrhenius, Experimental Preservation (Zurich: Lars Müller, 2016).

tandem with a building often contradict such ideas. In particular, they reveal the changes, alterations and compromises made or imposed during design and construction, and expose the interventions of builders, budgets, clients and other forces at play in the built work. They also underscore the distributed nature of architecture, and its manifestation across a wide range of media. Such a fragmented concept of the 'work' has support in copyright law where the authored work of architecture is not limited to buildings themselves. In the United States, for example, Sarah M Hirschman explains that, 'an "architectural work" is defined as "the design of a building as embodied in any tangible medium of expression, including a building, architectural plans, or drawings."'[17] Thus, the consolidation of digital building archives erodes the authority of the building itself, which is revealed as only one embodiment – one version among many – of the architectural project.

Of course, architecture and its authorship has always been complex, and our means to document it woefully, and wilfully, inadequate. Ultimately, the value of the digital archive is that it forces us to deal with this complexity, to confront the challenges of authorship, and to find new and better means to acknowledge the inherently collaborative nature of architecture and its expanded array of contributors. This unravelling and re-writing of the past, we suggest, will also *help* to imagine a more inclusive discipline for the future.

17 Hirschman Sarah M., "Legalizing Architecture: How Congress Defined the Discipline," Future Anterior 12, no. 1 (2015 (Summer)): 27.

The Omega showroom facing the Duomo of Milano.Towards the interpretation and spatialisation of the information. Graphic elaboration by Chiara Monterumisi.

Chiara Monterumisi and Ines Tolic (University of Bologna)

The Omega Project: Developing Architectural Narratives for the Age of Mass Digitalisation

INTRODUCTION

In recent decades the digitalisation of analogue documents has facilitated remote access to collections while helping preserve archival files. However, as James M. O'Toole pointed out, while 'preserving the documents [is] certainly worthwhile' it is not 'as important as preserving the information'.[1] To critically transform unique archival records into information understandable to a wider audience (including not only research insiders) in the first place and, secondarily, use the information in order to develop historically accurate architectural narratives are two of the most significant goals of the *Omega Project*: a multidisciplinary and collaborative endeavour, jointly pursued by the Department of the Arts of the University of Bologna and the Centro Studi e Archivio della Comunicazione (CSAC) of the University of Parma.

The *Omega Project* focuses on a single case study, to which it owes its name. The Omega watchmaker and jewellery showroom, a lesser-investigated work by Italian architects Pier Giacomo (1913–1968) and Achille (1918–2002) Castiglioni, was designed for Piazza del Duomo in Milan at the end of the 1960s. The showroom undoubtedly represents a remarkable achievement by the Castiglioni brothers; however, due to the complexities of the work, the shop also happens to be richly documented in the CSAC collections both qualitatively and quantitatively. Moreover, thanks to a dense network of collaborations, the showroom truly represents a 'node of knowledge'[2] from which it is possible to get a cross section of the international *milieu* and the 'cultured professionalism'[3] which back then characterised the city of Milan. Lastly, the showroom was dismantled in 1986 and was replaced by new projects for other brands. Thus, the *Omega Project* provides an interesting opportunity to try and establish a dialectical relationship between an archive, where its story is stored, and the city, for which it was designed.

1 James M. O'Toole, "On the idea of permanence", *The American Archivist*, 52, no. 1 (Winter 1989): 16.
2 The term was introduced by Caroline Bruzelius within the *Visualizing Venice* project in order to describe the intersection of different historical narratives. Cfr. Kristin L. Huffman, Andrea Giordano & Caroline Bruzelius, *Visualizing Venice. Mapping and modeling time and change in a city* (London and New York: Routledge, 2018).
3 Maria Vittoria Capitanucci et al., *The cultured professionalism in the postwar period* (Milan: Abitare Ordine e Fondazione dell'Ordine degli Architetti, Pianificatori, Paesaggisti e Conservatori della Provincia di Milano, 2012), p. 13.

Crossing the barriers between research domains in favour of an active dialogue between *research by design* and *historical research*, a 3D digital model of the showroom was built. We made sure that the resulting model would not only represent the ponderation on the architecture details and assemblage of pieces as faithfully as possible, but also duly acknowledge any approximation, uncertainty or scantiness in order to avoid inconsistencies (or the possibility of their amplification) within its digital output. Our project escapes from merely 1:1 spectacular visualisation goals deriving from the potentiality of the digital towards literally 'building' a system capable of containing all available information. Along the way we asked ourselves how information can efficiently be extracted from archival documents and made widely accessible? How can information be transformed into an architectural narrative? How to acknowledge what inevitably gets lost along this process? And ultimately, how do we create a product capable of accommodating new information and future narratives?

THE OMEGA SHOWROOM: A HISTORICAL OVERVIEW

The Omega showroom stretched across a seven bays building designed by Giuseppe Mengoni a century earlier. Flanking the entrance of the commercial gallery named after Italian king Vittorio Emanuele II, the showroom uncompromisingly tackled a hard design topic: grafting a modern space highly equipped from the technological point of view onto an urban framework of historical value.[4] The showroom appeared so rooted in its setting that the Italian journal Casabella invited architects to learn from it, especially when designing shops and stores or seeking to make ephemeral architecture appear less so.[5] The project took approximately two years to complete as confirmed by the archival documentation. It was inaugurated in April 1969, just months after Pier Giacomo Castiglioni passed away.

Two years later, in 1971, Achille Castiglioni unaided supervised the project to open a secondary access at basement level. The entrance allowed the public to enter the showroom straight from a corridor of the 'metro' which, opened some years earlier, had already come to epitomise the city's dynamic character. The main entrance, on the ground-floor, faced the northern façade of Milan Cathedral. Although the Castiglioni brothers chose an all-glass shopfront detached from the façade, the relationship with outside was strategically mediated by Mengoni's portico which allowed for peaceful coexistence between contemporary architecture and historic urban landscape.

Another issue to which the Milanese duo dedicated great attention was the vertical connection within those 'more than 1,000 square metres'.[6] An unconventional system of staircases with a series of half-landings and walkways interconnected the three levels. A little mezzanine gallery faced onto the ground-floor, while the largest sales area spilled over into the basement. As the drawings show, both customer and employee movements were treated in efficiency-related terms. A theatrical play of reflections achieved by glass panes and mirrors ensured maximum aesthetic pleasure too.

Achille and Pier Giacomo Castiglioni were 'a good example of comradely understanding and professional teamwork',[7] while various other collaborators and craftsman were also involved in the project. Mention should be made of the Japanese designer Umeda Masanori who was in charge as draftsman and model-maker for Castiglioni's studio; the Swiss graphic designer Max Huber, who prepared the many discreet shop signs and the watch-calendar sculpture positioned along the portico; and finally engineer Andrea Caimi, who supervised the building-site and details of execution. Each of these collaborations inevitably inclines one to investigate further archival collections, making it possible to envisage architecture as 'nodes of knowledge' scattered in our cities and waiting to be enhanced through use of digital technology. Due to demolition, the Omega showroom today survives uniquely in archival collections which, besides CSAC, include the Fondazione Achille Castiglioni (Milan), the Department Responsible for Monuments, the Environment and Historical Buildings (Milan), the Max Huber Archive (Novazzano, Switzerland) and the Umeda Masanori Archive (Tokyo). After collecting the relevant documentation from all of these, organising began on our archival resource, eventually leading to a 3D interactive model bringing the showroom back to Piazza Duomo and thus retrieving a fragment of Milan's urban history.

TOWARDS THE SPATIALISATION OF INFORMATION

Unlike other archives housing records relevant to the Omega showroom, CSAC provides an online repository. All digitalised items are processed via a standard cataloguing system, Samira software, and hence are remotely accessible to researchers. The collaborative arrangement between the University of Bologna and that of Parma enabled us to depart from standard procedures, greatly enriching the description entries and thus amplifying the index levels of queries per keywords. As expected, though, failing a global catalogue/database to connect up all the collections' documents, we could not test the networking aspects beyond the material stored at CSAC.

Given the abundance of documentation preserved in Parma, the case study nevertheless managed to prove what we expected, i.e. that the 'utopian goal of an infinite availability of collective knowledge' comes in 'confusing form: an overwhelming mass of information of data, texts, images, videos, sounds appearing too disorganised, fragmented and complicated to comprehend'.[8]

4 Cf. Achille Castiglioni, "Negozio Omega di Piazza Duomo a Milano, *Fenarete*, 127 (1971): 64.
5 G. Klaus Koenig, "Editorial", *Casabella*, 339–340 (August–September 1969): 70.
6 "In Piazza del Duomo a Milano: mille metri quadrati di Omega", *Domus*, 477 (August 1969): 10.
7 Arturo Belloni, "Interview mit Achille und Pier Giacomo Castiglioni", *md. Moebel interior design*, 10 (1963): 60.
8 Mariabruna Fabrizi, Fosco Lucarelli, *Database, Network, Interface. The Architecture of the Information* (Paris: Caryatide, 2021), 1.

As the case study is a work of architecture, we decided to adopt the architectural configuration of space as ‘a logical organisation, translated analogically into the digital realm in order to organise information’.[9]

The majority of documents relating to the Omega showroom are hand-drawings (sketches, plans, elevations and sections, technical details, models, perspectives, axonometric views, etc.), photos taken during construction and afterwards, such as magazine photo shoots,[10] and ultimately meetings’ notes, annotations beside technical drawings, materials invoices and letters. Within the process of building a digital model each formal and structural architectural element was reconstructed as far as possible, grouping the archival records according to analogy of content and, within each group, restoring the chronological sequence. Very often higher density of documentation was encountered where the scale of representation was more accurate or there were delicate matters the architects had had to attend to: the staircase, for example, or the shop window. Nevertheless, it became clear that density measures the *quantity* of information and not its thoroughness.

It was particularly important for the digital reproduction to highlight the accuracy of archival items and reveal the gaps for each component of the project: some portions are understandable only by certain analogical affinities with other elements while others are, unfortunately, unrecoverable. Parts that do not match with the drawings are probably because certain aspects were developed on site and with the craftsmen. With the dismantling of the Omega showroom, a certain amount of knowledge was simply lost. Likewise can be said about the oral memories of the figures involved, of which potentiality cannot be exploited, since only very few are still alive like Umeda Masanori.

Certain fine materials were described in great technical detail, but rarely illustrated by sketches and lacking details of size. To determine the size of assemblage of some parts we had to work from inference, looking at other elements. Moreover, discrepancies among the drawings required continuous verification of the same detail through different scales of representation and further validation from photos and technical notes. The details, elements or areas redesigned in such a way have been highlighted within the model to distinguish them from what we may consider historically accurate.

Just as the drawing played the role of a thinking-tool in developing the original Omega showroom, here the critical 2D re-drawing implied in the *research by design* digitally retraces how the project was progressively conceived and then built. The reconstruction also comprises superimposition of several layers showing the modifications through proposals. Such outputs produced with ‘computer-aided drafting software (CAD) do not alter the relationship between design and construction’ […] ‘CAD drawings left the representational nature of drawings intact’ […], but ‘lay outside the workflow of the core design and documentation process’.[11]

As final step, the experience of the digital model, archival records and all extracted information is finally experienced through an emerging simulated medium XR (Extended Reality: Virtual reality, VR, and Augmented Reality, AR) which allows interaction in real time.[12] This means that the 3D-model serves as the access point to incorporate further multimedia contents[13] and help decide what one looks at: for instance, the same gamut of archival items contributing to the reconstruction of a specific part can be consulted again to recall the designer ideas or the process of document discovery.

Thus, the *Omega project* stands as a pilot ambitiously reframing the idea of ‘accessibility’ of knowledge and memory of the built environment. In this sense, building the showroom model does not constitute the target of the research per se, rather we consider of central importance its role of a real testing ground that tries to make explicit the problematisation of translating the variety of analogical information into a digital spatialisation. Indeed, it proves how a critical re-construction is a continuous fluctuation between various degrees of interpretation (literal, selective, plausible, subjective, contradictory, etc.) and of representation extrapolated from the different sources.

CONCLUSIONS

The digitally reproduced showroom oscillates between the ‘*representational* attitude of architectural drawings which rests on a separation between a sign and the reality to which it refers’ and, on the other hand, the building *simulation* attitude which ‘requires casting as much building information as possible in the form of computable data’.[14] From the second medium, our interest does not go towards testing model performance, but rather borrows from the building information model (BIM) technologies the capacity of digitally storing and processing large amounts of information of a wide variety of types in the same 3D model. If information is the most important element to be preserved, it needs a system in order to produce knowledge. The system, in the Omega case study, is given by a double set of coordinates relevant to both space and time. As for the time, it made it possible to retrace the history of the design process, unpacking all the information for 3D reconstruction that made ‘new relationships appear and produce[d] new objects and spaces for action and speculation’.[15]

9 *Ibidem.*
10 The project gained Italian resonance in *Casabella (*no. 339–340, 1969), *Domus* (no. 477, 1969), *Ottagono* (n. 14, 1969), *Fenarete* (no. 127, 1970), but also outside in *MD. Moebel Interior Design* (no. 12, 1969) and *AR. Architectural Review* (no. 893, 1971).
11 David Ross Scheer, *The Death of Drawing: Architecture in the Age of Simulation* (London; New York: Routledge, 2014), 12.
12 Cf. Jennifer Whyte, *Virtual Reality and the Built Environment* (Oxford: Architectural Press: 2002), 41.
13 Cf. M. Fabrizi, F. Lucarelli, *Database, Network, Interface*, 113.
14 David Ross Scheer, *The Death of Drawing*, 11.
15 Orit Halpern, *Beautiful Data: A History of Vision and Reason since 1945. Experimental Futures* (Durham: Duke University Press, 2014), 21.

Historical research, research by design and digital design technologies should work in unison enhancing the relationships between archival documents and the environment they were conceived for, especially when the former represent architecture. As Antoine Picon put it, despite all the technological advancements and possibilities offered by digital, 'architecture has remained faithful to the built environment'.[16] Hence, a collecting institution should be conceived as a node 'in the large network of architectural knowledge production' and 'a regulator of flows and trends, bending space and time around it, an accelerator'[17]. In this sense, innovations can be beneficial for the primary functions of archival collections and their curatorial mission: documenting and preserving, displaying and interpreting, researching, and fostering participation; while at the same time improving understanding of the built environment and the historical layers it was built upon.

Bearing in mind that the knowledge amassed in archival repositories remains in a condition of decontextualized oblivion, far from the places and people whom the architecture was conceived for, the *Omega Project* also questions limits and potentialities of new technologies for generating a dialogue between digitalised contents and physical urban spaces.

'Today's digital architecture realises that an essential component of its agenda is to explore the shifting boundary between the physical and the electronic worlds […] At the urban level, the public spaces of tomorrow (such as Piazza Duomo in Milan for which the Castiglioni brothers designed the showroom) will be places where the two realities are intertwined, allowing an even greater array of interactions than today'.[18] Consequently, 3D digital modelling as an interface between the two realms, proves how data collections from the past, present and future can shape architectural research and practice, offering a narrative experience through space.

16 Antoine Picon, Digital Culture in *Architecture: An Introduction For The Design Professions* (Basel: Birkhäuser, 2010), 55.
17 Cf. Albena Yaneva, *Crafting History. Archiving and the Quest for Architectural Legacy* (Ithaca, London: Cornell University Press, 2020), 192.
18 Antoine Picon, *Digital Culture in Architecture*, 56.

Víctor Muñoz Sanz, Marten Kuijpers, “Automated Landscapes: OFFICE”, in ‘WORK BODY LEISURE’, official Dutch contribution to the 16th International Architecture Exhibition of La Biennale di Venezia, curated by Marina Otero Verzier. Rietveld Pavilion, May to November, 2018.

Víctor Muñoz Sanz (TU Delft)

Designing Consent: Emerging Spatialities in Data-driven Work Environments

INTRODUCTION

In his book Manufacturing Consent (1979), American sociologist Michael Burawoy tried to answer the long-standing question in industrial relations, why do workers routinely consent their own exploitation?[1] He argued that surplus labour is secured, and obscured, by constituting the labour process as a game, fostering internal competition, and creating internal labour markets. The labour process emphasises workers as individuals rather than a class, as a way of aligning the interests of capital and labor. While Burawoy’s question and proposition are still relevant, they are not sufficient for conceptualising consent in the time of post-industrial, automated, and smart work.

As proposed by Byung-Chul Han, the era of biopolitics, a central force in industrial production, is obsolete and we are in the era of psychopolitics.[2] Big data and smart technologies are seductive mechanisms that neoliberalism uses to exploit the psychic realm for surveillance and control. Instead of discipline and deprivation, psychopolitics are pleasing and fulfilling, reward us with emotions and the opportunity to become subjects. At the same time, as our behaviour is modelled by algorithm correlations on big data, neoliberalism is making us its subjects—master and slave in one.[3] Overall, compliance is turned into consent.

Today, across economic sectors, data collection technologies allow for pushing even further the individualisation of the work process. Ideas of autonomy, personalisation, flexibility, self-monitoring and positive psychology dominate entrepreneurial discourse. While research has looked at this questions from the perspective of industrial sociology,[4] shortcomings still remain concerning how management and space entangle towards the creation of new narratives building consent in contemporary human and non-human work environments. The question is therefore, how might their design be participating in the psychopolitics of control and worker consent.

1 Michael Burawoy, *Manufacturing Consent: Changes in the Labor Process under Monopoly Capitalism* (Chicago: The University of Chicago Press, 1979).
2 Byung-Chul Han, *Psychopolitics: Neoliberalism and New Technologies of Power* (London: Verso, 2017).
3 See also: Justin Joque, *Revolutionary Mathematics: Artificial Intelligence, Statistics, and the Logic of Capitalism* (London: Verso, 2022).
4 See for example: Sophia Galière, “When food-delivery platform workers consent to algorithmic management: a Foucauldian perspective,” *New Technology, Work and Employment*, volume 35, issue 3 (November 2020): 357–370; Caitlin Petre, “Engineering Consent: How the Design and Marketing of Newsroom Analytics Tools Rationalize Journalists’ Labor,” *Digital Journalism*, volume 6, issue 4 (March 2018): 509–527; Paul Jackson, Hosein Gharavi and Jane Klobas, “Technologies of the self: virtual work and the inner panopticon”, *Information Technology & People*, Vol. 19 No. 3 (2006): 219–243

The three hypothesis presented below are the result of ongoing exploratory research on this question. Specifically I report on trends identified through the analysis of corporate documents and fieldwork on multiple case study research covering sectors such as horticultural production, dairy farming, and industrial automation in logistics. In these sectors in transition, technologies and spatial design are explicitly coupled to generate ideal the conditions to secure surplus labor. With that, this contribution aims to delve not only on the question of how data is reinventing the way buildings condition performing work, but inquire who is developing technologies and associated narratives, for whom, and to what end.

Critiques as the ones here presented might be derided as conspiracy theories, but I argue that is merely an evasion. What follows are not conspiracy hypothesis to explain new forms of supporting capitalist exploitation. In fact, the treatment is much closer to a market analysis with the results being an outcome of observing trends in the working of market forces and actors. That being said, the three hypothesis I put forward below are particular trajectories in the design of work environments for consent. Architecture in the service of workplace psychopolitics, paradoxically, exists alongside other forms of oppressive work conditions, and the fact that the reasons for a worker to consent their exploitation are far more complex than what this paper can encompass.

GAMING ENVIRONMENTS: INDIVIDUALISATION AND COMPETITION

Hard-core members of the *gamers* community use red, blue and green (RGB) LEDs lighting to create special effects and personalise their gaming room setup. 'This is what my room looks like with no RGB, I literally feel dead inside,' tells a gamer in a YouTube video.[5] Indeed, purportedly these light also help setting the right mood and to boost concentration on the game.

The spatial design of control rooms for industrial automated processes follow a similar logic for achieving consent and work satisfaction in routine work. 'Incorrectly planned environments intended for 24x7 use often are depressing, unwelcoming and uncomfortable at best—and at worst create fatigue and boredom' reads a web page by ABB—a top industrial automation company.[6] 'Operators are not static robots,' tells another document, after all, 'they are human beings who thrive on variety, stimulation, activity and choice.'[7] With that, the workspace nurtures a feeling of 'proactive alertness' in the operator.[8]

5 Tech Tesseract, "TRANSFORM your GAMING SETUP with RGB Lighting! How I light my Gaming Room!", YouTube video, accessed August 25, 2022, https://www.youtube.com/watch?v=dZgABJ72y20

6 "How to enhance control room operator capacities: human factors and ergonomics", ABB, accessed August 25, 2022, https://new.abb.com/control-rooms/features/how-to-enhance-control-room-operator-capacities

7 With ABB's desk system "It's even possible to have one temperature above the desk and another down on the floor for someone who suffers from cold feet." ABB, "System 800xA Operator Effectiveness Control rooms of the future are here now" (2012), 4. See patent filing: ABB AB, "Automatic Configuration System For An Operator Console" (International, 2015).

8 ABB, "How to enhance control room operator capacities."

The operator's desk is the ultimate *gaming station* of the post-industrial worker. In advanced models, operators can save up to 10 ergonomic and environmental presets. The operator blends with the console in a 'neocybernetic' fashion—the machine recognises workers, adapts and reacts to their bodies and environmental preferences, and provides them with the information at the moment that is needed.[9] As in a gaming room, light is a key component in the desk. Its intensity and colour temperature creates 'the perfect meaningful non-flickering light for each individual operator and situation.'[10] Such emphasis on gaming-like environments is evident in the remote control console, a Nintendo-looking device with Joysticks, buttons, coloured lights, and icons.

Despite the emphasis on the user being in total control, individual choice is limited when this can jeopardise the quick and smooth movement of information between human and machines. The so-called Operator Activity Cloud monitors the workplace environment and warns the operator when light, sound or air quality are not meeting standards and impacting alertness. The system can eventually take control, and individual comfort preferences can 'be automatically overridden by the process system in pre-determined situations.'[11]

Gaming takes a totally different dimension in a data-driven glasshouse horticulture business. Data collected at the level of the individual employee through labour registration systems allows to assess individual performance. The idea is that instant 'performance feedback motivates staff to be more productive', particularly when there is a bonus involved.[12] The performance ranking of employees is shared publicly in a dashboard on a monitor in the canteen—the only social space available in the glasshouse—shaming slow workers and motivating individual competition. Data transparency becomes an instrument for the control and creation of subjects who strive to be 'liked' and receive a monetary and emotional reward.

FREEFLOW MOVEMENT: AUTONOMY AND CONTINUITY

Centralised systems of control and data registration can impact negatively industrial processes and worker's satisfaction. Human and non-human animals bodies occupy space, and their accumulation in a single, necessary passing point can cause data-capture processes to slow down. For example, in a glasshouse, vegetable pickers register their actions on a terminal via a RFID tagging device linking their ID, activity, and performance (number of

9 See: Antoine Picon. *Smart Cities*: A Spatialised Intelligence (Chichester: John Wiley & Sons, 2015). A patent filing by ABB refers to a drowsiness alert system in which a wearable device would monitor the operator's vital signs. ABB AB, "Drowsiness Alert System For An Operator Console" (International, 2015).

10 ABB, "How to enhance control room operator capacities."

11 "System 800xA Operator Effectiveness Control rooms of the future are here now," ABB, accessed February 2018, 4, https://library.e.abb.com/public/23e1ec050575dc4fc12579e6002b8d22/3BSE068791_en_800xA_Control_rooms_of_the_future_are_here_now.pdf?x-sign=j+NIVGydq0plujrZed7dTqvFUOdCVDaCEWyNZ/7+xLsdZ+Th/iiD8LmOzrEaRE3q

12 "Work-IT. Manage labor and production by data monitoring," Hoogendoorn, accessed 25 August, 2022, https://www.hoogendoorn.nl/en/product/work-it/

kilograms collected for example). Workers clustering at the same time to register their labour on a terminal increases the risks of human error, time, and costs. In a dairy farm, an ill cow can potentially obstruct the passageway to the milking robot, disrupting the traffic of the most productive animals.

In both examples, what is at stake is achieving a seamless and unobstructed continuity in the movement of flows of data and matter. At the same time, low levels of worker's consent (and animal welfare) is generally attributed to such suboptimal sequences of actions, inefficient layout of workplaces, and invasive forms of control. All of these ultimately increase stress, and affect individual agency and autonomy in performing the job.

Not surprisingly, industrial technology companies have realised the synergistic relation between efficient flows, and consent, and devised new ways of data-driven control and organisation of movement in productive spaces. 'Co-ranger Productive: Seamless Works' is a system developed by Dutch company Ridder, already in use in indoor tomato growing operations.[13] Sensors, placed on the harvest carts, and on the workers' wrists make possible to register real-time positions with an accuracy of 10 centimetres. Data is sent to beacons on the roof. The algorithms of Ridder's management software correlate data to generate reliable registration of labour and output. With no visible control terminals conditioning movement and relations, hierarchies of control and servitude are blurred. Managers and workers delegate control tasks to the system. Managers have less work, and employees can focus on doing their without worrying about forgetting to register or making mistakes impacting their pay.

In dairy farming, solutions for controlling animal labour are heading in a very similar direction. Automated farms are designed as so-called Cow Lounges.[14] In these, cows roam free and decide when they want to be milked, reportedly giving them the opportunity to express their natural behaviour and liberating them from stress. By correlating data from gelocation and other sensors placed in the cow's collar, the algorithm can identify the social ranking of each cow or the status of their health—aspects that can lead to congestion in the milking robot. A carefully designed set of automated gates and fences then directs the problematic cows to a special zone in the barn, safeguarding the freeflow of productive animals.[15]

BUILDING APPEARANCES: EXPERIENCE AND AESTHETICS

Sectors transitioning from an industrial to post-industrial, automated, data-driven mode of operations, such as port logistics or glasshouse horticulture, might be employing architecture as a tool to both legitimise themselves as good employers and keep workers satisfied. Working on the port or in agriculture holds certain stigma, as it is traditionally associated with low-skilled, masculine and tolling jobs, and these sectors are the object of severe criticism for their environmental footprint. Yet since the use of automation technologies, modern port logistics and horticulture need to recruit high-skilled professionals, including data scientists, which are hard to attract and retain.

Companies are therefore obliged to adopt external architectural practices that have proved successful for other organisations—that is, they are externally legitimated—in order to increase their attractiveness. Indeed, these new types of jobs require a different type of space. Port workers do not operate cranes from an uncomfortable cabin anymore. The shift to automation and remote control allows to centralise operations in one office building. Further, those manly stevedores are replaced by young professionals, including women. Interior designers are hired to create attractive social spaces in office buildings, such as lounges, canteens, pantries, or meeting rooms. As mentioned before, workstations are highly technological and individualised. The layout of the tables, auxiliary furniture, and materiality of wall panels, roofs and floors in the control room are of utmost importance to achieve focus. But also to create an environment in which technical and architectural solutions create a desirable workspace, highly individualised yet collaborative and social: 'All of these factors work in favor of attracting new and hopefully younger operators into the control room.'[16]

A comparable trend can be observed in glasshouse horticulture. Technokas, a company offering architectural and engineering services for growers points at how the image of glasshouse is becoming increasingly important —to create a better experience for customer, but also 'to increase their attractiveness on the labour market with a representative business space'.[17] While the everyday work of seasonal, routine-work employees changes in one direction, companies pimp up business premises for their managers and scientist with 'high efficiency coupled with a high aesthetic value.' Indeed, horticultural entrepreneurs suddenly recognise the need of having a public facade, an appealing presence in the urban environment, and modern office environments to cater certain type of workers. With improvements in lightning and environmental control, the envelopes of these buildings are getting an additional purpose. Form and ornament seem to be giving these architectures a new form of monumentality and representativity in the landscape. Overall, it is about making of the workplace a space of emotional experience, which appeals to questions of comfort and design.

13 "CoRanger Productive: Seamless Works," Ridder, accessed August 19, https://ridder.com/ridder-coranger-seamless-works/
14 "Cow Lounge®," ID Agro, accessed September 2, 2022, https://www.idagro.com/products/cow-lounge
15 "Barn Design for Robotic Milking," Lely, accessed August 20, 2022, https://www.lely.com/media/filer_public/0e/fd/0efd2985-1aaf-4eb4-98dc-530fb3ce5b45/stallenbouw_en_20-05-10.pdf.
16 Per Lundmark, "Control room ergonomics with the operator in focus for an attractive collaborative environment," ABB Value Paper (n.d), 6, accessed September 3, 2022, https://library.e.abb.com/public/0c863836b06a0818852575ac00620b97/1463_Lundmark_Control_Final.pdf
17 "Grote doelmatigheid gekoppeld aan hoge esthetische waarde," Technokas, accessed September 2, 2022, https://technokas.nl/smart-greenhouses/bedrijfsruimte/grote-doelmatigheid-gekoppeld-aan-hoge-esthetische-waarde/

CONCLUSION:
WORKERS AS SUBJECTS, WORKSPACES AS A LABORATORIES

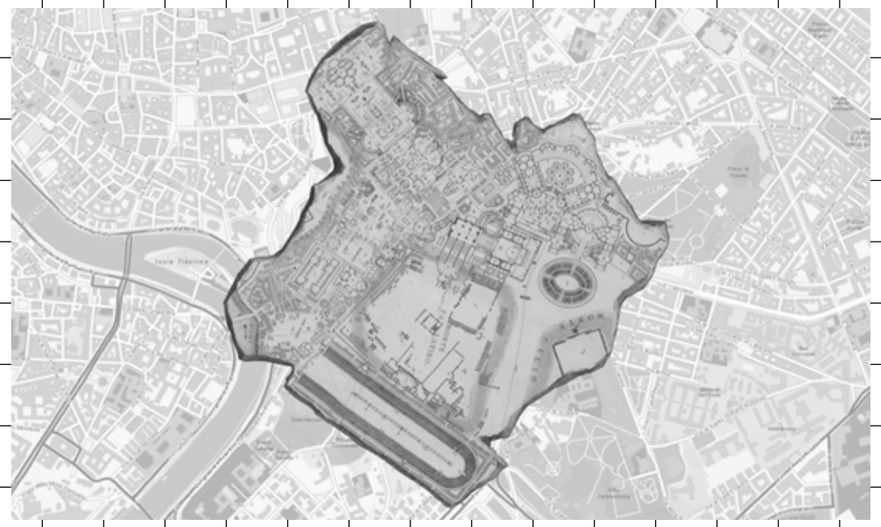
Between 1928 and 1932, Elton Mayo and Fritz Roethlisberger of the Harvard Business School conducted a series of experiments in the Hawthorne plant in Chicago. Their aim was to discern which conditions nurtured work satisfaction, and consent.[18] While they drew some conclusions linking higher levels of agency and cooperation in doing the work to job satisfaction, the experiment lost credibility on methodological grounds.[19] Nonetheless, the study did bring a key insight: the so-called Hawthorne effect.[20] An unwanted side effect in observational research, it describes how individuals modify their behaviour —in this case attention and interest in their work—and consent when they are being observed and receive feedback during an experiment. Research has shown that the reverse is also true: anomic workplaces—that is, incompetent management and inappropriate means to do the work—undermine consent.[21]

Since 2016, when I began researching automated landscapes, there has been an acceleration in the development and application of automated and data-driven technologies at workspaces. Companies in the sectors investigated are constantly updating their systems, introducing new technologies, and collaborating with technology developers in testing others currently in development. In that way, the workplace becomes a laboratory. Workers are then put in a situation in which it is not just their performance that is being observed, but also one which shows how management is competent and *cares* for better, more efficient working conditions, and, most importantly, one in which, as subjects of an experiment, worker's experiences in interacting with technology are observed, and *matter*.

What data scientists need to train their machines, and improve their correlations and behavioural predictions, is the unobstructed flow of data. As long as humans and non-human animals are part of the assemblages of production, gaining their consent will be needed. By creating conditions for competition, autonomy, and emotional affect, experimental approaches to the design of work environments seem to be participating in the psychopolitics of control and worker consent. To what extend the shift from workers as objects of exploitation to the creation of subject-workers through technology and design impacts their consent at work is a question that demands additional inquiry. In that sense, further research should focus on providing empirical evidence to test this hypothesis. This would necessarily need to account for the voice of the workers to understand how they perceive these technology-led transformations in the spatialities of work, and how these condition their relation to employers.

18 Elton Mayo, *Social Problems of an Industrial Civilization* (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1945)
19 Irving Schonfeld, Chu-Hsiang Chang, Occupational health psychology: Work, stress, and health (New York: Springer, 2017).
20 H.M. Parsons, "What happened at Hawthorne?: New evidence suggests the Hawthorne effect resulted from operant reinforcement contingencies," *Science*, vol 183 issue 4128 (March 1974): 922–932.
21 Randy Hodson, "Organizational Anomie and Worker Consent," *Work and Occupations* 26, 3 (August 1999): 292–323

Hybridisation



Nolli map of the northern part of the campus of Delft University of Technology, based on the historical archive of Campus Real Estate and plans by cepezed. Screenshot of the Allmaps Viewer application, created by the author.

Jules Schoonman (TU Delft)

Georeferencing Building Plans: Revisiting Nolli Maps in the Digital Age

Architecture, urban planning and landscape archives are being digitised at an accelerating speed. Creating digital representations is often beneficial for the preservation of the original objects since it can reduce the need for physical consultation. Slowly but surely, digitisation goes hand in hand with the renewal of public interfaces for disclosing digital collections, the implementation of open access policies, and standardisation of computerised access. Through the case study of Allmaps, a series of tools for working with digitised maps and plans, this paper discusses the possibilities for making cross-institutional interfaces in response to these developments. Departing from the paradigmatic *Pianta Grande di Roma* (1748) of Giambattista Nolli, a map that includes both interior plans and archaeological reconstructions, the paper discusses how such representations of the built environment can be recreated in the digital domain, using open standards and open-source software.

NOLLI'S *PIANTA GRANDE DI ROMA*

In 1748 Giambattista Nolli published the *Pianta Grande di Roma*, the most accurate cartographic depiction of Rome to that date which set the standard for the city's urban cartography for more than a century. The map still arouses the interest of map makers, architects and urban planners today because of the way it combines topographical features, detailed renderings of the urban fabric and hundreds of floor plans of public monuments.[1] The resulting 'ichnographic' map represents the city simultaneously at different scales, depicting both interior and exterior spaces, and highlighting the interrelationships between individual plots and the overall urban morphology.

Although Nolli's map is today seen as a model for mapping public and semi-public spaces, this public-private dichotomy might reflect our contemporary interest more than that of Nolli himself.[2] Aside from the practical purpose of delineating the 14 *Rioni* (urban districts) of Rome, the map expresses a clear antiquarian interest in archaeological sites and their integration into the modern city. Similar to Leonardo Bufalini's pioneering *Roma* map of 1551,

1 Mario Bevilacqua, "Nolli, Giovanni Battista," in: *The History of Cartography. Vol. 4: Cartography in the European Enlightenment*, ed. Matthew H. Edney and Mary Sponberg Pedley (Chicago: The University of Chicago Press, 2019), 1061–3.

2 For an example of these contemporary interests see e.g. Marques King, "Nolli map as a tool for small developers," published Jan 19, 2017, https://www.cnu.org/publicsquare/2017/01/19/nolli-map-tool-small-developers.

Nolli included (partial) reconstructed plans of ancient ruins. While Bufalini's map offered a blend of ancient Rome, imaginary reconstructions and renderings of the contemporary city, Nolli established graphic conventions to distinguish between those categories.[3] Plans of archaeological sites appear in black; their reconstructed parts as black outlines with white fillings. Other parts of the city are outlined in black and hatched with increased spacing, appearing grey. Giovanni Battista Piranesi, who helped to engrave Nolli's map and produced the architectural *capriccio* of the reduced edition, used a similar technique for the plans in *Le Antichità Romane* (1756). Other than drawing a clear public-private distinction, Nolli's map serves as a scientific time machine to locate and compare ancient Rome with its modern counterpart.

Hardly any freestanding buildings are depicted on Nolli's map. Each edifice seems partially or fully immersed in the surrounding building block. The city is organised around a series of open spaces formed by public squares, such as the Piazza Navona. The emancipation of buildings takes place in the interior, where the symmetric layout compensates for the irregularities of the allotted parcel. By including floor plans, Nolli's plan exposes the hidden resonance of interiors, public squares and ancient ruins, for example in the case of the elliptical forms of Bernini's Sant'Andrea al Quirinale, Michelangelo's Piazza del Campidoglio and the Roman Colosseum. Nolli's map can therefore be interpreted as a comparative investigation into the city's positive (open) and negative (built) spaces.

At the end of the 1970s, Nolli's map was reappraised as an analytical tool by Colin Rowe and Fred Koetter in their joint publication *Collage City*.[4] Using similar but more abstract 'figure-ground diagrams', the authors juxtaposed a project of Le Corbusier with the urban plan of Parma, Italy. While Le Corbusier's plan depicts a couple of rectangular building outlines amid a surplus of space, Parma's plan is mostly black with countless courtyards and public spaces. The two diagrams seem to be each other's inverse. Rather than showing a clear preference, Rowe and Koetter used the diagrams to contrast and compare different design paradigms and question the underlying principles of modern city planning.[5]

3 On Bufalini's map, see: Jessica Maier, "Mapping Past and Present: Leonardo Bufalini's Plan of Rome (1551)," *Imago Mundi* 59, no. 1 (2007): 1–23.

4 Colin Rowe and Fred Koetter, *Collage City* (Cambridge: MIT Press, 1978), 50–85. A fragment of the original Nolli map is depicted on p. 80. According to Charles P. Graves, the graphic convention might have been mediated through the work of Piranesi, see: Charles P. Graves, "The Plan Game: The Origins of Collage City", published Sep 5, 2018, https://lookingatcities.info/2018/09/05/the-plan-game-the-origins-of-collage-city/. James Tice testifies that he was introduced to Nolli's map by Colin Rowe in the Masters Urban Design Studio at Cornell University in 1968, see: James Tice, "Revealing the Micro Urbanism of Rome: A Posthumous Collaboration between G.B. Nolli and P.M. Letarouilly," in: *Giambattista Nolli and Rome. Mapping the City before and after the Pianta Grande*, ed. Ian Verstegen and Allan Ceen (Rome: Studium Urbis, 2013), p. 199, fn. 4. Thanks to Stefano Milani for this reference.

5 In 1978 Rowe and Koetter tested some of their ideas in a reinterpretation of Nolli's map as one of the contributions to the *Roma Interrotta* exhibition. For an evaluation of this proposal see: Kevin Hinders, "Nolli, Roma Interrotta and the Monte Celio: A New Proposal Based on Past Lessons," in: *Giambattista Nolli and Rome. Mapping the City before and after the Pianta Grande*, 233–247.

FROM PHYSICAL TO DIGITAL

Despite the continued interest in Nolli's map, his method of collating maps and plans has not been widely adopted as standard practice. Architectural plans often depict surrounding buildings as outlines, while urban plans fail to include architectural details. This can only be partly explained through the split between the specialist domains of architecture and urban planning. The making of a Nolli map is a time-consuming effort, requiring both archival research to locate relevant sources, and fieldwork to fill in the blanks. After collecting all relevant information, the subsequent challenge is to redraw all parts in a uniform style, at the same scale and stitch them together.[6] Another practical consideration is the sheer print size needed to guarantee the readability of the floor plans. Nolli's map itself measures 176 by 210 centimetres and has a scale of about 1:2900.

These challenges can be overcome in the digital domain. Other than physical maps, digital maps have no fixed scale and can be adjusted for different zoom levels.[7] Zoom interfaces can be used to switch between maps and plans, when focussing on specific regions. A map viewer only loads those parts of the image visible to the viewer, setting no limitations on the dimensions of the full map. Digital tools also facilitate stitching together different resources through the method of *georeferencing*: adding geographic information to a digitised map. This makes it possible to change the projection of maps so that they can be used as an overlay on top of other maps.

Uniformity is more difficult to achieve but can be approximated by either tracing maps or (automatically) adjusting colour, tone and blending mode of layers. Digital maps offer additional possibilities beyond their physical counterparts. Content can be dynamic and adjusted based on user preferences (for example by filtering on certain types or periods). Metadata (information about the map) can be accessed directly from the map, instead of in a separate index.[8]

Despite the availability of technology to create digital Nolli maps, a lack of relevant skills, difficulties in obtaining relevant source data, and the maintenance and preservation of datasets and codebases can still spoil the game. Architecture schools are often inclined to train students in using proprietary software (used in practice) rather than open-source alternatives. Hosting and maintaining datasets of georeferenced maps and metadata can

6 It is easily overlooked that physical maps such as Nolli's are the result of a similar fusion of real-world measurements and existing printed sources such as architectural portfolios and archaeological publications.

7 A further distinction can be drawn between raster (or pixel) maps and vector maps. In general, I refer to raster maps here that originate from digitised physical maps or plans.

8 This advantage can be clearly observed in the digital edition of Nolli's map that was published under the direction of Prof. James Tice. See: Interactive Nolli Map Website 2.0, published Jan 2021, https://web.stanford.edu/group/spatialhistory/nolli/index.html. Part of Tice's original ambition seems to have been the inclusion of floor plans from Letarouilly's *Edifices de Rome Moderne*. See: James Tice, "Revealing the Micro Urbanism of Rome: A Posthumous Collaboration between G.B. Nolli and P.M. Letarouilly," in: *Giambattista Nolli and Rome*, 199–215.

be cumbersome and costly; much beyond the scope of a single project. And even if such a project would succeed, it might stop working after a while, without preserving the source data for reuse by others.

STANDARDISING ACCESS TO IMAGES

The growing implementation of the International Image Interoperability Framework (IIIF) by cultural institutions worldwide, and the current development of Allmaps helps to overcome some of the aforementioned obstacles.[9] IIIF was established by an international coalition of cultural heritage institutions in 2011, led by Stanford University Libraries and supported by the Andrew J. Mellon Foundation. In 2015 a consortium was formed of 11 institutions including the British Library, *La Bibliothèque nationale de France* and the Bavarian State Library, which has since increased to 63 members worldwide.[10] IIIF grew out of frustrations about the lack of interoperability between the various interfaces used for the public presentation of digital collections. Each institution maintained its own software and had developed individual ways to connect backend to frontend. This situation made it difficult to share codebases and gear user experiences to one another. It also preserved the need for duplicate infrastructures for thematic portals that highlight objects from multiple collections.

IIIF tries to address this situation by standardising access to image data (IIIF Image API) and metadata (IIIF Presentation API).[11] Depending on the level of implementation, the Image API supports requests for specific parts, sizes and orientations of images. The Presentation API makes it possible to describe relationships between groups of images, such as the combined set of images that make up the pages of a book. IIIF does not prescribe any software, but it determines how different pieces of software should communicate with one another. If this communication is standardised across multiple institutions, the same viewer software can be shared for displaying different types of digitised media.[12]

While this at first might seem as something institutions first and foremost cooked up for their own benefit of reducing maintenance costs and joining the bandwagon of their larger counterparts, a quiet revolution accompanies the implementation of these standards. Institutions have always been careful in opening up their digital collections to the public: downloads are often not available or of limited size, conditions for reuse restricted and high-resolution files only available per request and after payment. The implementation of IIIF goes hand in hand with implementing open access policies, abolishing reproduction costs and offering high-resolution downloads.

Importantly, IIIF allows to reuse images in other places on the web. This makes it possible to fetch image resources on external websites or in third-party applications, without the need to create copies or derivatives. Translated to the physical world this means you can take out loans from different institutions for an indefinite period of time without transportation costs or elaborate loan agreements. It eases the creation of thematic platforms that use these services to display selected items from multiple collections. If those platforms are used to add additional metadata to the objects (often referred to as *enrichments*), the original source can be referenced thanks to the linked open data specifications of IIIF.

GEOREFERENCING WITHOUT DERIVATIVES

As previously mentioned, georeferencing is a well-established method for enriching digitised maps. By removing non-cartographic elements from the image (by selecting a *pixel mask*) and adding geographic coordinates to three or more selected pixels (called *control points*), the image can be transformed (or *warped*) to another map projection, and used as an overlay in GIS-applications. Traditionally this results in the creation of derivatives of the original image such as GeoTIFFs or map tiles which require additional databases to store and serve these large assets. Allmaps is premised on the abilities of modern browsers to carry out such complex transformations on the fly, thereby eliminating the need for derivatives.

Allmaps is centred on a forthcoming extension to IIIF that stores pixel masks and control points in a simple Web Annotation format that references the original IIIF image.[13] Around this extension, a series of open-source packages, services and applications are being developed that can be used as stand-alone software or integrated with existing environments. This approach brings georeferencing projects within the reach of small-scale institutions and individual users, while limiting the dependency on proprietary software or costly subscriptions. While institutions traditionally select a series of large-scale maps for georeferencing projects, Allmaps does not discriminate between different types of cartographic imagery, such as maps printed in books, aerial photographs and urban or landscape plans – as long as they are IIIF-compatible. By extension, it also supports georeferencing orthographic projections such as architectural floor plans or archaeological drawings.

9 At TU Delft Library, IIIF (pronounced as *triple-eye-eff*) is used for the online presentation of the digital special collections. Allmaps was founded in 2020 by the author and freelance software engineer Bert Spaan. Current development of the Allmaps Viewer is funded by *Stichting Pica* and carried out in collaboration with the *Netwerk Digitaal Erfgoed* (Dutch Digital Heritage Network) and Leiden University Libraries. See also: https://allmaps.org.

10 Tom Cramer, *The International Image Interoperability Framework (IIIF): Laying the Foundation for Common Services, Integrated Resources and a Marketplace of Tools for Scholars Worldwide*, presentation held on Dec 13, 2011, https://www.cni.org/topics/information-access-retrieval/international-image-interoperability-framework. And: "About the Consortium," IIIF, accessed Sep 2022, https://iiif.io/community/consortium/.

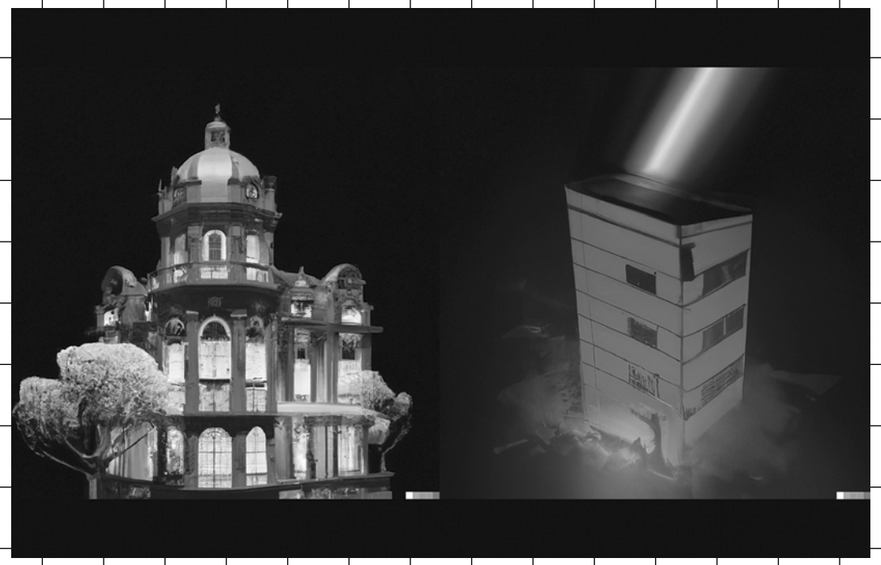
11 Detailed API specifications can be found on the IIIF website, https://iiif.io/api/index.html.

12 Examples of such viewers are Universal Viewer and Mirador.

13 The extension is currently being discussed within the IIIF Maps Technical Specification Group, part of the international IIIF Consortium.

DIGITAL NOLLI MAPS

Nolli's map of Rome still captures the imagination of architects and urban planners today. Its combined presentation of plans and maps has been reappraised as a tool to analyse the built environment. The production of such maps is often outside the scope of the design process however, due to the overall workload and practical challenges. The digital domain offers relief and additional possibilities. The ongoing worldwide implementation of IIIF opens up relevant archives for reuse outside of institutional domains, and Allmaps eliminates the need for generating derivatives and maintaining database infrastructures. These combined developments bring the making of digital Nolli maps within reach of architects, urban planners, students and researchers who wish to explore this format as part of the research and design process. It can be used to curate custom collections, compare plans across historical periods, overlay reconstructions and unbuilt projects, compare plans visually at the same scale and orientation, analyse positive and negative spaces, annotate maps with additional metadata and more. From an institutional point of view, Nolli maps can serve as a geospatial index to collections, a supplement to the regular interface. After locating objects of interest, visitors can be directed to the full record. Such an interface can be shared across multiple institutions to highlight relationships and improve overall accessibility. In the same way that Nolli conflated ancient and modern Rome in a single image, digital Nolli maps can bring together the dispersed domains of cultural heritage institutions, academic research, and contemporary design practice.



On the left, a 'beautiful' building created with DALL-E. On the right, an 'ugly' building produced by the same model. Image prompt by the author.

Erik Herrmann (The Ohio State University)

Mambo Dogface to the Banana Patch? Talking Wrong with Deep Learning

> *I've got a great trick to play on a three-year-old kid. Whenever you're around them, talk wrong. So, now it's like his first day of school, and he says to the teacher, 'Mambo dogface to the banana patch?'*
> — Steve Martin, *'A Wild and Crazy Guy'*

Following Lev Manovich's provocation that we think beyond categories in an epoch of growing artificial intelligence, this paper scrutinises the evolving role of datasets in architectural knowledge production with deep learning.[1] Machine learning models comprehensively alter our relationship with existing data, inferring novel possibilities from past events. Reliant on existing datasets, these models bring further urgency to nascent questions of how the biases and tendencies of big data shape contemporary culture. While information theory quantifies data into a probabilistic abstraction, data's origins are in storytelling. It marks significant moments, offers context, and occasionally denotes meaning. Deep learning models unearth untold stories embedded in cultural data towards generative acts of digital imagination. Likewise, architectural imagination is not only an act of cognition but an awareness informed by past experiences, inherited concepts, and recollections.[2] While this awareness or capacity for imagination was previously considered an exclusively human attribute, deep learning algorithms demonstrate virtuosity and artistry based on a kind of cultural anamnesis. Recent advances in predictive analytics allow feature extraction directly from cultural artefacts such as text, images, drawings, audiovisual content, and immersive 3d models, ensuring the expansion of deep learning use in architectural design. This paper considers, from a technical but accessible perspective, the shaping of the architectural imagination with deep learning, the changing nature of digital collections, and suggests one possible means for emancipation from the biases and tendencies of proprietary deep learning models.

1 Lev Manovich, "Can We Think Without Categories?" *Digital Culture & Society*, vol. 4, no. 1, 2018, pp. 17–28.
2 K. Michael Hays, "Architecture's Appearance and The Practices of Imagination," *Log,* no. 37 (Spring/Summer 2016): 204–213.

SHAPING ARCHITECTURAL IMAGINATION

In deep learning paradigms, storytelling is a two-step process that begins by training a storyteller. First, encoded functions are extracted from a provided dataset to build a model. Then, in a second generative step, the model surmises novel inferences based on the features observed in the original dataset. AI research companies scrape publicly available sources like Wikipedia to build training sets while rarely disclosing their precise makeup. Data collection and curation are costly. As a result, most developers keep their dataset proprietary.[3]

Deep learning models essentially only *discern* based on what they *observe* from their training sets. Although based on biologically observed neural networks, models only mimic *certain* learning approaches. Inferences or results can appear *enlightened,* but deep learning models do not *know.* Complex text-to-image models like DALL-E, for example, can produce incredibly sophisticated images, but cannot reliably count the number of items in a scene above three. Even for data scientists it can be difficult to discern why. In prior computation paradigms, software engineers understood how a machine arrived at its conclusions because they authored the layers of algorithms before compiling, but deep learning models generate convoluted algorithms indecipherable to human observers. Current models lack the capacity for causation or reasoning, and their conclusions rely predominantly on their training. This way, machine learning model behaviour is akin to the three-year-old kid in Steve Martin's classic joke, where a nonsensical dataset (talking wrong) results in original outputs with salient features (nonsense English words).[4]

Most contemporary machine learning research is in multi-modal models, which use multiple media types to produce learning environments where the model builds associations between formats. These models have evident applications to architecture, which is not an exclusively spatial medium but mediated in text, image, drawing, and models. In inter-modal models, datasets are toolkits to *produce and judge* new work, deeply ingraining collective bad habits, tendencies, and biases gleaned from the training set. Biases in these systems are most evident in simple queries without contextual information. For example, prompting a popular text-to-image algorithm called DALL-E for 'a beautiful building' results in a clumsy quasi-Baroque agglomeration. However, a request for 'an ugly building' from the same model returns a brooding late modernist box. This example is overtly ludicrous but evinces the presence of stronger biases that are more deeply ingrained and inscrutable due to the limits of language. It's impossible to accurately pinpoint why DALL-E's model makes its associations of beautiful and ugly buildings, but Google image queries mirror DALL-E's preferences: a search for beautiful buildings returns notably traditional results like St. Paul's Cathedral in London. The results for an ugly building are disproportionately modern. Of course, this is unsurprising, as deep learning model developers often scrape Google's repository of image metadata to create their training sets. The biases of Google's PageRank algorithm are deeply embedded in the model.

CANONICAL ANAMNESIS

The training set is presumed legitimate and absolute in generative deep learning systems—essentially canonical. However, early multi-modal models already demonstrate how deep learning will impact not only the configuration of our built environment but inevitably shape collective imagination in building culture. These models ensure that metadata, or how data is labelled (annotations, captions, tags), will become as relevant to deep learning training as the data they describe. In architecture, like any cultural domain, many of the natural language patterns we have established for identifying and distinguishing artefacts in our field (categories, typologies, canons) will actively shape the representational space of our future computer-aided work. Deep learning models will learn not only from the physical characteristics of buildings (culture data); but media about buildings (cultural data) and critical commentary about building culture (cultural discourse). In other words, the built environment sustains deep learning, as do the stories we tell about it. Manovich's project of cultural analytics considers how processing, interpretation, and experience of big data will alter our understanding of contemporary and historical culture. Echoing his aspirations for broader culture, how might we critique, scrutinise, and adjust our datasets toward a more equitable and sustainable architectural imagination? A more equitable and sustainable architectural imagination would, first and foremost, expand the narrow canons of architecture to inclusively reflect the collective makeup of the broader built environment and its histories. How might we leverage robust inferences while ensuring our contemporary cultural understanding of buildings does not disproportionately shape our imagination of the built future?

Manovich suggests artificial intelligence models like deep learning might offer opportunities to examine culture anew, meaning we 'learn to see cultures in more detail, without immediately looking for, and noticing, only types, structures or patterns'.[5] This advice would be well heeded in architecture, a niche domain where traditional categorisation and emphasis on canonical works often stymies broader inquiries into the built environment from wide-ranging cultures and perspectives. But, with dependence on deep learning models and their inferences only growing, how will we understand the concept of building differently? Might we break from the types, structures, and patterns that currently dictate dominant modes of architectural production?

3 The training sets for wildly popular text-to-image models including DALL-E 2, CLIP and Midjourney are not public.

4 Steve Martin, "Philosophy/Religion/College/Language." *A Wild and Crazy Guy*, Warner Bros., 1978. My thanks to my colleague Jeffrey Kipnis who first noted this parallel during our conversations on the subject of machine learning.

5 Manovich. "Can We Think Without Categories?": 26.

EXTRACTING ARCHITECTURES

Architecture, like machine learning, is an ill-posed problem—a problem where the information provided is insufficient to identify a unique or single solution. No two deep learning results are identical, and each query produces novel results. Similarly, fitting building designs are never singular. Architecture is too sensitive to eccentricities of environment, available resources, local traditions, power dynamics, and cultural nuances. When confronting an ill-posed problem, the best method is to enlarge the database, a complex enterprise in architecture. It is obvious, for example, to imagine teaching a model on one architect's oeuvre but challenging because few architects have a breadth of work that would suffice for a proper dataset. Training sets for popular deep learning models number in the millions. Like repairing a DNA strand, other material would be needed to fill in the gaps.

In the first digital turn of the early 2000s, principles of complete indexing and searchability shaped big data enterprises. While algorithms like Google's PageRank introduce biases to searches, the goal of most platform services was to record everything. In the creative fields, the new epistemology of the search attracted commentary from art and architecture historians and critics alike. For architectural historian Mario Carpo, Google's mantra of 'search don't sort' suggested an end to taxonomy and classification. According to Carpo, searches for specific instances removed the necessity for abstract principles and inaugurated a new science of searching, eliminating standards, averages, and other scientific approaches to generalisation.[6] For art historian David Joselit, storytelling in the epistemology of the search involved novel combinations based on penetrating observations of how images *move*. He emphasises format over media content.[7] In both cases, the ontology of the search came about from revolutionary methods of information *circulation*.

Deep learning changes the nature of digital collections. When authoring new models, the precise contents of a dataset are not as significant as their domain. Competing deep learning models draw from the same pool of digital ready-mades from sources like Wikipedia, Archive.org, and object detection databases. What is proprietary is not bits of data, but the *shape* of collections and methods used to harvest it. The new epistemology is not one of *circulation* but *extraction*. More extensive databases are helpful, but as Manovich notes, 'concepts and methods of sampling, feature extraction, and exploratory data analysis are more important than data size'.[8]

Prompting a deep learning model might feel like searching, but it is not. In a search, a user is uncertain of a data point but confident that it exists somewhere. If the results fail, the search may be altered to furrow out a distinct result. An opaque system of weighting that includes user profile signatures (location, search history, IP address) ensures varied results for different users with identical queries, but distinct users can generally discover identical information. In the new epistemology of AI prompts, users seek something that doesn't exist. There will be various degrees of certainty, but the search will always return a result if the prompt is appropriately formatted. There is always an answer, however unlikely. The deep learning process infers novel results in uncanny acts of digital imagination. The outcome of these models is always serial and bespoke, never an ideal result, but a host of equally valid options. These acts of digital imagination do not reproduce or copy existing cultural artefacts, but generate new content based on rules extrapolated from massive cultural collections. In architecture, these surmised rules behave similarly to the disciplinary construct of types. As K. Michael Hays notes, 'the word "type" does not represent so much the image of something that must be copied or imitated perfectly, as the idea of an element that must itself serve as a rule for the model.'[9] If acts of architectural imagination are not only cultural reflections, but socio-political acts of projection, care must be taken that new rules are not overly influenced by types inferred from historical data.

There are two opportunities for direct authorship in current deep learning paradigms. The first but most difficult is to shape the dataset before training. Undoubtedly, architects should advocate for our domain and contribute to the data ecosystem defining the built environment. However, it is an open and unanswered question of what role architects will play in making these models currently in the purview of data scientists. While aspiring towards a more open, equitable data future, perhaps we can shift our focus to methods that do not rely on enormous, generic open databases but on smaller, more carefully curated selections.

TALKING WRONG

Returning to Manovich's notes on the limits of language, should not we be pursuing more radical approaches than training models based on our fragmented understanding of the built environment? Steve Martin's classic joke suggests a counterintuitive approach: What if we spoke *wrong* to deep learning models, omitted critical information, or trained models on erroneously labelled datasets? After all, the child might be incorrect when they ask, Mambo dogface to the banana patch?' but the statement still bears coherent communication features. In Martin's joke, the child believes they are asking, 'May I use the restroom?' Their nonsense outburst is absurd, but it is not meaningless. The structure, cadence, tonality, and context of the question carry meaning. Inevitably, further conversations from the child would draw out the syntactical rules and grammatical coherence embedded in the noise. Talking wrong to deep learning models offers opportunities for novel counterfactuals, alternate histories, and novel observations. How might we 'talk wrong' to computers to break from the limits of our natural

6 Mario Carpo, *The Second Digital Turn: Design Beyond Intelligence* (Cambridge: The MIT Press, 2017), 23.
7 David Joselit, *After Art* (Princeton: Princeton University Press, 2013), 55–84.
8 Lev Manovich, *Cultural Analytics* (Cambridge: The MIT Press, 2020), 64.
9 Hays, 208.

language? Might the naivety of the machine help challenge the types, structures, and patterns that currently dictate dominant modes of architectural production? Even in the most absurd results there exists possibilities in the production of architectural knowledge.

Current models that produce increasingly mimetic realism demonstrate remarkable fidelity but conform to and reinforce existing categories and styles. Measuring the 'success' of a deep learning algorithm by its capacity for verisimilitude misses the point entirely. These models might be capable of producing stunning photorealism, but their features are based mainly on imprints from the dataset. The model's 'errors', disruptions of realism including omitted parts, odd proportions, misleading depth cues, and other incongruities deserve further scrutiny. Rather than dismissing these defects, we should focus on them to understand the intrinsic logic of the model. Discerning this body of work will involve new methods of interpretation, particularly appreciating outliers and surprising results.

Take, for example, the work of perceptual theorist Rudolf Arnheim in his groundbreaking text, *Art and Visual Perception: A Psychology of the Creative Eye*. While the bulk of Arnehim's text deals with the generalities of human perception, the celebrated Growth chapter explores shifts and nuances in perception based on the mental development of children.[10] To lend proper credence and validity to children's drawings, which prior scholars dismissed as naive, crude, and unsophisticated, Arnheim reconceptualised them as extensions of a child's effort to reconcile the perception of the world with the limits of drawing. Arnheim inferred differently. He looked at a widely dismissed dataset and ignored prior understanding of patterns and types to speculate on new relationships between drawings and our world for children and adults alike. The gift of Arnheim's scholarship is that it suggests new artistic models. Arnheim's interest in children's drawings revealed meaning and understanding embedded in features previously viewed as mistakes, oversights, or omissions and ignited a search for new rules and coherences latent in children's art.

A deep learning algorithm cannot explain the logic that influenced its inferences, just as a child may not be able to articulate their reasoning for certain drawing features. Of course, deep learning algorithms lack the extraordinary intellectual and cognitive characteristics of a child's developing mind, but Arnheim's approach suggests the value of searching for new coherence from apparent mistakes. Faced with an impending hegemony of machine learning in design, we may search for meaningful differences by talking and listening wrong to our incessant machines of growing discretion.

10 Rudolf Arnheim, *Art and Visual Perception: A Psychology of the Creative Eye* (Berkeley and Los Angeles: University of California Press, 1974), 162–217.

Input phrase: 'A suburban cul de sac in Singapore built in a Gothic revival style'.
Image by DALL·E 2, input by author.

Matthew Mullane (Radboud University)

Seeing History with Computer Vision: The Architecture of Text-to-Image Synthesis

AN ENCHANTED SUBURB

In April 2022, the artificial intelligence (AI) research firm OpenAI launched DALL·E 2, a powerful 'text to image synthesis' algorithm programmed to convert natural language input into images by drawing relations between entries in a massive and meticulously categorised database of images and captions. OpenAI advertised the power of DALL·E 2 with images showing astronauts on horseback and polar bears playing guitar; banal t-shirt fantasies meant to show off the algorithm as a tool of 'imagination'. However, the algorithm also excels at making images that are deceivingly real. For instance, entering the phrase 'A suburban cul de sac in Singapore built in a Gothic revival style' will output an image showing a group of homes packed into an anonymous residential neighbourhood. Some of the categorical terms in the phrase are immediately recognisable: the crenelated turret signifying 'Gothic' and Singapore's popular 'black and white' colonial style houses represented by the white walls and black trim. But its fidelity is so convincing and production so simple that it becomes magical. The buildings are believably structured and the image itself, with its familiar human perspective, amateurish cropping, slight tilting, and generic 'digital camera' patina suggests a real estate photograph, or a snap taken by a passing tourist.

The online response to DALL·E 2's release is characterised by a mixture of awe and anxiety. Web pages and twitter feeds overflow with articles simultaneously admiring the algorithm's 'superhuman' powers while warning of deep fakes, propaganda, and a broader existential threat to human creativity.[1] More than the threat of robotic arms replacing physical labour, a prospect of a creative AI stokes our deepest fears that even the most human activities like artmaking could be mastered by machines. In the artworld, where long-existing anxieties about creativity and agency are constantly stoked by new technologies, the mixture of excitement and trepidation is palpable. One artist given early access to the program described his experience as 'equal parts energising and discouraging'. He asked himself 'why bother making things if this can [make] 100 amazing versions of an idea instantly'.[2]

1 For a representative article showcasing this conflicted media response, see Nitasha Tiku, "AI can now create any image in seconds, bringing wonder and danger," *Washington Post,* Sept. 28th, 2022, https://www.washingtonpost.com/technology/interactive/2022/artificial-intelligence-images-dall-e/.

2 Alan Resnick, Twitter post, May 20, 2022, 8:52 p.m., https://twitter.com/alanresnicks/status/1527724051065516032?lang=en

The power of DALL·E 2 is astonishing, yes, but also mystifying. Kate Crawford and Alexander Campolo have called this dual experience the 'enchanted determinism' of AI.[3] As viewers, we are easily stupefied by the power of AI and ascribe to it a 'superhuman' ability that obscures the people and politics behind it. This ersatz suburb was output by DALL·E 2, but it was also made by humans working in institutions. Such human made structures of knowledge and power in fact determine the outcome, but the magical ease of the algorithm's operation shields us from such epistemological, political, and ethical complexity.

While artists fret, meme accounts churn out the absurd, and corporations forecast the value of our AI experiments, I believe that architecture can help us pierce through the magical fog of DALL·E 2's enchanted determinism. As a discipline, architecture is infamous for its strategic interdisciplinary borrowing, but in this case, we should think of it as a precedent, if not an origin, of AI image generation. The historian Molly Steenson has made a similar point by showing how architects and their myriad practices of 'architecting' contributed to the material and intellectual infrastructure of AI.[4] In other words, to better understand the determining factors of AI image making, we should re-think, or perhaps remember, that architecture is also a text to image synthesis engine.

Digital tools in contemporary architecture have largely been used to generate novel forms through geometric manipulation on the screen and advanced production in the shop, as seen in parametric design and robot-assisted construction. Text-to-image synthesis adds a temporal dimension to these presentist calculations, offering a new way to see architecture history and engage with its categorisation. From the Roman Empire to postmodernism, the ability to see and reorganise architecture history has always been a matter of power, politics, and influence. The architecture generated by text-to-image synthesis is just as conflicted and contingent as these past examples, but now, it is also a struggle that we are all unwittingly a part of. How do our everyday actions of searching and uploading contribute to this new algorithmic architecture history?

ALGORITHMIC REVIVALISM

What is at the core of OpenAI's algorithm? Due to the company's (ironic) secrecy, we know only its vague outline. We know that its foundation is a textual neural network called GPT-3 (Generative Pre-Trained Transformer 3) that can generate natural language sentences, paragraphs, and even longform stories. Breaking down its name, GPT-3 is a neural network based upon a generative model, meaning that it outputs text based upon probabilistic calculation of sentence order. It bases probabilistic success on 'pre-training', a practice of making 'tokens' or numerical designations of billions of text examples scraped from books, databases, and the internet. GPT-3 arranges words using a transformer model that excels at disambiguating words and arranging them in a way that is sensitive to their context.

DALL·E 2 utilises GPT-3 in tandem with a vast database of captioned images to join language processing and image synthesis. Where GPT-3 text creation is trained using web-based text inputs, the recognition and prediction of images is based upon pre-existing work done over several decades by governments, corporations, and academic researchers in associating words to images and categorising them into enormous databases that can be used to train neural networks. The most famous such database, ImageNet, uses a nested system to arrange huge sets of images into retrievable categories. DALL·E 2 uses these databases to 'diffuse' images pixel by pixel into something recognisable.[5] For our sake, what is most important to understand about DALL·E 2 is that its range of output is determined by a huge set of images made and partially categorised by humans.

The front-end of this complicated algorithm is a simple web-based GUI whose sleek minimalism only occasionally gives way to the politics beneath. OpenAI warns users that inputting certain terms related to 'hate, harassment, violence, self-harm, sex, shocking, illegal activity, deception, political, public health, or spam' can result in an immediate closure of their account. For example, when I tried to generate an image of 'A revolutionary battle for freedom being fought outside the New Institute in Rotterdam', I was met with a warning that the prompt violated its 'content policy'. The second structural fact determining DALL·E 2's output originates in its pre-training. It can only synthesise images form material that it has scanned with its computer vision. This shapes DALL·E 2's possible output in several important ways. First, any attempt to generate images of the future will be totally predictable, stitched together from familiar categorised scenarios. For example, the prompt 'The skyline of Rotterdam in the year 2250' regurgitates an image of the current skyline but doubles its landmarks (De Rotterdam and the Erasmus Bridge), assuming that the future will simply be the contemporary multiplied. It also fails at generating images from non-human perspectives. Given that nearly all the training images are from a human perspective, trying to generate a view of a building from say the perspective of a dog cannot escape the human gaze. Lastly, and most importantly, DALL·E 2's output is constrained by history. Its image database is ever-growing, but it is effectively a historical archive, meaning that anything that it synthesises must be interpolated by an already categorised aspect of historical imagery. To use an architectural term, DALL·E 2 is a (very powerful) tool for revivalist thinking and design.

The process of fragmenting the world into units, meticulously categorising them, and then synthesising new objects through novel prompts is a high-tech iteration of a very old architectural strategy. We can find examples of

3 Alexander Campolo and Kate Crawford, "Enchanted Determinism" Power without Responsibility in Artificial Intelligence," *Engaging Science, Technology, and Society* 6 (2020), 1–19.

4 Molly Steenson, *Architectural Intelligence: How Architects and Designers Created the Digital Landscape* (Cambridge, MA: The MIT Press, 2017).

5 For more on ImageNet, see Kate Crawford, *The Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence* (New Haven, CT: Yale University Press, 2021), 123–150.

this process in the Renaissance and even before, but the approach was honed to an algorithm-like precision in the nineteenth century by revivalist architect-scholars like Augustin Pugin. In his aptly titled 'Specimens of Gothic Architecture' he merged visual and textual analysis by identifying and drawing composite parts like rose windows and portal doorways, and then arranging them into page-bound categories.[6] The goal of revivalist research was not to create a static archive, but rather a dynamic database of ornamental and structural elements that could be rearranged, and even 'synthesised', at will to successfully respond to new design prompts ranging from 'Houses of Parliament' to 'chair'.

I introduce the two Gothics created by Pugin and DALL·E 2 to understand what is behind the enchanted façade of text-to-image synthesis. These two examples help bring the epistemological and political motivations of both into relief. In the nineteenth century, revivalist architecture was justified through the empirical study of buildings. Researchers were expected to go out into the world, see a building with one's own eyes, and document it with one's own hands. These excursions were motivated by a nationalist desire to create origin stories that united disparate people under a singular cultural and governmental system. Today, what we can call algorithmic revivalism is not governed by the empiricist rigour of the historian, but by many different sets of human eyes working for corporations, universities, and governments, all aided by the disembodied seeing of computer vision. Politically, the nationalism of previous revivalisms has been replaced a contemporary political logic of what Shoshana Zuboff has described as 'surveillance capitalism'.[7] Where nineteenth century revivalism consolidated power in the nation state, AI empowers a more complicated web of governmental and corporate actors that Zuboff calls the 'Big Other'.[8] This nebulous entity is omnipresent and makes money by modulating our behaviour so that we feel more and more comfortable giving our unpaid labour as source material for AI training.

ARCHITECTURE HISTORY AND THE 'BIG OTHER'

Artificial intelligence and text-to-image synthesis opens onto a new paradigm of digitally aided design. Instead of facilitating mathematically determined 'form-finding', programs like DALL·E 2 offer a new means of interacting with and knowing architecture history. The program excels at making two types of historical images in particular. The first is the 'parafictional'. The art historian Carrie Lambert-Beatty has described the parafictional as a means of creating worlds where 'fictions are experienced as fact'.[9] As a whimsical example, DALL·E 2 and I created 'A toilet in the style of Frank Gehry'. Gehry's signature curved forms are convincingly replicated in a believable bathroom environment with high enough resolution and fidelity that we could mistake it for an authentic photograph of an authentic object. This is a comical example, but DALL·E 2's power, and indeed its danger, is in its parafictional potential to deceive and threaten. Hence the limitations on beta access, content restrictions, and repeated calls for ethics oversight committees from within the AI community.

The second type of historical image that DALL·E 2 exceeds at is the counterfactual or speculative image. Where the parafictional image seeks to blur the distinction between fiction and fact, the speculative image is honest in its falsehood. Using DALL·E 2's extensive historical database, users can input declarative text strings that function like speculative 'what if' questions. For example, as a historian of colonial architecture, I often speculate on alternative routes of colonial influence. Prompts like 'An antique photograph of Big Ben in the style of the Great Stupa at Sanchi' or 'An antique photograph of the White House in the style of a pueblo house' visualise colonial incursion in reverse, and in so doing, encourage us to imagine different worlds. The speculative questions can also be rooted in the details of architecture historiography. For example, what would the familiar skyscraper look like if the colourful glass of Expressionism had not been snuffed out by the material realism of designers like Mies van der Rohe? DALL·E 2's answer is an arching Mies-ish façade whose gridded panes of glass have been replaced with diaphanous panes recalling the drawings and paintings of the German Crystal Chain.

These experiments fully realise the potential of what Mario Carpo has called the 'second digital turn' where digital tools are used not only to make new objects but 'think in a different way.'[10] At a time when we are encouraged to think about architecture history at a global scale, text to image synthesis offers a new means of accessing the millions of images and terms that we use to understand the connectedness of the globe. It also inculcates us as unpaid labourers in the factory of the 'Big Other'. Prior to the mainstreaming of AI, the art historian David Joselit diagnosed a mode of making architecture according to the 'Epistemology of Search', where the goal was not producing 'new content, but its retrieval in intelligible patterns through acts of reframing, capturing, reiterating, and documenting'.[11] DALL·E 2 however is not so much a means of retrieval as it is tool for revival. Where search-based design is made with the assistance of human decisions to 'reframe, capture, or reiterate', text-to-image synthesis minimises human input and hides its technical manoeuvres. Thinking with AI is difficult in this sense as we are disconnected from the ways that our search queries and image uploads are being fed back into the algorithm to shape its future output. Algorithmic revivalism may be user-generated, but it is not user-controlled, a disquieting fact that perfectly reflects how our digitised lives and labour are monetised by 'Big Other' beyond our recognition.

6 Auguste Charles Pugin, *Specimens of Gothic Architecture Selected from Various Ancient Edifices in England*, 2 vols. (London: J. Taylor, 1821).
7 See Shoshana Zuboff, *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (London: Profile Books, 2019), 8.
8 Ibid., 376.
9 Carrie-Lambert Beatty, "Make-Believe: Parafiction and Plausibility," *October* 129 (Summer 2009), 54.
10 Mario Carpo, *The Second Digital Turn: Design Beyond Intelligence* (Cambridge, MA: The MIT Press, 2017), 162.
11 David Joselit, *After Art* (Princeton, NJ: Princeton University Press, 2013), 56.

View of slides documenting a model for the Walt Disney Hall project being scanned into CATIA.
Frank Gehry Papers. The Getty Research Institute, 2017m66.

Emily Pugh (Getty Research Institute)

Slides, Software, Data, Drawings: The Frank Gehry Papers as Hybrid Architectural Archive

What is sometimes referred to collectively as 'the digital' is often discussed not only in isolation, but also in binary terms in relation to material forms of information.[1] Moreover, the two are often treated as if in opposition to one another, with the presumption that digital processes replace or obviate the need for those based in paper or pen. In fact, in the contemporary architectural archive, digital materials do not exist in isolation. On the contrary, born-digital design files, datasets, collections metadata, and digital image files exist in the same ecosystem with plans, drawings, office correspondence, and even architectural models. The challenges of archival data often stem from the difficulties of translating information from the virtual to the material and back again. This challenge has unique dimensions in the case of architectural archives, which can be described as essentially hybrid collections, combining both digital and material forms of information on increasingly larger and more complex scales.

The Frank Gehry Papers, acquired by the Getty Research Institute (GRI) in 2017, demonstrates the kind of hybridity that is endemic particularly to architectural archives created from the 1950s on.[2] The collection represents about 280 projects designed between 1954 and 1988, along with a select few projects that were completed after 1988, including Walt Disney Concert Hall in Los Angeles. The GRI's archivists and conservators are still preparing the Gehry archive for public access, a process that was delayed by the pandemic but is slated to be completed in 2024. Rough estimates of its contents include 2,385 tubes/boxes of rolled drawings; 1,307 bankers boxes of correspondence and other documents, photos, samples, and similar material; around 110,000 slides; around 500 physical models; 104 GB of images and 90 GB of project-related files, for a total of about 194 GB of born-digital material.

In what follows, I will briefly trace the Gehry Papers collection from the primary site of its creation in the Frank Gehry Office, through archival processing, and to its access by patrons of the GRI. In doing so I will focus, first, on delineating the various digital forms that constitute the archive and, second, on exploring the relationship of these digital forms to the archive's *physical* materials, its drawings, models, and slides. My goal in doing so will be to reflect on a complex set of relationships that connect the archive's physical and digital components and thereby to counteract a monolithic

1 See for example Pamela Fletcher, "Reflections on Digital Art History." *CAA.Reviews*, June 18, 2015. https://doi.org/10.3202/caa.reviews.2015.73.
2 See https://www.getty.edu/research/special_collections/notable/gehry.html

notion of ‘the digital’ with a more considered and nuanced conception of the architectural archive as a hybrid ecosystem of information.

ARCHITECT

A discussion of the Gehry archive begins with an examination of the architect’s design process, since, like any archive, it reflects the architectural practice of Frank Gehry himself, as well as his firm. This design process is informed in its early stages by an engagement with physical materials, in particular ink sketches and physical modelling, which to Frank Gehry are of utmost importance. For example, asked for his thoughts on architectural models as part of a 2002 interview for the journal *GA Document*, Gehry replied ‘The models are a way of studying. It’s the way of working I feel most comfortable with. That’s how I design.’[3]

In the Frank Gehry Office, physical models created are translated into digital design files, in software programs like CAD but also CATIA, the aerospace software that Gehry’s firm pioneered the use of for architectural design in the early 1990s. During the design of Disney Hall, this process of translation consisted of tracing a stylus over physical models to produce CATIA files that captured the complex geometry of the models. In the Gehry office, CATIA models are often translated back into physical models for further design and refinement, before being converted into a digital format once again. The residue of this process of translation—the physical models, the CATIA files, the photos documenting the modelling process—forms a significant chunk of the GRI’s Gehry archive.

As this example demonstrates, the Gehry Office’s use of CATIA did not represent a replacement of the use of physical models. On the contrary, the introduction of CATIA to the design workflow fuelled an incredible explosion of material production within Gehry’s firm. With the ability offered by CATIA to translate highly complex forms into built structure, Gehry and his team were able to create even more elaborate *physical* models, using an even more diverse range of materials. The Walt Disney Concert Hall project within the Gehry archive includes over 200 models alone, far more than any other single project; other early CATIA projects, such as the Bilbao Guggenheim and Peter Lewis House, likewise generated an enormous trove of physical models and other material artefacts. While the use of CATIA does not alone explain the incredible number of models that were created for these projects, it should nonetheless be regarded as an important factor driving material production within Gehry’s firm.

3 Interview with Yoshio Futagawa, “FOG Speaks on ‘After Bilbao’,” *GA Document* 68 (2002), 12.

ARCHIVE

This snapshot of the Gehry Office’s design process, while brief, perhaps provides insight into how the archive that came to the GRI grew to be so large. And it is very, very large. The GRI’s largest acquisition prior to the Gehry archive was that of the Swiss contemporary art curator Harald Szeemann. The Szeemann Papers total about 2,000 linear feet or just over 609 metres. In comparison, the Gehry Papers surpassed the linear mile mark (that is about 5,280 feet or 1.6 kilometres) a year ago, and there are two years left to go in processing. What makes this archive large, in addition to the factors related to design processes I have just outlined, has to do with Frank Gehry’s position as a world-renowned architect. In short, Gehry has the financial means to, for example, hire model makers as well as rent storage space to accommodate his own archive. However, there are other reasons as well for the enormous size of the Gehry archive.

For one thing, architectural archives are in general getting larger and larger.[4] In California specifically, the introduction over the past twenty or so years of new liability laws and building codes (including those related to so-called earthquake performance) has translated into the generation of many more types and copies of drawings and design specs that must be submitted to building authorities. Whereas an architect working in an earlier period, such as Paul Revere Williams, might have generated maybe seven drawings as part of designing and building a large mansion in the 1930s and 50s, architects and firms working in more recent decades produce hundreds or more drawings as part of designing and building a single structure.

This is yet another example of how digital technologies can drive the production of physical materials. Software programs make it relatively easy, not only to create but to continually revise and update design specs, in comparison with documents created by hand. Moreover, such programs mean that generating physical copies is a matter merely of clicking ‘print’. The need for design specs and the relative ease with which they can be generated both contribute to the size of the resulting archives. In the case of the Frank Gehry Papers, for example, the collection included a high number of printed-out design specs, one copy created for each member of the design team, each time a new version was produced. While the archival processing team throws out any untouched paper specs, they do retain any that are annotated.

As this example demonstrates, these and other decisions made during processing have a constitutive effect on the archive, determining what it comprises. Yet it is important to remember that the archive does not only consist of the materials that came from the Frank Gehry Office and through the door of the GRI in 2017. The trashing of duplicate print copies

4 The insights regarding the influence of building codes on the size of archives were offered by Ann Harrison (Lead Archivists, Gehry Papers processing) and Laura Schroffel (Special Collections Archivist responsible for born-digital materials), in discussion with the author, September 14, 2022.

notwithstanding, the act of archival processing *increases* the overall size of the collection; moreover, processing means the integration of the collection into the GRI's archival infrastructure, an infrastructure that comprises both physical materials (e.g., boxes, folders, tubes, crates) *and* digital materials, which includes both collections data and the software systems that manage and provide access to it.

The example of the slides in the Gehry collection demonstrates how processing affects the archive's size and composition. The GRI has digitised the 110,000 slides in the Gehry Papers. This portion of the collection thus now exists as physical slides *and* as a set of digital images, three for each slide: 1) a primary version for preservation (full-size, uncompressed TIFF); 2) a cropped and modified version of that TIFF; and 3) any derivative versions required for broader access via the web (e.g., lower-resolution JPEGs). Moreover, processing and digitisation generated collections metadata to describe *both* the physical slides *and* the digitised images thereof; there are also duplicates of these digital images and metadata that are backed up on servers as well as on physical tape drives. In addition, note that in many cases the slides are photos of other materials from the archive, such as models. Thus, there is a set of relationships between the slides and the digital visual and textual data that represents or describes the 35mm slides AND between these slides and many of the models and images that are also part of the archive.

The result is an archive comprising a large collection of diverse physical and digital components, including slides, software, data, and drawings, some generated by the Frank Gehry Office and some by the GRI. These materials are furthermore interrelated in multiple and complex ways, some of which are more apparent than others.

ACCESS

As I hope these examples have begun to demonstrate, the application of digital technologies to architectural design and to archival processing ultimately have the effect of increasing the size of the archive overall, including its physical dimensions. Remember that even the collections data or digital images must be stored on physical materials—servers as well as tape drives—and thus, an increase in the digital footprint of an archive necessarily means an increase in its physical footprint. The increasing size and scale of archives further drives the use of digital technologies as means of managing their contents.

The overall increase in the size of archives, and of the proportion of their contents that takes digital form, has implications for those accessing the archives once they are processed. This, of course, creates challenges for those accessing archives. Ultimately, the scholars, designers, students, and others who might want to study the materials in this archive are asked to navigate that complex ecosystem of digital and physical materials that make up the Gehry Papers. Understanding how the materials relate, what each is or is not documenting, and the various means by which information in all its forms can be accessed and analysed is critical to researchers' ability to use the archive, to make sense of what they find within it.

As I have argued elsewhere, changes in archival practice both facilitated and necessitated by the greater use of digital technologies has meant that the burden of information management no longer falls on the archivist alone, but is increasingly shared by the archival researcher.[5] This reality seems painfully evident in relation to the Gehry archive: how does one go about searching through the tens of thousands of drawings or hundreds of models, of various sizes, types, and materials, that might be associated with a single project? What about the tens of thousands of CAD and CATIA files, some of which may only differ from one another in minor or even imperceptible ways?

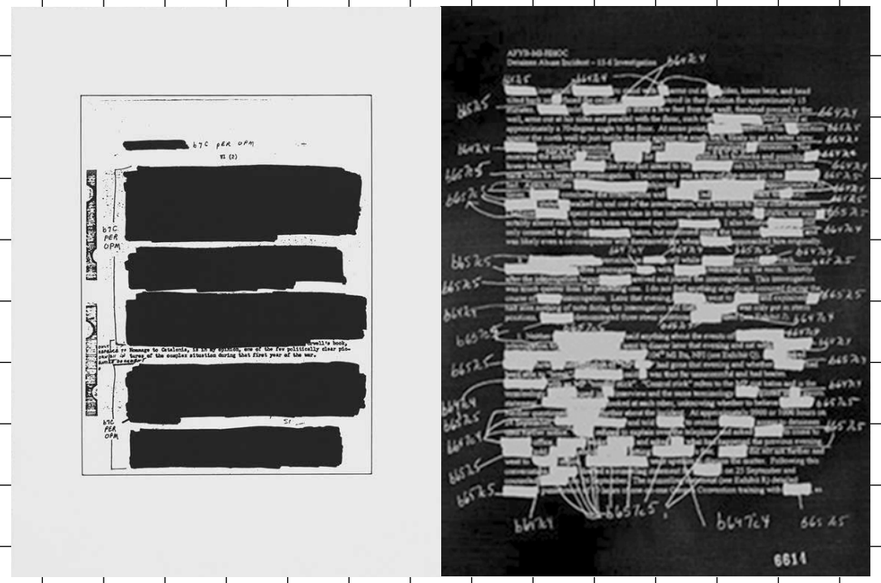
Once again, the use of data-driven and computational approaches become increasingly necessary for those wishing to conduct research in archives like the Gehry Papers. Returning to the example of the digitised slides, one can imagine downloading all 19,000 files associated with the Walt Disney Hall project and using PixPlot, a visual similarity tool developed by Yale University, to browse these images.[6] PixPlot analyses and groups images by similarity, providing a useful way to begin browsing a large corpus of images and see what it might contain. Beginning with a tool like PixPlot does not preclude either the focused analysis of one image or the visual inspection of the physical item that was digitised; however, it does provide a much quicker way of identifying which subset of images are most relevant to a researcher's project, as compared with paging through digitised images JPG by JPG. And remember that we are only referring to the slides, which are not the only images of the Disney Hall project in the archive; there are also thousands of born-digital image files and photo prints.

The example of the Gehry Papers challenges, but more importantly *complicates* the notion that digital or data-based forms of information exist either in opposition to or in isolation from physical or material forms. Navigating this large and hybrid archive necessitates an exploration of how these various formats of information relate to one another. Indeed, understanding the physical and digital artefacts in the Gehry archive as all part of multiple and intersecting processes—of design, construction, archival description and data generation, research and scholarship—is critical to locating not only the building, but the architect, the archivist and the scholar within the systems of information production, of which the contemporary architectural archive is a part.

5 Emily Pugh, "Art History Now: Technology, Information, and Practice." *International Journal for Digital Art History*, no. 4 (2019): 3.51. https://doi.org/10.11588/dah.2019.4.63448.

6 See "Projects: PixPlot," Yale University, https://dhlab.yale.edu/projects/pixplot/ (accessed October 20, 2022).

Inclusions



“Sensitive Data”. Images by Jenny Holzer.

Xenia Vytuleva-Herz (Basel University)

Reading between the Lines and the Grammars of Concealment

February 2022 was marked by a shocking armed conflict in Russia and Ukraine and became the watershed of thought in many ways. It has divided nations, families, friends, it forced to return to mechanisms of Inner immigration, manipulation resistance, and reading between the lines. Reading between the lines is not an empty metaphor. It draws direct connections with a habit of detecting secrets, extracting them from images or textual fabric, it activates the special optics to understand the grammars of concealment. In this paper, I will render visible scenarios of annulling cartographic presence of Socialist secret cities of nuclear research and production during the Cold War and compare them with contemporary practices of manipulating sensitive data.

To illustrate the significance and the average example of data concealment and a powerful skill ‘reading between the lines’ I think of my own first lessons in reading while sitting on my grandfather’s lap. We were exercising on one of those popular useless newspapers that never delivered the news, but rather the achievements of the Communist Party. The newspaper was likely *Pravda*. When I finished some excruciatingly boring bureaucratic passage, my grandfather would instruct me to read it again, but this time ‘between the lines’, taking notice of minor intonations, pauses, and a secret verbal index. What exactly did the author want to tell us, but for some reason could not? What did the text explain in the margins? What is left untold?[1] My grandfather, a Soviet engineer, scientist, and dissident who spent three years in the Gulags knew how to extract the real data, or valid information even from the most conventional manipulated media. What I mean to express here is critical thinking skills that were engendered by the very way in which the ruling class tried to obscure. Paradoxically, driven by the demands of complete control, the authorities cultivated an advanced dexterity to operate with sensitive data that is imperative for the dissident culture; we were trained to be dissidents.[2]

Perhaps one of the most radical examples of such data concealment is the case of the Soviet Secret Cities during the Cold War.[3] Nameless and not shown on maps, secret Soviet cities, were sites of highly secretive scientific and military research work. More than forty cities, some with a population over a million, were established as part of a cold-war posture of confrontation and competition, and were only recently declassified.

1 One of the first independent underground publishing houses established after the fall of the regime – is called “Ad Marginem”.
2 X. Vytuleva, E. Cadava, Playing the X-Record // Cabinet Magazine (NY), June 2017
3 X. Vytuleva, From Copy – to Trope, Secrecy, Quotation and Urbanism in Soviet Zato’s, Perspekta 49, Yale Architectural Magazine, MIT Press, 2016, PP. 219–242.

Hiding or cancelling data is no surprise when talking about science, knowledge production and knowledge transference. During the Cold War various ways of data concealment traversed both capitalist and socialist populations as a whole, making itself present in cultural production, from art and film to children's games and stories.[4] In the Socialist block, however, these *grammars of concealment* have been taken to the whole new extreme and became the conceptual art form itself. As the historian of sciences Asif Sidiqqi writes, 'Science and secrets became consubstantial to Soviet science'.[5] My intention with this paper is to show that it was not only consubstantial to science, but to quotidian life as well. *Cancelling Data* has a morphing syntax, an unofficial ethical codex and an intriguing aesthetical margin. By unlocking the genealogies of voids and silences and examining the bureaucratic machine – the grammars of *data concealment* become concrete and visible.

INVISIBLE INK

It all starts with the birth certificates issued within the secret cities. Paradoxically, on the birth certificates that secret residents received, there was no sign of being special or classified.[6] They seemed wholly unremarkable at first glance: a piece of pale green GOSZNAK paper with watermarks, security codes and cursive hand-writing. So why do secret residents love to meticulously study their birth documents? Why do they like to compare minor data – stamps, signatures? Because, unlike others in the USSR, they were in on a special 'secret': reading between the lines, the location of birth, was always mystified. Imagine, for example, three children born to one family, all delivered in the same paediatric hospital in the secret city of nuclear research and production Sarov. However, each one would have a different birth location listed in their birth certificate. This metaphysical displacement of a large ghost urban formation into multiple index codes displays the grotesque nature and the absurdity of 'lost in-between'. It is this data displacement that acts as a code, or, in the language of the residents was called '*the invisible ink*', echoing Benjamin's description of history: 'the events surrounding the historian and in which he takes part… underlie his presentation like a text written in invisible ink'.

GEOGRAPHIES OF CONFUSED NUMBERS

The first practical move to hide urban formations was to camouflage the topographic data of the secret zone through an opaque numbering system. When describing it, the residents often used the poetic expression 'rabbit footprints'.[7] While running away from a predator, rabbits are known to sprint in chaotic ways to create fake tracks. This tactic is particularly noticeable on white snow and is a common visual and textual metaphor in the Eastern European literature. Dostoevsky's *Crime and Punishment*, Nabokov's novel *Lake, Cloud, Tower* make use of the term. The goal of such an indecipherable riddle – was to create an urban fabric of 'irrational data'. Even if there were just three schools in a secret city, their numbers would start with 240, 367, or 489, suggesting they belong to a bigger formation. Other public and municipal institutions, like nurseries, hospitals, were also not indexical, but were coded according to the logics of camouflage.[8] This murky, irrational logic marked the urban grid of secret zones- ghost urban formations, already complex and full of paradoxes. One question kept pulsing in my head: what if the cities were to be opened? Is there a way to reverse the data system of the rabbit footprints? Will this system of orientation ever be convertible or, at least, comparable with the numbering standards of today's digital world? Just as a side note – GPS System or Google Corporation are rarely helpful here. During my time in the secret cities, rather than looking something up, it was always easier to ask a human.

MAPS AND SECRETS

If there had been a representational device that could tell us about the grammars of concealment, paradoxically it would have been the map. By making present what is absent, the rationality and clear logic of the map suggests a view of the world known, the world understood. The order of the map presents an archaic cosmos into which one descends to find hidden paths, coded data, treasures and secrets. Even though maps belie a sense of objectivity and reality, It is also the map which unveils the ambivalent interplay of showing and neglecting, representing and concealing, navigating and camouflaging. When talking about secret zones, this seemingly innocent sequence of juxtapositions is displaced by other, more delicate dialectics on various levels. If secret zones are secret, how are they to be distinguished on a map? What are the consequences, then, for mapping those territories that border secret zones? The logic of concealment entails that the map becomes an alter ego, a doppelgänger, of a secret *per se*. Or to put it another way, what role does such data play in the realm of contested and liminal spaces? Is there a mythology that is concealed behind this concealment?

In contemporary cartography the choice of visual language – graphics, agenda, codes, symbols is usually defined by the long lasting tradition of national geographic and cartographic institutions vs. international standards.[9] Maps produced in the USSR, featuring extra thin graphical lines, tilted italic fonts, refined agendas were originally delineated by the

4 See, for instance, Kate Brown, Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters, Oxford University Press, 2013.
5 Siddiqi in ZATO: Soviet Secret Cities of the Cold War, edited by Xenia Vytuleva, NY: Columbia University, 2012.
6 A significant research on the cultural anthropology of the Secret Nuclear Citieswas conducted by Galina Orlova, See for instance: G. Orlova, Secret laboratory life in the USSR, 1940s – 1970s, Cahiers du monde russe Volume 60, Issue 2–3, 2019, pp. 461–492.
7 More about Soviet Secret Cities ZATO and secrecy see in: N.V. Melnikova – Shaping by the West of the nuclear Soviet Union's image from 1945 to 1950.
8 See O. Zhidkova, *We Built Novouralsk*, Novouralsk, Russia: Novouralsk Press, 2013, p. 105.
9 See The New Nature of Maps: Essays in the History of Cartography. By J.B. Harley (ed. Paul Laxton) (Baltimore, Johns Hopkins University Press, 2001).

German cartographical alphabet of World War I and migrated to Russia as part of professional exchange, and even a trophy.[10] The visual language of data concealment, however, is much more complex.[11] It is not the result of a billiard-ball-like cause that sets the chain of events in motion. Rather it belongs simultaneously to the flock of fields such as: history of technology, political sciences, art history, business. Whether it is 'cancelling by neglect', 'damaged data' or 'manifested absence'.

The simplest way of annulling data is ignoring the presence of a secret zone – cancelled by neglect. When the sociologist Saskia Sassen talks about invisibility in relation to slums and refugees and financial iniquity in her book 'Expulsions', what she's really saying is that these are 'invisible' because they are not visible in data.[12] Before GPS – Era secreted, or 'made secret', by neglect was a common practice in military cartography. During the Cold War, for instance, Soviet as well as the US secret cities were missing, omitted, not existing, and thus invisible.

The second option largely used today in the zones of military conflicts, critical stage and secretive corporations, IT analysts and strategic political domains is data distortion. *Pixelation* and *Blurs* as methods of data concealment are often used in temporary conditions- for instance, to camouflage urban fabric of the president's cortege on-line regime. Such camouflaged data aim to present an image that is optically highly confusing.[13] In the North American secret zones the coexistence of visible/ invisible urban formations marks a drastic visual contrast: the high-resolution terrains of the non-censored residential blocks versus high resolution of 'pixelated' nuclear plants. Distorted data is uncanny, it triggers anxiety and is operating within the *aesthetic of uncertainty*.

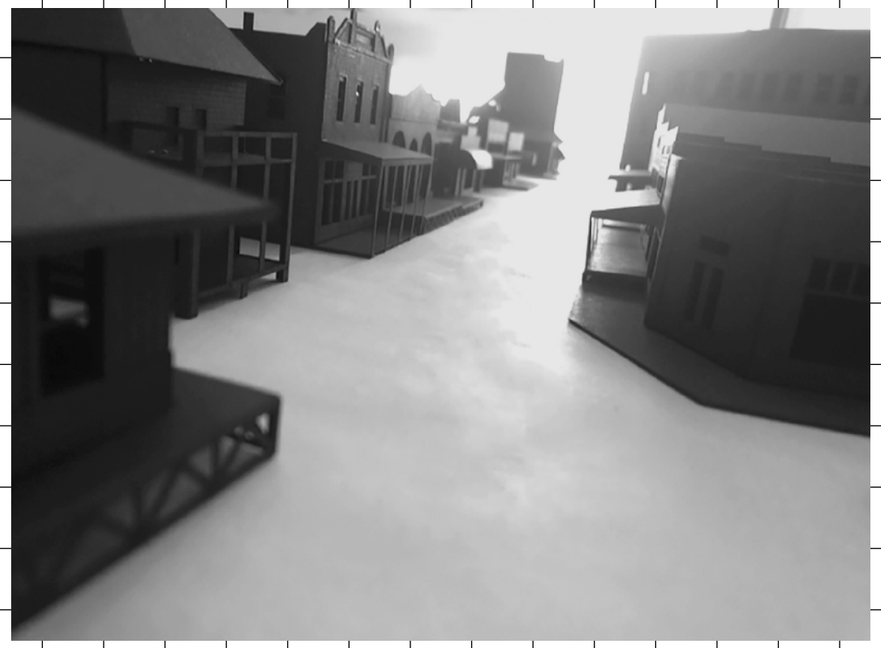
And finally, the most acknowledged and even cinematic gesture of concealment – the manifested absence of *black-striping*. Officially, *black-striping* was introduced into military parlance at the outset of WWI and served later as a visual signature of the Manhattan Project. According to the historian of law Cornelia Viesman, the logic of concealment is already injected into a legal act: 'Crossing out, is more elementary than the more productive act of writing down', she writes, 'the ambiguity of silence is a sign of both oppression and power and reflects an important *topos* in cultural anthropology'.[14] Since the second half of the twentieth century, black-striping has become an obsessive cultural trope and migrated as a solid metaphor to the territory of art. There can be no more literal proof of Lacan's claim that the entry into the domain of the symbolic starts with deleted letters behind bars.

10 See: *Postnikov A.* Maps for ordinary consumers versus maps for the military: double standards of map accuracy in Soviet cartography, 1917 – 1991 // Cartography and Geographic Information Science. 2002. Vol. 29(3).
11 See Maps as theories, *Real science: What it is and what it means.* John Ziman, Cambridge University Press, 2002.
12 Sakia Sassen, Expulsions; Brutality and Complexity in the Global Economy, Harvard University Press, 2014.
13 On the mechanisms of geographical camouflage and Google-Earth disorientation and blurring see Chris Perkins, ZATO: Soviet Secret Cities of the Cold War, edited by Xenia Vytuleva, NY: Columbia University, 2011.
14 Cornelia Vismann, Files: Law and Media Technology, Stanford University Press, 2008.

The Socialist regime has introduced one more exhilarating and somewhat poetic version of cartographical camouflage – being secret, as hidden under natural water forces.[15] This seems to be a particularly complex case of data concealment, as it involves the reverse logic of migrating metaphors: not from military – to art, but from art history – to military. As many other non-logical cultural phenomena in the USSR hiding under the waterfront went by a joke of hunters and fishermen 'If you want to find the secret – find the map'. Indeed, if one would want to go fishing or hiking, one would need to operate with a special classified map, or otherwise risk being misled by a vast number of fictional waterfronts. Searching for the waterfront often ended up finding concrete perimeters and military checkpoints. Fishermen and hunters never followed officially printed maps. Rather than purchasing a map, they would rather craft a map of their own. Any waterfront for them signalled suspicion and anxiety. Lakes, rivers, and shorelines formed the core tradition of Soviet imagery security. A waterfront would immediately be associated with the close proximity of a secret zone, it was a synonym of danger and pure enigma. Curiously, in the era of Google Earth, the magical function of fake waterfronts would be replaced by the new generation of the ephemeral: namely constant clouds. Until 2013, these clouds never moved. They could be only replaced by another type of cloud. A spectacular palette of geographical concealment varies from – Spindrift clouds, Cumulus clouds or most commonly – the Cirrostratus – thin, high-level lane of clouds, forming the blinding veil above strategic domains. Thus, Google Earth's double / *doppelgänger* planetary body reinforced this mytho-poetic of secret military spaces and cancelled geographies. I would argue that it also signals an inevitable transference on the level of a secret zone as a myth. For instance, Novouralsk, the secret city for Nuclear Production in the middle of the Urals range, with a population of more than one hundred thousand inhabitants was one such case. Unlike Sarov, it was simply deleted. For many years its territorial presence in official maps was covered by the blue depth of a perfectly shaped lake.

There is another scenario of reading this saga of concealment. In this 'fantasy of an intimate globe', to use Vittoria di Palma's definition, one could talk of a bizarre geopolitical battle between the regulatory principles of visual apparatus.[16] Unlike China, the USA, North Korea, and Israel, operating with more abstract and techno-based imagery: pixilation, blurring, or black striping, post-Soviet military intelligence, is persistently referring to the tradition of covering the enigmatic terrains with liquid droplets and frozen crystals – the non-moving clouds.[17] This ephemerality and subjectivity has its own history; it can be traced back to the crepuscular iconography of romanticism – the 'New Technological Sublime'.[18]

15 U; Lab ST. See Katya Larina, *ZATO: Soviet Secret Cities of the Cold War*, edited by Xenia Vytuleva, NY: Columbia University, 2011.
16 On aesthetic of Uncertainty see, Vittoria Di Palma, "Blurs, Blots and Clouds: Architecture and the Dissolution of the Surface", AA Files#54, London, 2012
17 X. Vytuleva, On secrets and Clouds, in Secret Zones, Communicating knowledge through invisible terrain, Conference Paper, ETH Zurich, 2017
18 On the emergence of the "New Sublime" see: Marco di Michelis, Il sublime è ora / The Sublime is Now, Taschenbuch, 2008



A speculative view of Boley, Oklahoma.
Model constructed by Jared Macken with the assistance of Hulen Howard, 2022.

Jared Macken (Oklahoma State University)

Reconstructing the Speculative History of Boley, Oklahoma an All-Black Town in the Prairie

We lie, as Emerson, said, in the lap of an immense intelligence. But that intelligence is dormant, and its communications are broken, inarticulate and faint until it possesses the local community as its medium.[1]

Change life! Change Society! These ideas lose completely their meaning without producing an appropriate space. A lesson to be learned from soviet constructivists from the 1920s and 30s, and of their failure, is that new social relations demand a new space, and vice-versa.[2]

If you want to see what this nation is all about, you have to ride the rails. Look outside as you speed through, and you'll find the true face of America. It was a joke, then, from the start. There was only darkness outside the windows on her journeys, and only ever would be darkness.[3]

RADICAL SOCIAL SPACE IN THE MIDDLE OF THE PRAIRIE

In response to the peaceful protests after George Floyd was murdered in the spring of 2020, and conversations about the history of systemic racism in the United States, the State of Oklahoma passed House Bill 1775 banning Critical Race Theory (CRT) in classrooms. While CRT is not a part of most curriculums affected by this bill, its rhetoric makes it clear that lessons dealing with Oklahoma's racial history are not welcome. The historical record, however, shows that Black citizens have influenced the development of the state. In fact, just a little over 100 years ago, before Oklahoma was a state, there was a political movement led by the Black lawyer and politician E. P. McCabe to make this land, what was known as 'Indian Territory,' the All-Black state of Lincoln. McCabe's idea was inspired by the emergence of over 50 All-Black towns that formed by 1903 as former slaves of Native American nations were freed by emancipation and acquired land from those tribes.[4] The State of Lincoln would have ensured these segregation

1 John Dewey, *The Later Works of John Dewey, Volume 2, 1925–1953: 1925–1927, Essays, Reviews, Miscellany, and the Public and Its Problems* (SIU Press, 2008): 17.
2 Henri Lefebvre, *The Production of Space* (Wiley, 1992).
3 Whitehead, Colson. *The Underground Railroad.* Doubleday, 2016.
4 'All-Black Towns | The Encyclopedia of Oklahoma History and Culture,' accessed August 30, 2022, https://www.okhistory.org/publications/enc/entry.php?entry=SE017.

laws were banned, but in 1907 the State of Oklahoma was established, abandoning McCabe's vision by enacting its first segregation law with State Senate Bill One.[5] Earlier the same year, the Black author and educator Booker T. Washington published an article about visiting the All-Black Town of Boley located in the middle of the prairie. He arrived by the Fort Smith and Western Railroad and describes stepping into a bustling town of over 2,500 inhabitants. The article extols the ideals of the town while marvelling at its success, a cosmopolitan refuge with amenities that included a school, colleges, grocers, doctors' offices, banks, two cotton gins, and community meeting spaces. As he strolled through the main street in the centre of the town, Washington described a robust social space that acted as a physical representation of its citizens' ideals, a literal and metaphoric symbol of the community's unity. Boley's guiding ideology of 'moral, industrial, and political freedom' for Black citizens was radical and defied racial politics.[6] These two aspects of the town: its social space and ideology, can be examined through the architectural form of its main street.

In the spring of 2020, I was a new faculty member at Oklahoma State University developing an elective course in the school of architecture that explores how rural towns and cities from the state relate to urban history.[7] Boley, and its neighbouring All-Black Towns have become an important part of this research. This past summer I started collating data collected from this course, including an incomplete axonometric drawing of Boley's main street inspired by Washington's article. The drawing was incomplete because while we were able to trace its history through data—such as census reports, fire insurance maps, newspaper articles, and historical accounts—there is very little photographic evidence that helps us see the architectural form described by Washington's article. To compound this problem, All-Black towns declined during the Great Depression and the rise of industrial agricultural practices, leaving their main streets in ruin. However, this past summer I realised that the most important digital resource collected was Washington's article, given its complex description of the town's social space. Utilising tools of architectural speculation observed from architectural discourse, an image of the town visited by Washington was explored through the act of model making. Speculative urban figures emerged through these models, creating images of the town that were based on data but projected alternate histories inspired by the article. Given the attempts to suppress elements of this history in Oklahoma today, including and analysing the All-Black Town, Boley included, is integral to a holistic architectural discourse.

5 'Senate Bill One | The Encyclopedia of Oklahoma History and Culture,' accessed August 30, 2022, https://www.okhistory.org/publications/enc/entry.php?entry=SE017.

6 Booker T. Washington, 'Boley, A Negro Town in the West, 1908,' *Outlook*, January 4, 1908, 28–31.

7 The course utilizes analytical methodologies pulled from the discipline of architecture's discourse on the city in order to examine these towns. For instance, a few of these sources include: Fumihiko Maki and his argument for reimagining the architectural object as a 'collective form'; Robert Venturi and Denise Scott-Brown's use of pop culture and the 'everyday' as a source of architectural antecedent; and Piranesi's reconstruction of fragmented maps of the Campo Marzio to initiate methods for speculating about new urban figures.

BOLEY'S RADICAL IDEOLOGY AND ORDINARY FORM

Boley is an important case study in my course and was an important destination for Booker T. Washington because it was a significant haven for its town's founders and also other Black Americans fleeing segregation laws in adjacent states. The town as an urban form provided an environment of social equity that eased the daily psychological and physical trauma that came from living in white cities during the Jim Crow era. Inhabitants described All-Black Towns as strongholds of freedom that provided 'community, comfort, easier living, and strength' for their citizens.[8] In comparison, outside these towns they found 'danger, disorientation, and unease'.[9] As a result, All-Black Towns became a 'utopian movement' that created 'idealised places where Blacks could be free,' an idea that unified their citizens around this simple yet radical ideology of freedom.[10] It is important to understand the architectural form used to create this space. What is compelling in the case of Boley is that, in contrast to its radical ideology, the town's physical manifestation was the ordinary main street. Through this ordinary form and the individual architectural parts that comprise it, the citizens of Boley were able to both 'Change Life!' and 'Change Society!' and in the process create a meaningful and intentional social space.[11] Boley subverted the laws of segregation at the time by forming a metaphorical Black 'bastion'—a space that by-passed the ways social segregation limited the success of the citizens it affected—but by realising its physical form as a typical main street.[12]

Boley's radical ideals were manifested through the simplest instantiation of the main street typology: a single linear street open at the ends and lined by flat store fronts.[13] The aligned fronts created a long collective wall that unified business owners into a canyon-like space that spanned the length of the street. The repeated fronts created a pact of formal unity between neighbouring stores that allowed for small moments of differentiation through signage and parapet wall shapes, creating a street that was a monument comprised of individuals. Each side of the street faced the other, creating a street form that emphasised its inhabitants and therefore the ideals that unified them. In addition, the banal and unassuming architectural features of the typical main street, such as awnings, entrance niches, marquees, and sidewalks connected the storefronts. These connections generated the town's social spaces, or locations where its radical ideals took place through bustling street interactions.

8 Karla Slocum, *Black Towns, Black Futures: The Enduring Allure of a Black Place in the American West* (Chapel Hill: University of North Carolina press., 2019): x Preface.

9 Slocum, *Black Towns, Black Futures*, x Preface.

10 For many examples of how All-Black towns changed the fabric of society, look at Karla Slocum's *Black Towns, Black Futures*.

11 Henri Lefebvre, *The Production of Space* (Wiley, 1992).

12 Tolson, Arthur L. "BLACK TOWNS OF OKLAHOMA." *The Black Scholar* 1, no. 6 (1970): 18–22.

13 The main street takes many different shapes in Oklahoma towns, including the common courthouse square where aligned store fronts form a square around a central courthouse. Main street can also be cordoned off at the end with a monumental structure, as is the case with many mining towns that were estabilshed around the same time as Boley. Each of these different types of main streets relates to different ideologies, each of which unified their communities.

A FRAGMENTED DIGITAL ARCHAEOLOGY

Today, all that exists of Boley's physical form are a few remaining store fronts. The town Washington visited can only be experienced through scattered digitised data that was collected by government agencies, historical museums, and libraries. While this data helps describe Boley's characteristics, it does so through hyper-specific points of view that are never unified through a single image or data set, thereby fragmenting the narrative of the town. Internet-accessible archival photographs and fire insurance maps work interchangeably to describe the physical form of the town, but only provide a glimpse of the street. What is left is a fragmented digital archaeological site where a complete view of the town cannot be accurately depicted through data alone, and a single archival image could never capture every characteristic of the street. Boley's dynamic main street can only be partially reconstructed unless the gaps are filled in by the imagination.

This condition of historical fragmentation is common within All-Black communities including the Greenwood Neighbourhood of Tulsa, Oklahoma, a sister community to Boley. In 1921, the community's main street was targeted and burned to the ground by a white mob. Information about the tragedy was intentionally suppressed over the years. Awareness of this tragic event has emerged recently through the tireless work of Tulsa residents who partnered with local and national academics who have researched, located, archived, and digitalised many artefacts that bear witness to this history. This awareness has created projects that ensure these events will be remembered and will remain a part of the history of the city. The sheer amount of data generated is difficult to comprehend and arduous to organise, but an interactive New York Times article reconstructs a virtual drive through Greenwood, retelling the history with image and text, a complete multi-media experience.[14] Forensically reconstructed projects like this become essential resources that organise and communicate once fragmented historical data about historically segregated and suppressed communities like Greenwood. However, they do not speculate about how the social and political ideas of the communities from these histories were represented through the architectural forms that made them possible, such as the main street. Data must be unified through different methods for this to take place.

DIGITAL FRAGMENTATION AND SPECULATIVE ALTERNATE HISTORIES

Data fragmentation can also be reversed through the act of creating alternate histories through creative speculative methodologies. Take for instance Colson Whitehead's book *The Underground Railroad* which retells the stories of African American slaves escaping the horrors of the antebellum south but imagines the underground railroad was literal, an actual system of trains that transported slaves from southern states to northern free states. Whitehead uses this one simple change in the fabric of historical space-time, and the idea that the train's secret was known only to its passengers, to transform factual events into a fantasy. The result is a speculative history that uses the literal underground railroad to blur the boundaries between invented fictional scenarios and actual events in the historical record. Invented speculative history is able to unite fragmented data in order to imagine the important but lost interactions between characters, places, and events.

Similarly, Boley's narrative can be pieced back together, but instead of accomplishing this through literature, it can occur through speculative architectural model making that arranges the scene for alternate histories. By isolating, exaggerating, and then rearranging specific ordinary architectural parts found in Boley, and then rearranging them into new speculative urban figures that are guided by alternative historical scenarios, the fragmented digital archaeology of Boley can be imagined. For instance, one scenario imagines the town arranged in a linear fashion like the original, but with certain elements isolated and exaggerated in different parts of the street, emphasising the role each plays in creating social space. Another imagines that state segregation laws became more stringent, threatening the well-being of the town. In this case the town could react by creating a more insular urban form akin to a fortified city, making it a literal bastion for Black progress. The linear street is kept intact, emphasising the town's ideals all the same, but a new figure occurs at the back of the main street properties. A final scenario imagines the street as if its citizens were no longer affected by laws that limited their freedom, where a piazza-like figure balloons into the plan off the middle of the street creating spaces for new cultural events while still adhering to the formal constraint that fronts must align. While the rule of the fronts unifying the town is maintained, awnings, niches, and sidewalks are exaggerated and gain eccentricity, resulting in fictional spaces that imply new speculative historical events. The models create a hybrid between the limited number of photographs of main street, and Washington's article. These new artefacts in the form of alternate histories explore different ways the town's ordinary form and radical ideology can inspire speculative urban figures.

COUNTERACTING HISTORY SUPPRESSION WITH SPECULATIVE MODELS

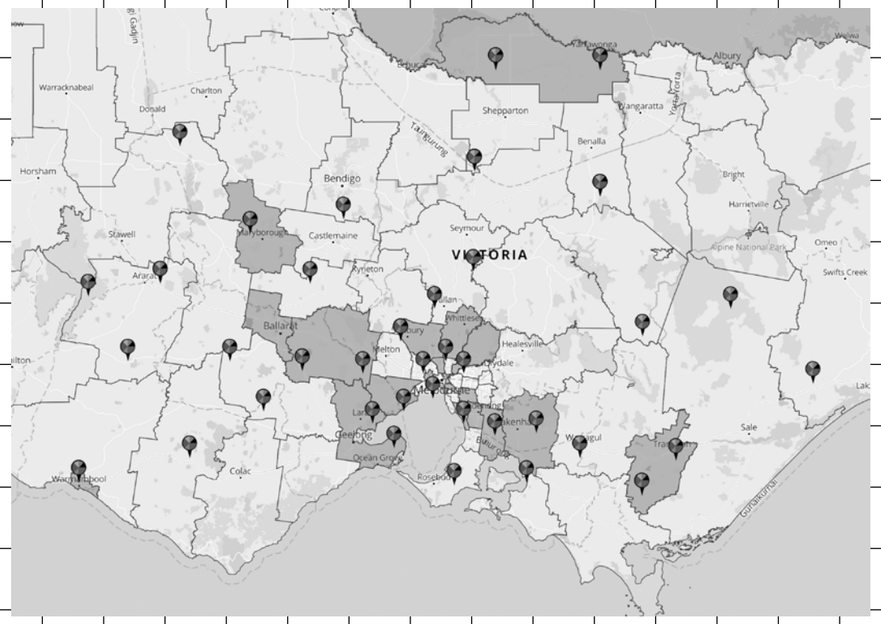
This use of the data from Boley, and Washington's article as a guiding inspiration, imagines spaces where new historical scenarios could take place. This allows the town not merely to be reconstructed as the archival images already depict, but to highlight moments where the radical nature of the town's narrative can realise new cultural spaces. New urban figures like cultural plazas start to undermine the ordinary nature of the unified linear main street while the intellectual ideas of the town are allowed to grow and create a dialogue with other projects on the city. An alternative

14 "What the 1921 Tulsa Race Massacre Destroyed," The New York Times, accessed September 5, 2022, https://www.nytimes.com/interactive/2021/05/24/us/tulsa-race-massacre.html.

speculative history could include a scenario that no longer requires the town to be a bastion of Black life, but an urban form worthy of comparison with other historical examples from the canon of architectural thought so that it becomes a model for use within discourse on the city.

These models also imagine that Boley *intentionally* cloaked their radical ideology in ordinary form—a tactical use of the linear main street as a way of undermining the strategic segregation embedded in Jim Crow laws.[15] By intentionally not constructing an architectural spectacle, their idyllic utopian society in the middle of the prairie was able to counteract racial and social politics. It was through the ordinary everyday life represented by the inhabitants of Boley that new architectural spaces were created by using typical elements of the main street. In the process, the town's ideas, or the 'immense intelligence' of its burgeoning citizenry, was instrumentalised in the lives of its community.[16] Citizens raised in Boley have made lasting contributions to society, and it is argued that this is a direct result of the utopian qualities the town brought to its inhabitants.[17] The resources of the town made this possible by creating a space that was not haunted by racial segregation. Now that the story of towns like Boley are starting to be told, we can ensure they are not forgotten by integrating them into the culture and discourse of the city.

15 Certeau, Michel de. *The Practice of Everyday Life*. University of California Press, 1988: XV-XVII.
16 John Dewey, *The Later Works of John Dewey, Volume 2, 1925–1953: 1925–1927, Essays, Reviews, Miscellany, and the Public and Its Problems* (SIU Press, 2008): 17.
17 Slocum, *Black Towns, Black Futures*, 4.



A screenshot of YourGround: a crowdsourced mapping tool designed for women and gender-diverse people in the state of Victoria in Australia to anonymously share their safety-related recreation experiences of public spaces. Image by author.

Nicole Kalms and Timothy Moore (Monash University)

Smart Cities? Try Harder with Gender-Sensitive Data

'I am being held by the TSA in Orlando because of an "anomaly" (my penis)' tweeted Shadi Petosky on September 21, 2015. She was told to get back onto the airport security scanner as a man or 'it was going to be a problem'. She was then patted-down, surrounded by seven people, and detained for forty minutes before missing her flight and then being asked to leave the departures area.[1] Mis-gendering, evasive pat-downs and the forced exposure of bodies are an everyday occurrence for queer, trans-, intersex and gender-nonconforming people passing through airports. Cis-normativity is built into the body scanner at the security checkpoint where UI design is limited by binary gender and body shape. The system makes a binary decision about someone's gender based on their anatomy. Designer Sasha Costanza-Chock, who has shared their own experience of security checkpoints in the book *Design Justice*, writes that norms, values and assumptions are encoded and reproduced through the design of socio-technical systems.[2] Inequality can be built into technology.

There is increasing reciprocity between the material environment and sensing systems, which shape cities and citizens in real-time. Data produced by individuals is expanding on a planetary scale with the activities of everyday life generating significant amounts of data: web searches, travel, shopping, communication, social media, and body surveillance. The phalanx of data produced, gathered and interrogated is creating new landscapes of information and modes of behaviour. At best, big data can help empower citizens to address immediate urban problems. At worst, data can perpetuate bias and disadvantage. The formation of data, and its biases, is important to consider before transforming data into shaping places and buildings.

GENDER BIAS AND COUNTER-METHODS

Gender bias in data is everywhere. Bias can emerge when those who collect and analyse data are from a dominant group—meaning that the collection of data may be 'unrepresentative' or that some data may 'never get collected at all'.[3] This is evident in the creation of data fields. Most policy frameworks relating to data do not set a minimum definition for sex and gender fields (especially across urban governance, policing, public transport and community

1 Margarita Noriega, "Transgender woman live-tweets her expulsion from Orlando airport," *Vox*, published September 22, 2015, from https://www.vox.com/2015/9/21/9367327/transgender-shadi-petosky-twitter-orlando-airport.
2 Sasha Costanza-Chock, *Design Justice: Community-Led Practices to Build the Worlds We Need* (Cambridge, Massachusetts: The MIT Press, 2020).
3 Catherine D'Ignazio and Lauren Klein, *Data Feminism* (Cambridge, Massachusetts: The MIT Press, 2020): 28, 23.

projects). Disaggregation by sex alone is insufficient; additional indicators should reflect the community-specific priorities including age, disability, ethnicity, gender, geographic location, income, indigeneity, migratory status, race, religion and sexuality. The omission of who and what to count is a considered decision.

These biases are evident in the disciplines of urban design and architecture where data production can make an assumed universal idea of how people experience buildings and places, which, in general, defaults to the experiences of men. Research suggests that most designers will simply default to their own 'world-view' or attitudes and preconceptions that deliver solutions that favour men's preferences.[4] In this sense 'failing to include the perspectives of women is a huge driver of unintended male bias that attempts (often in good faith) to pass itself off as "gender neutral" and is a form of discrimination against women'.[5] For example, while cities are building an information rich footprint from 'an extraordinary number of people carry around a powerful mobile device',[6] this can create a biased footprint as women, gender diverse people and marginalised communities more broadly are less likely than men to access information communication technology (ICT) and the World Wide Web (www) and—with an over-emphasis on ICT—this excludes a significant number of voices. Some stories will not be gathered, some people will be left out, and some may feel misrepresented. In the worst-case scenario, it is possible that some discrimination towards people may be deepened while others will benefit.

Queer and feminist methods of data collection, visualisation and analysis have emerged to address gender and sexual identity bias.[7] Translating this literature to the disciplines of urban design and architecture, queer and feminist methods could mean many things: making the field of data research more welcoming to women, gender-diverse people and the LGBTIQ+ community; it could mean undertaking data research with these marginalised communities to assist in making spaces, buildings and places that are safer and symbolic for them; or it can mean challenging the orthodoxy in which data research is undertaken.

Monash University's XYX Lab has been undertaking data research of gendered experiences in the urban environment since 2016. Through this work, we have identified several feminist and queer methods through literature and fieldwork. First, the collection of the stories of women, gender-diverse people and the LGBTIQ+ community is integral as inadequate

4 Clara Greed, "Overcoming the Factors Inhibiting the Mainstreaming of Gender into Spatial Planning Policy in the United Kingdom", *Urban Studies* (Edinburgh, Scotland), 42(4), (2005), 738.
5 Caroline Criado-Perez, *Invisible Women: Data Bias in a World Designed for Men* (New York: Abrams Press, 2019): XIII.
6 Scott Hawken et al., "Safer Cities for Women: Global and Local Innovations with Open Data and Civic Technology" in *Open Cities | Open Data*. eds., Scott Hawken, Hoon Han and Chris Pettit (Singapore: Palgrave Macmillan, 2020): 86.
7 See Kevin Guyan, *Queer Data: Using Gender, Sex and Sexuality Data for Action* (London: Bloomsbury Publishing, 2022); Koen Leurs, "Feminist data studies: using digital methods for ethical, reflexive and situated socio-cultural research", *Feminist Review* 115, no.1 (2017): 130–154.

participation from marginalised groups can result in the reinforcement of power imbalance and discrimination. Yet, simply collecting data to address power imbalances is not enough, which leads to the second point. Data must deal with the issues of marginalised communities moving from the notion of 'data about us' to ensure that the priority is 'data for us'.[8] Third, people should have the agency in the process: they should be able to choose how to self-identify in data collection because "the most authoritative voice, when speaking of a person's gender, is one's own".[9] They should also choose when and how they share noting that identity may change across time, culture and communities. Fourth, data should be open-source, including being available for the people who share information. This counteracts an impetus with big data that can be used for commercial agendas, which may result in information not being transparent and accessible.

DATA *ABOUT* US

People need to see themselves in data. This was the impetus for the project HyperSext City, instigated by Monash University's XYX Lab during 2021 in Australia, which investigated the intersection of sex and gender with the built environment through the form of storytelling as a travelling exhibition with an online repository. The main feature of the exhibition is the display of statistics and quotes from research reports and peer-reviewed sources collected from communities, researchers and individuals across the globe, which appeared on gallery walls in Sydney (Tin Sheds, 2021) and Fremantle (PS Art Space, 2022) as duotoned graphics. Examples of the statistics displayed include: Sixty percent of women in Egypt have experienced street-based violence perpetrated by men over their lifetime[10]; in Mexico City almost sixty percent of women surveyed by the National Institute of Statistics and Geography had been groped in public spaces[11]; seventy-two percent of Australian LGBTIQ+ people have experienced verbal abuse.[12] This highlights the first point that the collection of the stories of women, gender-diverse people and the LGBTIQ+ community is core to challenging discrimination.

Hypersext City addresses the first critical point that data should be about us; however, 'data about us' is not enough. The collection and analysis of data must move to 'data for us' through dealing with social issues of marginalised communities, and to shepherd those communities to have agency in the process of data collection, such as to self-identify and choose what and when to share information, and to access this information.

8 Kevin Guyan, *Queer Data: Using Gender, Sex and Sexuality* Data for Action, 13.
9 Lo Marshall, "Negotiating gender-diverse realities built on binary expectations: public toilets in Britain" in *Contested Cities: Design and the gendered production of space*, eds., Jess Berry, Timothy Moore, Nicole Kalms and Gene Bawden (London: Routledge, 2021) 216.
10 Shereen El Feki, Brian Heilman and Gary Barker, eds, *Understanding Masculinities: Results from the International Men and Gender Equality Survey (IMAGES)—Middle East and North Africa: Executive Summary* (Cairo and Washington, DC: UN Women and Promundo—US, 2017): 87.
11 Instituto Nacional de Estadística y Geografía, *National Survey of Victimisation and Perception of Public Safety* (Aguascalientes, Mexico: INEGI, 2013).
12 Alan Berman, *Speaking out: Stopping Homophobic and Transphobic abuse in Queensland* (Melbourne: Australian Academic Press, 2010).

Hypersext City begins to meet this challenge through making the repository available and open for further contributions. The HyperSext City repository is a resource for scholars and communities – inviting audiences to submit research via a simple, user-friendly web interface and contribute to this ongoing project. The curation of the statistic occurs across architectural typologies (for example: recreation spaces and public toilets) and can be filtered for intersectionality (such ethnicity, religion, age and socio-economic group). The repository allows the user to search for specific issues (for example gender-based violence, law and policy). By filtering the content for various strategies, audiences can access peer-reviewed and evidence-based research about how to address gender inequity in public spaces. This dynamic resource (and the companion exhibition) builds a resource for accessing insights into global gender injustice.

DATA *FOR* US

Another example of collecting the data of marginalised voices is YourGround, a project conceptualised by Monash University's XYX Lab and CrowdSpot to crowdsource perceptions of safety by women and gender-diverse people. YourGround invited these groups to share their experiences on a digital mapping platform. The data was crowdsourced from April to July in 2021, and its collection was assisted by its promotion by 23 municipal government partners and state organisations that recruited participants through social media posts; direct emails to community group members; posters and flyers in English and seven other languages; footpath decals, billboards and paste-ups; and through digital media, such as radio and Spotify ads alongside TV and radio interviews. The use of crowdsourced mapping (crowd-mapping) in YourGround is a method for deepening understanding about the experiences of marginalised people in the urban environment.

Recognising that women, gender-diverse people and the LGBTIQ+ community have been historically excluded from urban discourse, the opportunity provided by crowd-mapping is to draw out issues specific to marginalised people, which is integral in creating 'data for us'. Over the thirteen-week period of collecting data, around 6,000 submissions were made in the form of 'safe' and 'unsafe' pins, comments about those pins, and clicking of the support button on a pin. This was augmented by working with local community organisations to undertake outreach working one-on-one with people to enter their data via ipads) The placement of an 'unsafe' pins locates in areas in need of immediate attention, and also the specifics of what spatial and behavioural conditions make people feel 'unsafe'. One user stated:

> *This bridge crossing and the surrounding path on either side of the bridge is so dark it's hard to see anything further than 100m. I feel very uncomfortable riding through there at night because anyone could be there and I wouldn't know. I've taken longer routes in the past to avoid it. I most definitely wouldn't walk there at night. (20–24 years old, Female, LGBTIQ+)*

The 'safe' pin demarcates positive spaces and when collated and synthesized alongside other stories can indicate positive initiative of local communities. One user said of a local park:

> *I walk through the gardens on my way home sometimes and the paths are well lit, you have good sight lines and given the amount of traffic around the boundaries of the park, there are almost always people around (50–54 years old, Female, LGBTIQ+).*

Collecting data to address power imbalances, such as these stories, however, is not enough. A criticism of queer methods (that also holds for feminist methods) is that 'The use of data to increase and diversify representations of LGBTIQ+ people promises much but, on its own, is not an outcome that necessarily addresses injustice'.[13] Data is only useful if made visible and then used to leverage change. This ensures data about women and gender-diverse people, and for the LGBTIQ+ community, 'is used to construct a social world that values and improves the lives of' those people.[14] This is addressed in YourGround with its stories being collated with access high-quality data and insights for local governments to access that would normally be outside of their budget. YourGround builds into its reporting recommendations to make material improvements to community spaces through site-specific understandings. The insights from the YourGround project have reinforced that there is not a single way to design safe, inclusive spaces. Rather, a multitude of factors must be nuanced for particular communities and their needs. From this, municipal governments can use YourGround data to make well-informed decisions that will make recreation safer, more accessible, inclusive and equitable for women and gender-diverse people.

Through crowd-mapping, YourGround has also enabled individuals, in particular, those who are frequently marginalised and not specifically addressed in public place-making, to have a voice, and have agency in the information that they wish to share, when they wish to share it, and how they wish to self-identify. This reinforces the third point that people should have agency in the process. Through testimony, the statement or recollection of a witness, it establishes the witness as an autonomous subject rather than a silenced victim.[15] YourGround also addresses the fourth point that data should be accessible with this information being available online (and collated into a report) after the data collection period had closed.

The ways that data is collected, and the tools, technologies and methodologies used to extract insights, can shape critical information for decision making. Providing an understanding and representation of the lived experiences of marginalised communities, as demonstrated by XYX Lab's Hypersext City and YourGround projects, is integral to meeting the rights and needs

13 Kevin Guyan, *Queer Data: Using Gender, Sex and Sexuality Data for Action*, 19.
14 Ibid.
15 Johanne Bøndergaard, *Forensic memories: after testimony* (Lund: Centre for European Studies at Lund University, 2014).

of women, gender-diverse people and the LGBTIQ+ community. If places and buildings are to engage with inclusive frameworks, they must critically consider the methods and approaches to data collection that can challenge sexuality and gender bias to counter various patterns of discrimination.

Traffic control police cabin turned into a press kiosk in Ponte de Lima, Portugal (built c. 1940).
Photo by Ricardo Costa Agarez, 2022.

Ricardo Costa Agarez and Diego Inglez de Souza (University Institute of Lisbon)

Collective Storytelling of Common Architecture: *Arquitectura Aqui* in Portugal and Spain

INTRODUCTION

Digital archives can be open laboratories for knowledge production and for new forms of intellectual and cultural examination of the built environment. Open is the key qualifier here: Open to whom? Whose archives are these? Who are their gatekeepers? What content are they open to? Does open access, on its own, guarantee the creation of a meaningful laboratory for knowledge production? Can the production itself be open? Knowledge of architecture and the built environment is generally narrow and exclusive: for the twentieth century, much of the research and writing behind it is based on canonical works (most in the 'global North') and very little on the common buildings and ensembles that frame community lives in unassuming ways—'common' objects both in that they were meant to serve collective purposes and have not been seen, in art-historical, style-focused readings, as deserving attention. Even canonical works are largely narrated in specialised dissemination forums, confined by the rarefied language of experts. If storytelling avant-garde buildings to 'lay' audiences is a challenge for most, how about more mundane structures? Common pieces of public infrastructure are, in fact, seldom seen as architecture at all in most contexts, even by designers. This widens the gap between the world of architects and the communities they exist to serve—a gap that has recurrently assailed the conscience of architectural thinkers, from contextualists to postmodernists and beyond.

We believe that digital archives constructed as open laboratories for knowledge production can help bridge this gap and bring architecture closer to communities, if they are collectively generated: the paper discusses this possibility, its promise and challenges, based on a concrete example. Our research, dissemination and public engagement project *Arquitectura Aqui. Community, Proximity, Action: Housing and Collective Facilities in Portugal and Spain 1939–1985* is grounded on a purpose-built digital archive: a new open-access information system where existing data (historical, material, technical and socio-cultural) is collected from mostly analogue, national, regional and local sources, filtered and combined in novel readings using layperson-friendly language and turned into storytelling vignettes about communities and their built environment. This ongoing collective effort in architectural and urban history making and dissemination incorporates contributions from local actors—users, promoters, enablers

and researchers—and seeks to respond to their input and concerns. Our focus on common objects aims at extending the use life of sturdy, pragmatic buildings that fulfil the essential needs of historically deprived groups in villages on remote locations that experienced desertification and deindustrialisation processes and towns in metropolitan and coastal areas. We approach communities comprehensively, investigating every building or space dedicated to collective use and lowest-income rehousing estates, built within the proposed time frame through public (state or local) commission and/or funding. Seeking to avoid a patronising stance and conventional value-granting hierarchies, we co-create this history with community members to encourage its appropriation and inform local management, retain and reuse initiatives, countering the unsustainable, resource-exhausting trend to pull down and replace these structures that is still prevalent in Portugal and Spain.

ON *ARQUITECTURA AQUI*

In this paper, we present the tenets and lines of development of our ongoing research projects—under the common header *Arquitectura Aqui* (*Architecture Here* in both Portuguese and Spanish)[1]—while questioning their potential, limits and challenges, at a moment when we prepare to test our ideas in loco, with fieldwork set to begin in the coming months.

Four key concerns underpin *Arquitectura Aqui*:

1. How can we, as historians and thinkers of architecture and urban design, foster a more sustainable built environment? A critical approach to the often fluid notion of sustainability in built environment production processes in the 'developed' world is, we believe, dependent on a heightened conscience of the need to retain and reuse existing building stock before building anew—the need to extend, through repurposing, reappropriating and maintaining, the 'use life' of buildings and ensembles.[2] Portugal and Spain—where modern essential needs were met with the slow-pace provision of basic infrastructure and collective-use facilities throughout the twentieth century—appear as a relevant field of enquiry into how buildings erected with considerable effort in what were then 'developing' countries, can be reassessed and reconciled with contemporary requirements through the prism of critical sustainability.

2. How can we nurture more resilient communities—i.e., less reliant on dwindling public resources to erect new structures and better prepared to address present and future needs with initiatives focused on managing the building stock that is already there? We suggest that constructing a solid knowledge base about this building stock is an essential step in supporting well-informed, sustained participation and engagement by local communities in management actions. This effort will be more effective if such a knowledge base is constructed together with communities: as Chris van Empel noted, communities become interested in built environment management processes once 'their involvement is encouraged by stimulating information, and expertise is provided to support their contributions.'[3]

3. How can we help make architecture and urban design more socially relevant? In other words, how can we contribute to reconnecting the discipline and everyday needs, widening the relevance of the profession to society at large? In contemporary Portugal and Spain, the distance between the two increases, just as the two countries become relevant in architecture's global dissemination circles through the fractional output of a celebrated few; the everyday production that most intensely affects people's lives and escapes publication is blanketed over as low-quality by the metropolitan architectural elite.[4] Many Iberian citizens, meanwhile, tend to associate architecture with high-profile schemes (conference centre, townhall, courthouse) and less so with their proximity facilities (health centre, retirement home, fire brigade station).

This is detrimental to both architecture and society. One way to counter it, we posit, is to shed light on the immediate context of everyday life, its more mundane objects, seeing unassuming, bureaucratic and even 'ugly' buildings as architecture deserving to be considered and discussed: in short, *Architecture is Here*, all around us. We—those who think about the discipline's place in the world—need what Joan Ockman called a 'critique of normative architecture' to mend 'the breach between theory and practice' and overcome the discipline's marginalisation: in 'allying itself with avant-garde projects rather than addressing itself to issues of normative practice,' Ockman noted, architectural theory 'has too long evaded the challenge of taking

1 *Arquitectura Aqui. Comunidade, Proximidade, Ação: Habitação e Equipamento Coletivo em Portugal e Espanha 1939–1985 / Comunidad, Proximidad, Acción: Vivienda y Equipamiento Colectivo en Portugal y España 1939–1985* is the public name of two research projects: *ReARQ.IB—Built Environment Knowledge for Resilient, Sustainable Communities: Understanding Everyday Modern Architecture and Urban Design in the Iberian Peninsula (1939–1985)*, funded by the European Research Council (Starting Grant GA949686) and hosted by Iscte—University Institute of Lisbon, Portugal (PI Ricardo Costa Agarez, researchers Catarina Ruivo, Diego Inglez de Souza, Ivonne Herrera and Sheila Palomares); and *The Architecture of Need: Community Facilities in Portugal 1945–1985*, funded by Fundação para a Ciência e a Tecnologia (PTDC/ART-DAQ/6510/2020) and hosted by Évora University, Portugal (PI Ricardo Costa Agarez, researchers João Cardim, Rita Fernandes, Sofia Diniz and Tânia Rodrigues).

2 There is by now substantial literature on the topic of Retain & Reuse applied to built environment production processes. For a recent, concise overview, see David Cheshire, *The Handbook to Building a Circular Economy* (London: RIBA, 2021). For a specific exemple that materialised some of these tenets—the award-winning 'metamorphose' of the Tour Bois-Le-Prêtre in Paris by Druot, Lacaton and Vassal—see Frédéric Druot, Anne Lacaton and Jean-Phillipe Vassal, *PLUS—Les grands ensembles de logements—Territoires d'exception* (Barcelona: Gustavo Gili, 2004).

3 Chris van Empel, 'The Effectiveness of Community Participation in Planning and Urban Development', *WIT Transactions on Ecology and the Environment* 117 (2008), 549–556 (549).

4 A position made clear, for example, in a recent report on the state of affairs in Portuguese architecture commissioned by the national research council: Fundação para a Ciência e a Tecnologia, *Agenda Temática de Investigação e Inovação: Arquitectura Portuguesa* (Lisboa: FCT, 2019).

on the real and pressing problems of the designed environment'.[5] While Ockman wrote from a specific academic and economic (North American) context, we borrow her proposition to address what we see as a shortcoming of architectural culture in Portugal and Spain: investigating twentieth-century quotidian, collective-use buildings is one first step towards creating a critique and a theory of this architecture—and prompting practising architects, today, to engage with it more closely.

4. How can we understand differently and appropriate structures that are directly associated with a traumatic or controversial period of recent history, marked by radical shifts in political rule both in Portugal and Spain?

Our main question is, in short: How can architectural and urban history—of our closest, most essential and needed structures such as collective-use facilities and lowest-income housing, in this case erected between 1939 and 1985 in Portugal and Spain—be put at the service of more sustainable and resilient communities?

We believe that the answer to this question involves, among other tools:

1. The creation of a digital archive as an open laboratory for the collective production and dissemination of knowledge, accessible to different publics and constantly expanded.

2. The development of storytelling devices that combine our capacity to read the built environment as designers and thinkers (by reading we mean researching, analysing, describing, structuring a discourse and writing about buildings and ensembles) with the capacity of community members to read and elaborate on those structures in many ways other than these.

Not coincidentally, the objects that retain our interest—market halls and elementary schools, vicinity healthcare centres and retirement homes, post offices and cooperative facilities, low-cost rehousing estates; generally sturdy, concrete-framed, no-frills structures, many barely fifty years old—are repositories not only of energy and materials but also of local knowledge and (intensely) lived experiences. These mid-century buildings are 'perhaps the most unloved stock of buildings ever constructed', as Carl Elefante put it: yet saving the significant amounts of embedded energy they contain 'must play a role in curtailing climate change.'[6] Our research focuses on a period that coincided, in Portugal and Spain, with the generalisation of reinforced concrete, 'The most destructive material on Earth', to use the environment journalist Jonathan Watts' words.[7] Envisaging alternative futures for these structures, other than demolition and replacement, counters the planned obsolescence premise that, according to reinforced concrete critics like Sérgio Ferro and Anselm Jappe, was at the root of its development as a mass-construction technique.[8] The implications of this development were profound, as Jacques Fredet noted: reducing the estimated life of buildings turns them into mere functional implements that can be put aside once initial costs are redeemed; their embedded social content, historically a formative element of the city, disappears; the symbolic function of the built (latent of manifest) is often forgotten.[9]

Concurrently, while such facilities tend to fall outside of the established categories of historical, cultural or architectural significance (stemming from the traditions of historic preservation policies), they tend to bear testimony to important episodes, routines and even long periods of our daily lives: they are where we dwell, learn, meet, heal, trade, work, enjoy ourselves. They are condensers of common (as in both collective and unexceptional) life, consistently present, which makes them particularly relevant when we think of ways to engage and empower (for lack of a better term) communities and strengthen their stance in wider built environment valorisation initiatives.[10]

Furthermore, structures planned and built between 1939 and 1985 in Portugal and Spain witnessed a specific sequence of historic events whose consequences remain vivid in contemporary Iberian life. The end of the Civil War in Spain had this country join Portugal in establishing two of the longest-lasting dictatorship regimes in recent history, toppled by force (in Portugal) and attrition (in Spain) in the mid-1970s. Both countries then entered a stage of political transition and stabilisation (with the attendant late-capitalist formatting strategies) as a requirement for accession to the European Community, which materialised on 1 January 1986. Peripheral communities across the peninsula are largely served, to this day, by facilities erected through undemocratic processes, many of which dressed in the heavily decorated compositions commonly associated with the history-obsessed governments of Franco and Salazar: 1940s county jails (in Portugal) and Guardia Civil barracks (in Spain)—intimidating, sturdy and begging re-functionalisation—are possible examples among many. This brings another challenge to *Arquitectura Aqui*: politically-charged architecture—or perceived as being so in metropolitan views—needs to be addressed in a holistic approach where style is but one of the aspects discussed, and the values of use life and materiality gain relevance.

5 Joan Ockman, 'Toward a Theory of Normative Architecture', in *Architecture of the Everyday*, edited by Steve Harris and Deborah Berke (New York: Princeton Architectural Press, 1997): 122–52 (150).

6 Carl Elefante, 'Changing World, Evolving Value', *APT Bulletin: The Journal of Preservation Technology* 48, 2–3 (2017): 9–12 (p. 10).

7 Jonathan Watts "Concrete: The Most Destructive Material on Earth" The Guardian, 25 February 2019, https://www.theguardian.com/cities/2019/feb/25/concrete-the-most-destructive-material-on-earth.

8 See Sérgio Ferro, "Concrete as Weapon," *Harvard Design Magazine* 46 (December 2018) and Anselm Jappe, Béton — Arme de construction massive du capitalisme (Paris: Editions de L'échappée, 2020).

9 Jacques Fredet, Les Maisons de Paris: *Types courants de l'architecture mineure parisienne de la fin de l'époque médiévale à nos jours, avec l'anatomie de leur construction*, vol.1 (Paris: Editions de l'Encyclopédie des nuisances, 2003), 134–135, cited in Jappe, Béton, 84–85.

10 For broadening approaches to diverse built environment values, see e.g. Kathryn Rogers Merlino, '[Re] Evaluating Significance: The Environmental and Cultural Value in Older and Historic Buildings', *The Public Historian* 36, n.3 (2014): 70–85.

We are looking at a building stock that has been left out of current global efforts at the reuse of twentieth-century structures—Docomomo duly focusing on important pieces of modern architecture legacy, for example—in a context where that priority is still far. The construction industry being one of the key engines of the economy, in both Portugal and Spain (as an essential provider of low-wage employment), the newly built is still widely prevalent, and most reuse initiatives are only partly so, often narrowed down to maintaining the reinforced concrete structure and replacing everything else. The longstanding experience in northern and central Europe, now with reuse-first policies and circular economy principles increasingly in place, remains a distant reference.

In the cadre of our research and public engagement projects, we are purpose-building an online, open-access digital platform where existing data (historical, material, technical and socio-cultural) is collected from mostly analogue, national, regional and local sources, filtered and combined in novel readings using layperson-friendly language. This digital archive incorporates contributions from local actors—users, promoters, enablers and researchers—and aims to weave them into a form of co-written history: an account that seeks to avoid the top-down rigidity of academic knowledge flow (i.e., experts from Lisbon go and illuminate unknowing locals on the value of their built environment) and adopt a mutual learning stance instead. Being metropolitan based, we can access relevant information resources (archives and libraries) more easily than peripheral community members; as trained researchers and designers, we can critically analyse data and understand buildings (form, function, culture, history) in a serviceable way. We envisage a co-creation process in which we bring those two assets (hard data and critical analysis) to the community, share and expose them to debate; in exchange, we tap into the wealth of knowledge contained in the memory and experience of individuals and groups, as well as in the more conventional records (papers, iconography, film) under their stewardship. Collecting, accumulating and linking these heterogeneous contents in a relational and non-linear data system opens new possibilities for uncovering, reading and sharing fragments of these related histories, enabling users—experts, community members and the general public—to take an active part in determining the fortune of this building stock.

Arquitectura Aqui focuses not on objects or agents but on communities, taking their built environment and socio-cultural dynamics as the spatial and historical unit of enquiry.[11] These are our elected entry points, from which both our research method and the users of the digital archive branch off to discover buildings and ensembles, individuals and organisations, programmes and schemes, actions, projects and events that configured the community's built environment. Each item is supported by myriad resources (archive, literature and legislation readings; fieldtrip notes; photograph, audio and video records), all cross-referenced and individually searchable. One of our challenges is to turn this mass of information on seldom-before studied buildings and ensembles—the crown jewels of Iberian architecture being largely absent—into storytelling vignettes that are not only relatable but relevant to laypeople at large, and community members in particular.

Our collectively built, open archive will therefore be formed by combining three main resources:

1. Our own visits, readings and investigations—we experience the objects, today, and research their history, recording both the hard data and our field notes on the database; this (purpose-built) online repository is divided into forms designed to record 'Objects' ('Communities' and 'Buildings'), 'Agents' ('People', 'Organisations' and 'Programs'), 'Activities' ('Actions', 'Projects' and 'Events'), 'Documentation' (from archive file readings to literature reference notes) and 'Resources' (photographs, video, audio and PDF files).

2. The testimony and record of experiences by users, managers, neighbours and community members at large—we ask people to share their knowledge with us, in informal conversations, in semi-structured interviews and in writing (via a dialogue-like form), during our engagement moments and later.

3. The materials (raw, undigested) that both the team and our community participants gather. It is based on these three main resources that the team then narrates the stories behind the creation and use processes of the buildings and ensembles—and, by extension, of the communities themselves. *Arquitectura Aqui* was designed as a methodological experiment to probe ways to answer the key question stated above (How can architectural and urban history be put at the service of more sustainable and resilient communities?) by studying a sample of 45 communities in Portugal and Spain (15 per each year of fieldwork) representing a diverse range of social, cultural, economic and demographic contexts. Our findings will inform similar initiatives in other contexts, in the Iberian Peninsula and beyond. In each community chosen for the sample, we establish both formal and informal partnerships with municipalities, local interested parties and other agents (individual and collective); we also draw on the support of regional and national institutions (from archives to government bodies).

We have been drawing inspiration from existing experiments and grassroots initiatives while honing our concept and preparing our tools of engagement with communities for this collective history-making exercise. The recent record of participatory practices encoded in the terms of reference of large urban projects, and the actions spontaneously organised by social movements to resist or propose alternatives to these ambitious plans, are important references to design our own strategies. On the other hand,

11 We understand communities, in the first instance, as geographically defined groups, ranging from entire cities and towns (capped at 100.000 residents as of 1985) to villages and hamlets (minimum 3.000 residents in 1985) and sections of larger centres (neighbourhoods). Our study samples an array of communities with different cultural, economic and social historical backgrounds and later-day compositions; our work cases are diverse and multivocal, both between and within them.

experiments in public history, stimulating citizens to access local archives and take part in the writing of the history of their communities and spaces, complement our intention to act dynamically between local and microhistory and urban activism. The limits of the different ‘steps’ of participatory processes as described and analysed by Sherry Arnstein[12] are also lessons to be considered when proposing participation efforts that go beyond rhetoric. Even if both countries were under violent dictatorships during a significant part of the period of our study, Portugal and Spain have a rich history of ‘associativism’, ranging from organisations established in remote rural communities to promote cultural and leisure activities to associations designed to provide decent housing and reclaim the right to the city.

Only experience will tell what the most efficient strategies and participation tools are to engage community members on this shared process of narrative elaboration and meaning elicitation. We expect unusual or dissonant historiographical perspectives to emerge from this juxtaposition of general and monographic studies with extensive data collection and close attention to the users’ objects of interest and memories. Our goal is to shorten the gap between academic knowledge and lived experiences and create a common field of engaged people prepared to participate and imagine new futures for these structures. *Arquitectura Aqui* asks us to probe a new alliance between architects, scholars and citizens.

12 Sherry R. Arnstein “A Ladder of Citizen Participation,” *Journal of the American Institute of Planners*, 35 no. 4, (1969): 216–224.

Precedents

A fragment of the originally grayscale cover of Herman Hertzberger's printed book 'Lessons for Students in Architecture'. Designed by Piet Gerards, digitised by a smartphone, colourised through a 'neural filter' and pixelated through a 'texture' filter in Photoshop by the author.

Marija Mateljan (TU Delft)

From Structured Spaces to Unstructured Data.: Herman Hertzberger from a Computer Vision Perspective

Herman Hertzberger commented in his recent book that architect's 'thought-space' has shrunk compared to its original capacity.[1] As he explained, this is because architects are trained to satisfy the specific 'short-lived' requirements prescribed by the design brief. In his view, designing for the increasingly more 'dynamic and uncertain' world requires a change of approach.[2] What we should really be after is a 'programme for the *programmeless building*', where forms and spaces would be as free as possible from 'overly explicit meanings'.[3] This approach requires architects to 'no longer think in terms of *functions* but exclusively in terms of *conditions*—that is, in terms of space's capacity to fulfil more than one duty'.[4] In this paper, I will argue that, in the 21st century, due to the digital transformation of disciplinary memory, architect's 'thought-space' has not shrunk, but it has actually expanded, to such an extent that it has become increasingly challenging to navigate, and consequently to utilise for the design of (adaptable) buildings. Through a practical thought experiment, using Hertzberger's ideas as starting points, I intend to reveal the potential of *computer vision* for future design practice and raise awareness of the increasing interdependence between digital technologies and design thoughts that will shape the future of the built environment.[5]

ARCHITECT'S MEMORY

In his book *Lessons for Students in Architecture*, referring to the collection of ideas stored in an architect's memory, Hertzberger wrote: 'the more you have *seen*, *experienced* and *absorbed*, the more points of reference you will have to help you decide which direction to take'.[6] Hertzberger described the record of ideas in an architect's memory as a 'vast collection of images, something of a *library* of images from everywhere and of all times' that the architect can

1 Herman Hertzberger, *Architecture and Structuralism: The Ordering of Space*, trans. John Kirkpatrick (Rotterdam: nai010 publishers, 2015), 130.
2 Ibid., 126–30.
3 Ibid., 100, 144. Emphasis added.
4 Ibid., 109. Emphasis added.
5 This paper is a part of an ongoing PhD research at the intersection of architecture, computer vision and media studies, exploring interfaces between vision, memory, design thinking and the digitalisation of cultural techniques in the context of new emerging technologies resulting from the abundance of data.
6 Herman Hertzberger, foreword to *Lessons for Students in Architecture*, trans. Ina Rike, 6th ed. (Rotterdam: 010 publishers, 2009). Emphasis added.

'*consult* whenever a problem arises'.[7] The capacity to find a 'fundamentally different solution to a problem', he argued, depends entirely on the wealth of one's experience.[8] Discovering what the images have in common, by looking at their 'fundamentally unchangeable ingredients', would enable architects to find 'the "cross section of the collection", the unchangeable, underlying element of all the examples, which…can be an evocative form-starting-point'.[9] In other words, history keeps uncovering 'different aspects of an *unchanging structure* under changing conditions',[10] through the medium of memory.

Memory, as defined by the field of psychology, is the capability of encoding, storing, and retrieving information, where *encoding* refers to the initial learning of information by perceiving, *storage* refers to maintaining information over a period of time and *retrieval* is the ability to access information when needed.[11] Looking at these definitions, it becomes apparent that Hertzberger's original terms '*seeing, experiencing* and *absorbing*' could be translated into *encoding*, '*library*' could be translated into *storage*, and '*consulting*' could be translated into retrieval. This analogy enables us to investigate how memory transformed in the 21st century.

In his 1999 article 'The Seven Sins of Memory', psychologist Daniel Schacter described seven memory failures that can undermine thinking, indicating that human memory, although often reliable, is also fallible.[12] The fallibility of human memory and the potential way of dealing with its limitations was also insightfully discussed in Vannevar Bush's visionary essay from 1945 called 'As We May Think'. With great foresight, Bush spoke of a future device called 'memex' that would serve as 'an enlarged intimate supplement' to one's memory, enabling individuals to store all their 'books, records, and communications' and consult them 'with exceeding speed and flexibility'.[13] Bush advocated the development of instruments that would enable mankind to access their collectively accumulated knowledge. He believed that access and engagement with the collective 'record of ideas' would enable knowledge to evolve and endure 'throughout the life of a race rather than that of an individual'.[14] Evidently, technology has both extended and perpetuated human memory. Most notably, technology has escalated the externalisation of human memory.[15] And although people have long externalised their memories by 'creating representations that exist outside of their minds' (through writing, drawing and photography), the frequency of externalising memory significantly increased with the arrival of personal digital devices, which on the one hand, extended autobiographical memory, and on the other hand, enabled individual memory records to be collectively 'observed'.[16]

In his book *Building Knowledge in Architecture*, Richard Foqué argued that most of the knowledge in architecture is 'generated and legitimatised pragmatically instead of being logically derived from theory'.[17] If we adopt Foqué argument, we will be inclined to investigate how architectural memory records emerge in practice today, which can be illustrated through the following sequence of events: an architect takes a photo with a smartphone of a sketch that they made on top of a floor plan that was extracted from a digital 3D model, simulating the envisioned spatial situation; they then instantly send this *visual*[18] to a colleague who opens it on a tablet, 'zooms in' on a specific part of the floorplan, takes a screenshot, draws the proposed changes with a digital pen and sends it to a third colleague, accompanied by a link to a website which contains information about a project with similar characteristics;[19] the third colleague then proceeds to implement these changes in the original 3D model on a computer, and stores the record of the new solution in a form of a digital *image*[20], thereby making it a permanent item in the digital archive of that particular office.

This example reveals that in the 21st century architect's memory became more externalised, dynamic, collaborative, extensive and permanent, raising the following questions: How significant is this particular memory record compared to its previous versions? How can a colleague working on a 'similar' project in five years retrieve this memory record? Based on which characteristics was this design solution 'similar' to the one on the website and why is this relevant? And finally, how can this memory record, together with millions of other such records produced in practice daily, contribute to the evolution of the collective architectural knowledge base? In order to explore these questions, it is necessary to first reflect on the *visual* nature of architectural memory, and to examine the processes that underlie the organisation of knowledge.

ARCHITECT'S VISION

Considering that all production and absorption of the material recorded in human memory fundamentally proceeds through one of the senses,[21] we can

7 Hertzberger, *Architecture and Structuralism*, 118; foreword to *Lessons*. Emphasis added.
8 Ibid.
9 Hertzberger, *Architecture and Structuralism*, 118–19.
10 Ibid., 119. Emphasis added.
11 Kathleen B. McDermott and Henry L. Roediger, *Memory: Encoding, Storage, Retrieval*, Noba Textbook Series: Psychology, ed. R. Biswas-Diener and E. Diener (Champaign, IL: DEF Publishers, 2014), 9. Encoding techniques include: relating new information to the existing knowledge, forming mental images, and creating associations between information that needs to be remembered.
12 Daniel L. Schacter, "The Seven Sins of Memory: Insights From Psychology and Cognitive Neuroscience," *American Psychologist* 54, no. 3 (March 1999): 182. According to Schacter, the seven memory errors are: transience, absent-mindedness, blocking, misattribution, suggestibility, bias and persistence.
13 Vannevar Bush, "As We May Think," *The Atlantic Monthly* 176, no. 1 (July 1945): 101–08. Section 6.
14 Ibid. Section 1.
15 Emmaline Drew Eliseev and Elizabeth J. Marsh, "Externalizing Autobiographical Memories in the Digital Age," *Trends in Cognitive Sciences* 25, no. 12 (December 2021): 1072–81.
16 Ibid.
17 Richard Foqué, *Building Knowledge in Architecture* (Antwerp: UPA, 2010), 146–50. Foqué refers to Putnam's definition of pragmatic thinking, emphasising the significance of 'unity in learning and experience, and in conceptual thought and situational consciousness'.
18 A *visual* can be any sketch, drawing, diagram, picture, photo etc, used to show or explain something.
19 Besides the textual description (computationally translatable to any language) and the selection of drawings, renderings and photographs of the reference project, the website might even contain a link to the video clip in which the project architect explains the reasoning process that generated that particular spatial situation.
20 A digital *image* is any *visual* (see above), either born-digital (produced in digital form) or digitised (converted to digital form), eg a *drawing* made by hand is a *visual* that can be digitised (scanned) becoming an *image*.
21 Bush, "As We May Think," Section 8. Senses are: sight, hearing, smell, taste and touch.

certainly acknowledge that architectural design is dominated by the sense of sight, i.e. *vision*.[22] Architectural design can be seen as the realisation of an idea, or the resolution of requirements by means of visual communication,[23] which are used to enable spatial structures to be created or spatial issues to be resolved.[24] The ability to read graphic information is therefore a prerequisite for interpreting architectural memory records while processing digital records in large quantities requires employment of computational techniques. Therefore, it could be argued that the success of exploiting the growing architectural knowledge base essentially depends on the computer's ability to read various architectural *visuals*.[25] Recent evidence suggests that computers have become surprisingly good at extracting information from *visual data*,[26] as a result of advancements in the field of computer vision whose primary goal is to enable computers to perceive and understand the visual world as humans do. *Computer vision* research fundamentally derives from the fact that the human mind is a 'categorising machine' constantly processing and categorising sensory information.[27] Psychologically, the purpose of *categorisation* is to simplify the complexity of sensory inputs. By dividing our experience into 'groups or categories whose members share some perceptible similarity within a given context',[28] the process of categorisation establishes order in our memory, thereby enabling us to store and retrieve information efficiently. Language, to a great extent, helps us navigate our memories and enables us to communicate about what we perceive. Interestingly, Hertzberger argued that 'an idea can only be said to exist in so far as it permits formulation in words'.[29] This assumption, when observed from a (computer) vision perspective, is arguable since categories are *not* exclusively defined by language.[30] When it comes to recognition of visual features, people are able to group objects (and colours) based on their similarity even when they cannot verbally describe them. *Vision* allows us to register many distinct aspects and delicate nuances within images, e.g. distinctions between numerous geometric shapes, their ratios and relationships, visual rhythms and hierarchies, alignments, colours, textures, transparency, types of surfaces etc. These aspects are particularly characteristic of aesthetic artefacts, including architectural artefacts.[31] A

22 Written and verbally transmitted information is usually seen as supplementary to the graphic information in practice. Senses of *hearing*, *touch* and *smell* are also employed through eg site visits and material sampling.
23 Eg drawings, models, diagrams, renderings and photographs.
24 This definition is a partial adaptation and extension of the definition found on the construction wiki. See "Design," Designing Buildings, last modified July 27, 2021, https://www.designingbuildings.co.uk/wiki/Design.
25 Interpreting visual information is a complex task for a computer. When looking at an image, humans can immediately detect shapes (rectangles), separate them from the background (urban setting), understand what does each shape depict (residential tower), interpret the implicit information (competition render) etc, while computer can initially only 'see' the numbers that make up the image.
26 For example, in the field of medical image analysis computers have been able to exceed human capabilities in recognising visual patterns, leading to faster and more precise medical diagnostics. Visual *data* is un-interpreted visual information in digital format that can be processed by a computer.
27 Lev Manovich, *Cultural Analytics* (Cambridge, MA: MIT Press, 2020), 251.
28 Elin K. Jacob, "Classification and Categorization: A Difference that Makes a Difference," *Library Trends* 52, no. 3 (Winter 2004): 515–40.
29 Hertzberger, *Architecture and Structuralism*, 34.
30 John Paul Minda, *The Psychology of Thinking: Reasoning, Decision-Making & Problem-Solving* (Los Angeles: SAGE, 2021), 108–11. Minda mentions several experiments which studied colour and shape recognition across different languages and cultures, arguing against linguistic determinism theory.
31 Architectural artefacts include physical buildings but also their various 2D and 3D representations.

pattern we may observe by looking at sensory data, as Lev Manovich points out, is like 'constructing a new category: a recognition that some things or some aspects of these things have something in common'.[32] For this reason, images in their raw form, before having been assigned any semantic meaning through verbal *tags* or *metadata* in the digital environment, are considered 'unstructured'.[33] Artificial classification[34] systems, which are meant to organise our knowledge and enable us to efficiently access and retrieve digital memory records, impose a fixed knowledge structure, which often fails to 'reflect the way individual users structure experiential knowledge of the real world'.[35] Bush had already anticipated that the key obstacle to exploiting the collective knowledge base will be the artificial 'systems of indexing' that won't be able to replicate mechanisms of the human mind, which operates 'by association'.[36] The following examples will illustrate the nature of architectural associations and elucidate why *computer vision* technology opens promising perspectives for utilising architectural archives.

ARCHITECT'S 'THOUGHT-SPACE'

Comparing Stefan Wewerka's Ruhwald project and Aldo van Eyck's Sonsbeek Pavillion, Hertzberger indicated that 'although the differences between the two are obviously more profuse than the similarities, certain characteristics of their ground plans…bear strong resemblances'.[37] He described Wewerka's project as a 'grid' of 'rectilinear residential streets' separated by 'wall-like building blocks' with 'openings' that give the plan 'its permeability and…spatial openness', and he described van Eyck's project as 'parallel walls', 'of equal height', forming 'parallel streets', in which 'curves, hollows, shiftings…constantly narrow and widen one's field of vision', resulting in an 'alternate openness and enclosure'.[38] Looking closer, we can see that Hertzberger is trying to describe the underlying structure of similarities between the two projects primarily through their geometric aspects such as properties and relations (rectilinear, parallel, equal), rhythms (alternating open-closed, narrow-wide) etc, without focusing on their specific functions. Looking back at Manovich's definition of category construction, it is evident that Hertzberger is proposing a category of 'wall-like' projects

32 Manovich, *Cultural analytics*, 251. Manovich uses the term 'analog' for what is here called 'sensory data'.
33 'Unstructured' means that they cannot be organised according to a predefined model (eg a spreadsheet). On the example of a digital *photo*, the image itself is 'unstructured', but once digitally stored, it becomes associated with other 'structured' data (eg date, time, geolocation and other potential *tags* such as 'home' or 'office').
34 Jacob highlights the difference between categorisation and classification, explaining that *categorisation* is more flexible and creative while *classification* is more rigorous and exclusive. See Jacob, "Classification," 14.
35 Pat Molholt, "Research issues in information access," in *Rethinking the library in the information age*: Vol. II, ed. A.J. Matthews (Washington, DC: U.S. Department of Education, 1988), 93–113.
36 Bush, "As We May Think," Section 6. Bush indicates that any data placed in storage is filed alphabetically or numerically and one can find it by 'tracing it down from subclass to subclass'. In contrast, the human mind, 'with one item in its grasp, snaps instantly to the next that is suggested by the association of thoughts'.
37 Hertzberger, *Architecture and Structuralism*, 47.
38 Ibid., 44–48.

which have certain characteristics (spatial '*conditions*') in common, that can be visually recognised, but not exclusively associated with any fixed category based on their scale or '*function*' such as 'residential area' (Wewerka) and 'sculpture pavilion' (van Eyck).[39] From a *computer vision* perspective these visual characteristics are seen as numbers and patterns, which makes them quantifiable.[40] In other words, a machine could measure to what extent something is 'wall-like', compare it with something else and determine how strong the resemblance is through statistical methods. Statistical methods are 'especially well adapted to represent fuzzy boundaries'.[41] In fact, 'the whole point of numbers is to handle questions of degree that don't admit simple yes or no answers'.[42] Another example of fuzzy boundaries are the '*in-between spaces*'[43] which, according to Hertzberger, are characterised by the 'shifts and overlaps' occurring at the border between 'public' and 'private' areas in buildings, introducing the 'inevitable conflict of responsibilities and a concomitant lack of clarity in interpreting the space'.[44] Hertzberger basically admits that these spaces belong to multiple categories, which complicates thinking in 'black-and-white terms'.[45] However, by naming them 'in-between spaces', he formalises a new category which can then be used for communication between the members of the discipline, thereby associating the visually recognizable 'shifts and overlaps' with this domain-specific term. It is evident from these examples that language-driven and binary thinking undermines the complexity inherent in visual sensory experiences that are essential to architectural design. The statistical or 'numbers-driven' thinking, on the other hand, opens up new possibilities to deal with the global collection of architectural memory records that are imbued with fuzzy boundaries. Looking back at the initially introduced idea of the *programmeless building*, it is now evident that thinking in terms of '*functions*' reinforces the culturally predetermined categories, while thinking in terms of '*conditions*' destabilises them. A '*function*' with its fixed meaning is much easier to 'look-up', to communicate about and eventually to construct. A '*condition'*, on the other hand, is considerably more challenging to grasp, describe and associate with temporary cultural values.[46] Hertzberger was right when he concluded that '*space*, even more than language, has us so hemmed in that, like a fish in water, we are unable to step back from it far enough to get at its essence'.[47]

In conclusion, although *computer vision* technology opens up unprecedented opportunities to deal with the scale of global production and participation in architecture, the lack of access to private archives of architectural offices[48] and the growing language barrier between digital innovators and practising architects prevent data-driven technologies from substantially revolutionising architectural design tools and methods. Enabling computers to recognise disciplinary concepts in digital memory records is one of the key tasks for architects in the 21st century, considering the value of design precedents and prior experiences for design practice.[49] In order to make use of their overwhelming 'image collection', architects must therefore collectively and computationally broaden their vision. This endeavour requires considerable efforts and unconventional methods: opening up private archives and libraries, elaborating on the fuzzy boundaries and retrieving from memory the valuable lessons once learned from Herman Hertzberger.

39 Ibid.

40 A digital image is a matrix of pixels, where colour of each pixel is defined by its RGB value (numbers). Computer algorithms can use these values to identify and locate separate objects, identify scenes etc.

41 Ted Underwood, *Understanding Genre in a Collection of a Million Volumes*, Interim Performance Report Digital Humanities Start-up Grant, Award HD5178713, December 29, 2014. chap. 3.4.

42 Ibid.

43 The concept of '*in-between spaces*' is common in architecture, although different words are used to describe it. For example, Francis D.K. Ching talks about '*interlocking spaces*' in which 'a zone of shared space' emerges as a result of 'overlapping of two spatial fields' allowing for 'a number of interpretations'. See Francis D. K. Ching, *Architecture: Form, Space & Order* (Canada: John Wiley & Sons, 2015), 200.

44 Hertzberger, *Architecture and Structuralism*, 108. Emphasis added. Hertzberger gives an example of *school classrooms* that 'can be opened up to the adjoining communal corridor…using…partitions or other eliminable forms of separation to create a 'learning street'.

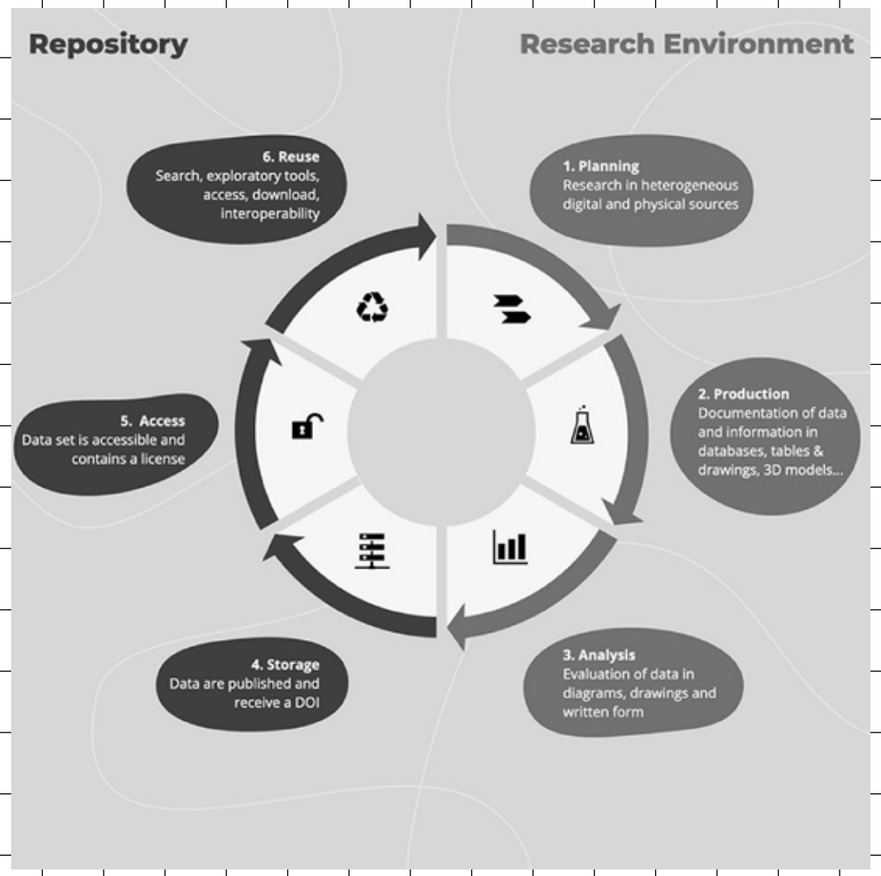
45 Ibid., 109. The two categories in this case are 'public' and 'private'.

46 Interestingly, referring to the growing lack of interest in professionalism, Hertzberger pointed out in *Architecture and Structuralism* (225) that nowadays people assume they can 'look-up' everything. This observation actually implies why thinking in terms of 'functions' prevails in the architectural practice today. Designing forms and spaces without strict labels and clear boundaries in the 21st century is extremely challenging since technologically-supported communication and collaboration between clients, consultants and architects essentially depends on categorical agreements.

47 Hertzberger, *Architecture and Structuralism*, 122–23. Emphasis added.

48 Architectural records are especially difficult to access due to *authorship* and *ownership* concerns. Authorship concerns (inherent in all design disciplines) make professional architects reluctant to share their knowledge, while growing data ownership and privacy concerns prevent access to design information of completed projects.

49 This premise is based on the widely acknowledged perspective that the analysis of design precedents is a useful method for transferring knowledge in architecture and an efficient strategy for developing novel designs by means of analogical reasoning.



Research data cycle. Image by authors.

Chris Dähne (Goethe University Frankfurt, TU Darmstadt)
Roger Winkler (TU Darmstadt)

How Can a Repository Become a Digital Data Lab? About the Future Transformation of Architectural Research

Interdisciplinary research teams generate and share large amounts of data with the aim of developing innovative concepts and methods using the latest technologies. The results of collaborative work are usually summarised in scientific reports supported by data visualisations. The original data itself mostly ekes out an existence in the storage of an internal university server. But is it not the benefit of scientific knowledge that it can be consulted for research–as the American engineer Vannevar Bush already demanded in the post-war years?[1] In the classical definition, repositories are storage locations for today's digital objects.[2] This includes survey and measurement data, technical processes in the form of software, or data on domain-specific objects of investigation such as buildings. Researchers deposit their knowledge in a repository in the form of a publication that is accessible and thus available to others, can be reused and referenced as a source. In this way, science and research build an imaginary data building where more than storage can take place, in fact, the collective exchange and exploration of data in the field.

With our contribution we would like to present considerations of a digital data laboratory, which we are developing within the framework of the DFG-founded FID BAUdigital.[3] In this laboratory, interactive and collaborative experiments are to be made possible with specific settings and tools, which can form domain-specific narratives.

FROM ARCHIVE TO LABORATORY

Surveys have shown that research data remain at the place of their scientific 'collection' and are archived there. Today, university repositories offer local services for publishing and linking data together with research results. At the same time, these often extend no further than simply making data available. In the best case, researchers can download the data with a free licence and afterwards reuse it. This 'individual' process is time-consuming

1 "A record, if it is to be useful to science, must be continuously extended, it must be stored and, above all, it must be consulted." Vannevar Bush, "As we may think. A top U.S. scientist foresees a possible future world in which man-made machines will start to think," *Life*, (Sept. 10, 1945): 112–24, 113.
2 Accessed October 17, 2022. https://forschungsdaten.info/themen/veroeffentlichen-und-archivieren/repositorien/
3 Accessed October 17, 2022. https://www.fid-bau.de/en/home/

and often requires special software to open as well as knowledge to handle the data. Insofar, it is possible to speak of transparent research, but technical obstacles have to be overcome before it is possible to actually speak of insight into the research data. It can be said that special tools are required for the acquisition, exploration, further processing and reproduction of research data, which are subject to the strictest control and quality assurance, as in a laboratory.

How can a repository become a laboratory? Initially, there is the archive that contains the materials to be studied. The content of the archive: data of cities, buildings, objects, or methods, determines the tools that need to be provided in the lab in order to work collaboratively and exploratively. Exploratory tools are primarily for investigating and analysing data; the challenges lie more in selecting and implementing them in existing systems.

The Architecture Machine Group had taken this hurdle in the 1970s with the development of a prototypical, laboratory-like 'a fictitious, two-dimensional landscape called dataland'.[4] The data inventory of personnel files, correspondence, electronic books, satellite maps or video clips stored in 'dataland' with the help of a relational location system could be selected by moving a joystick and viewed by transferring them to projection screens in the media room.[5] In addition, this made it possible to supplement data with handwritten notes and annotations, on the individual file being accessed, which from today's perspective is comparable to annotations.[6] This implies that archived data can be enriched and linked with additional information, in the form of metadata, and viewed directly in the virtual environment as well as examined with data-specific tools (exploration). Today, for example, complex georeferenced spatial information can be viewed, filtered, and explored without a great effort of time and the necessary expertise in handling it, thanks to interactive map visualisation.[7] What is new compared to the 1970s are the data formats; especially in architecture, 3D spatial data requires both discipline- and research-specific exploration and collaboration tools that can generate new narratives in the laboratory. The content of the repository thus determines the tools that can be used to generate new knowledge for research and science. What does this knowledge look like and what are its benefits for interactive research?

REPOSITORY: FROM STATIC TO INTERACTIVE

In recent years, technologies[8] and data formats[9] have been developed that allow 3D models to be viewed in browsers without plugins. However, the origin of this data usually lies in the software used to work with different 3D data. Basically, two types of 3D data can be differentiated: spatial, inherently 'digital born' data, which is generated as NURBS, BIM or mesh model, and 'retro-digitised' data, which is captured in technical measurement processes such as photogrammetry or laser scanning and visualised as point clouds or mesh models. These two types are generated and processed in a wide range of research contexts: For example, on the one hand, robotic construction processes are simulated and executed in the development of innovative construction methods based on parametric digital born 3D models. Structures and parts are retro-digitised during the process and afterwards for documentation purposes, so that they can be compared with the digitally born model. On the other hand, digital measurement methods such as photogrammetry and laser scanning are used in construction research to retro-digitise buildings and objects, in order to be able to construct digitally born models in CAD on this basis. These models can be used to provide information at the building or component level or to simulate historical structural and environmental behaviour. For whom is this information of interest and what tools must be available in the laboratory for the exploration of individual data?

LABORATORY: TOOLS FOR SPATIAL EXPLORATION

While in almost every 3D viewer the camera perspective can be rotated, moved and zoomed, the interior of the object often remains hidden. However, if this tool is used to place sectional planes in the model, sections or floor plans are generated, the interactive exploration of spatiality becomes possible. Augmented and virtual reality in particular complement such tools by intensifying the spatial experience, making it tangible and immediate. In addition to sectional planes, models can be explored by the user from the outside as well as from the inside through fixed, guided paths or free movements (similar to first-person video games). Examples in which these tools are used are the research project MARBLE,[10],[11] (Sectional Planes in Augmented Reality) or the Centre for Documentary Architecture[12] (guided and free movement).

TOOLS FOR CONTEXTUALISATION AND ENRICHMENT WITH INFORMATION

Especially when 3D objects are used as a basis for documenting findings such as in archaeology, information and links to further objects of investigation can be helpful as in the 3D-Model localised annotations. Whenever 3D objects have to be documented as digital-born data even during their creation process – as in historical 3D reconstruction, for

4 Nicholas Negroponte, *Being Digital* (London: Hodder & Stoughton, 1995), 110.
5 Negroponte, *Being Digital*, 110.
6 Richard A. Bolt, *Spatial Data-Management* (Cambridge/MA.: MIT, 1979), 10. Accessed October 17, 2022. https://www.media.mit.edu/speech/papers/1979/bolt_1979_spatial_data-management.pdf
7 Example Accessed October 17, 2022. example https://haptipedia.org/?t=map
8 Accessed October 17, 2022. https://developer.mozilla.org/en-US/docs/Web/API/WebGL_API and https://www.w3.org/TR/webxr/.
9 Accessed October 17, 2022. https://registry.khronos.org/glTF/specs/2.0/glTF-2.0.html.
10 Accessed October 17, 2022. https://doi.org/10.5446/57418#t=01:32:25,01:35:44.
11 Mixed and Augmented Reality in Blended Learning Environments. Accessed October 17, 2022. https://www.byzanz.uni-freiburg.de/Forschung/marble.
12 Accessed October 17, 2022. https://documentary-architecture.org/1937-doka-32-073-34-770

example – structured data formats such as IFC[13] can serve as information storage. This in turn requires tools to read out this information stored in explicit geometry. Examples are the open source project Kompakkt,[14] which developed a 3D viewer[15] with annotation tools, and the DFG 3D Viewer, which allows the visualisation of such component-based information.

TOOLS FOR PARAMETRIC AND KINETIC INTERACTIONS

In architectural research and practice, visual programming interfaces are used in CAD applications as a parametric design and prototyping tools. Parametric configurators[16] have simultaneously offered for some time the possibility of embedding 3D objects in an interactive web interface and displaying the changeable parameters. These parameters can be manipulated by the user, e.g. to display different variants or to interactively experience kinetic properties. Thereby, the control over which parameters can be changed lies with the person who edits and publishes such a file. So far, there are hardly any domain-specific as well as open applications, a commercial solution can be named with Shapediver.[17]

All the above-mentioned tools have one thing in common: they transform the original data model: they slice it up, create paths in it, or provide it with additional information in order to gain new insights for research.

FROM TODAY TO PAST AND FUTURE

So what might a digital data lab look like, where researchers can share the data they have collected and generated in the course of developing innovative concepts and methods, and what are they useful for?

The specialised FID BAUdigital is currently developing a central, domain-specific repository for researchers from the fields of civil engineering, architecture and urban planning. In the course of this development, an intensive exchange with researchers on the collection of data as well as the linked methodological and technical contexts is taking place, among other things. Only with the insight and evaluation of this information can the tools be determined that are necessary to enable the viewer to follow his own narrative and thus move from consuming to producing knowledge. In addition, the collection and domain-specific description of these methods and data is necessary in order to develop innovative concepts and methods using the latest technologies, artificial intelligence and machine learning in particular.

13 Accessed October 17, 2022. https://www.buildingsmart.org/standards/bsi-standards/industry-foundation-classes/
14 Accessed October 17, 2022. https://kompakkt.de/home.
15 Accessed October 17, 2022. https://dfg-viewer.de/dfg-3d-viewer.
16 Accessed October 17, 2022. https://www.configurator-database.com
17 Accessed October 17, 2022. https://shapediver.com.

In this context, 3D data in particular entail specific properties: First, the methods and process chains in the context of which they are created: As a means of providing and investigating historical structures in the archaeological context of MARBLE,[18] of the design and evaluation of robotically manufactured components of the Bugawood Pavilion from ICD Stuttgart,[19] as a basis for the detailed, digital documentation and reconstruction of the Wroclaw Synagogue at Al-Mainz,[20] or for digital conservation as well as static and environmental parametric behavioural simulation of engineering measurement models for form-finding from the late 20th century in SPP 2255 ‘Cultural Heritage Construction’.[21] Second, the entities studied and objects used, bring their own technical, spatial, as well as material information about: Cities, neighbourhoods, buildings, components, technical equipment such as sensors, robots or 3D scanners.

Depending on the context, data must be made spatially tangible; objects must be cuttable, walkable, and selectable in order to be viewed and examined holistically. They shall be interconnected with information and other sources in order to make material, technical, cultural and spatial contexts accessible and available, and their parametric and kinetic properties shall be simulated and experienced.

At the same time, users of the data lab bring individual, professional, social, or technical backgrounds and intentions, and in doing so need a space and the appropriate tools so that this data can be exported. These tools, in turn, each bring their own very specific functionalities, and both data formats and tools are constantly evolving.

Contexts as well as the nature of geometries and their three-dimensional properties pose different challenges to today’s research data infrastructure. It can be concluded that a monolithic approach to selecting a tool that provides all the required functionalities is not realistic. Instead, the infrastructure architecture on which the digital data laboratory is based must be both flexible and modular to adapt to variable circumstances. This applies both to the tools provided for exploration and to the structure of the information used to capture the data and objects under investigation. The digital data lab contributes to the development of narratives in science and research. Narratives that fill knowledge gaps in history and can be used for future developments.

18 Mixed and Augmented Reality in Blended Learning Environments. Accessed September 6, 2022. https://www.byzanz.uni-freiburg.de/Forschung/marble.
19 Hans Jakob Wagner and Martin Alvarez, et al., “Towards digital automation flexibility in large-scale timber construction: integrative robotic prefabrication and co-design of the BUGA Wood Pavilion,” *Constr Robot*, vol. 4 (November 2020). Accessed October 17, 2022. https://doi.org/10.1007/s41693-020-00038-5
20 Piotr Kuroczyński and Igor Bajena, et al., “Digital reconstruction of the new synagogue in Breslau: New Approaches to object-oriented research, in Teresa Guarda and Filipe Portela (eds.) *Communications in Computer and Information Science*, vol 1501, Springer, Cham. Accessed October 17, 2022. https://doi.org/10.1007/978-3-030-93186-5_2
21 Baris Wenzel and Eberhard Moeller, “Last witness and digital twin – physical and digital modelling the Munich Olympic Sports Hall – a case study,” *membranes2021*, vol. CS018 (Berlin: Springer, 2022), Accessed October 17, 2022. URL https://www.scipedia.com/public/Wenzel_Moeller_2021a.

A well protected data centre in one of Istanbul's industrial regions, where taking photographs is not allowed even for the employees. Image by author.

Berna Göl (Yeditepe University)

From Cybernetics to Datacenters: Searching for Reflexivity in Architecture

Last few decades witnessed a wide range of forms of portable data storage. From floppy disks onto USB flash drives, the idea of this portability was magical. Yet, portability left its place to something else. Today, people could be carrying flash drives with them to start their own computer in random workstations anywhere temporarily, and this would be quite easy. But things did not go that way.

In the course of less than two decades, data storage started to be outsourced with the help of the cloud; users and organisations somehow ended up using the cloud for preserving, protecting or even processing their data. The cloud represented a distinct shift in computing and network imaginaries, as materiality has been removed from the conversation. This is why, arguably, data centres that support the cloud, holding and preserving users' data are curious objects beyond people's everyday vision; they represent the material version of what is immaterial and difficult to grasp, or even a presumed explanation to the magic happening beyond people's control.

Architectural literature is known to lack necessary terminology to theorise these newly emerging dubiously enclosed structures. This paper argues that visiting the 1960s for the acclaimed example of the Fun Palace project to trace how cybernetics inspired and shaped a reflexive architecture is helpful in understanding today's otherwise concealed data centre architecture. If both instances, the Fun Palace project and the data centres, are examples to how computers and systems shape architecture, this pursuit can give a hint for understanding today's data centre architecture. Tracing reflexivity, or reflexive design thinking for challenging architecture's possibilities within the two architectures may present a hint for stepping outside of today's architectural imaginary. Reflexivity here corresponds to a self-criticism that extends to architectural practices, in this case to the design process. Bringing together pieces of information on how architecture employs or disregards reflexivity is the main trajectory. Each title chases architectural reflexivity through a reference from (1) the 1960s cybernetics within architecture, (2) from today's data centre literature and (3) observations of Istanbul's data centres with limited information.

POSITIONING HUMAN SUBJECTS IN THE IMAGINARY

Cybernetics is about self-regulating organisms that learn from new inputs and adjust accordingly within the changing context. The 1960s witnessed a number of architectural interventions that directly or indirectly adopted this idea in the postwar context.[1] For instance, the architect Aldo van Eyck took this opportunity as an inspiration to advocate flexibility in design via which users would transform a space, proposing what later was called generative spaces rather than prescriptive.[2] The architect Cedric Price along with Joan Littlewood from the theatre world was looking into cybernetic theories. They designed an entire structure that would learn from people's actions and accordingly adapt in form. The Fun Palace project, as they named it, was an experimental intervention that would align with welfare politics of the era, aimed to adjust to people's demands.[3] With the help of 'cyberneticians' and the recorded information on visiting patterns of people, the structure could change in configuration without fixed functions and proposed a laboratory of fun with a 'non-program'[4]. The reflexivity of architecture takes place on multiple levels: the criticism directed at architecture with a fixed program insisting on a work-leisure relationship that was problematic and the architect instead as an enabler rather than an authority figure. The positioning of human subjects, whether the user or the architect, was at the heart of the reflexive pursuit, understanding humans through machines and machines through humans.[5]

The limited amount of architectural research on data centres of the twenty first century overtly emphasises how these structures lack human subjects. Some take this as a landscape of the posthuman era in relation with the post-anthropocene. This landscape has gigantic human exclusion zones within buildings and some have monolithic design that is not meant to be inhabited by humans.[6] Some predict future data centres to be completely free of humans.[7] Anthropologists and media culture researchers, on the other hand, strongly emphasise that the commercialised image of data centres are indeed *depeopled* or *dehumaned* and thereby obscured in terms of labour relations.[8] So, the question remains, are the architectural texts mesmerised by the commercial representations of these structures?

In order to step beyond the published material on the architecture of data centres, a research within the expanding city of Istanbul illustrated a different picture on the issue. The online research followed by site visits showed that the majority of these structures are out of reach on many levels. While websites such as datacentermap.com and datacentercatalog.com present lists that do not match with one another, map applications include others, some of which are not in their place in the physical world.

In-house data centres of major companies often do not even appear in any maps, nor are they welcoming any visitors. The data centres that were in place both online and in the physical environment were businesses that called for new customers to store and preserve data. Not only would they constrain entrance, but even taking photographs outside of the barbed wires was a problem. The information shared about these data centre service providers were only limited to information directed at their customers, and in many cases not visible on the built environment. It was almost impossible to see a difference between a data centre structure and an office building in these examples.

Kristin Veel approaches data centres as uncertain architectures. Comparing the data centre projects, one a bunker below the ground and the other a modular and expandable skyscraper, Veel focuses on the idea of visibility of the projects and traces how transparency is controlled in buildings' design.[9] There is a conflict between the built form and the security and this can be observed through visibility of the structures. Moving from Veels emphasis on transparency, discussing data centre structures through visibility is a reminder of the human subject. It is fair to assert that the human subject, whether as an employee or a spectator, is still in the equation. The reflexivity that could imagine a different architecture, a different world with a different set of relationships imagining another world, however, steps away from human subjects in these examples, reducing human agency to that of a spectator, as observers that mainly see as much as what security and businesses together allow for.

IN SEARCH OF A DESIGN OF DATA CENTRES, A TYPOLOGY?

As cybernetic theories inspired architectural experimentation in the 1960s, Cedric Price advocated anti-building and anti-imagery, where buildings could learn from humans and be designed to be highly adaptable. In other words, the reflexivity was based on a criticism directed at architecture itself; according to Price, the society did not need 'the obsessions of form-makers' and that architecture could adjust to social and cultural transformations and be a catalyst for social transformation.[10] Thereby, the idea of favouring flexibility as well as temporality supported this pursuit. Moving from cybernetics, the architect, arguably, chose to step away from functionality and thereby the idea of typology closely associated with it.

1 Liane Lefaivre, "Space, Place and Play," in *Aldo van Eyck: the Playgrounds and the City*, ed. Liane Lefaivre, Ingeborg Roode, Rudi Fuchs, (Amsterdam: NAi Publishers, 2002), 18–58.
2 Nathaniel Coleman, *Utopias and Architecture* (London and New York: Routledge, 2005), 197–202.
3 Stanley Mathews, *From agit-prop to free space: The architecture of Cedric Price* (London: Black Dog, 2007), 13–4.
4 Cedric Price and Joan Littlewood, "The Fun Palace" *The Drama Review* 12/3, Architecture/Environment (1968), 127–134.
5 Andreas Rumphuber, *Lectures for Post Graduate Program* video shared by INSTEAD (parapoesis) in December 2014, 6:40, https://www.youtube.com/watch?v=0wussBF_It4.
6 Liam Young, ed, *Machine landscapes: Architectures of the post Anthropocene* (New York: John Wiley & Sons, 2019), 8–13.
7 Ippolito Pestellini Larelli, "Data Architectures" *e-flux Architecture*, January 2020, https://www.e-flux.com/architecture/intelligence/310404/data-architectures/.
8 Mél Hogan and Asta Vonderau, ed., "The Nature of Data Centers," *Culture Machine* 18 (Part of Open Humanities Press, 2019), 3. https://culturemachine.net/vol-18-the-nature-of-data-centers/.
9 Kristin Veel, "Uncertain Architectures: Performing Shelter and Exposure," *Imaginations: Journal of Cross-Cultural Image Studies* 8, 2 (2017), 30–41. http://dx.doi.org/10.17742/IMAGE.LD.8.2.4.
10 William JR Curtis, *Modern architecture since 1900* (New York: Phaidon, 1996), 539.

Literature on data centres as built forms often compare these structures to a number of former well known building typologies. The most common is a comparison to former structures to hold archives such as libraries and storage units, whereas others regard data centres as the inheritors of factories. However, some emphasise the inevitable temporality of these facilities and, by taking their services of preserving data into consideration, choose to understand them through bunkers of the past century.[11] In the former bunkers and today's data centres, bytes are like the bodies to be preserved for some time. A promise of permanent data storage is a goal, but an impossible one, maybe not for the data, but for the data centre.

The idea of temporality is different from the one in the Fun Palace project. In today's data centres, temporality is not wanted and even meant to be obscured, while in a reflexive architectural practice temporality could serve as an inspiration. Within the mechanical functioning and management of the data centres, temporality is a serious challenge where nothing is left to time, coincidences and other possibilities. Data centres are grouped according to the time they endure a power cut and measured in capacity according to how much power it consumes. Function and efficiency is inarguably a priority. One common quality of covered examples of data centres in the relevant literature and the Fun Palace project is the idea of excessiveness of the structures. However, relevant literature does not necessarily cover all data centres.

The enthusiasm with the human excluded giant structures appears as misleading. If data centres constitute a particular architectural typology, the problem of scale appears crucial; studying examples such as Google or Facebook as gigantic investments, as a majority of literature on data centres do, is like only studying 1960s mega structuralist projects such as the Tokyo Bay project to understand housing and accommodation. That is to say, there is also much to learn from small or mid-sized data centre structures, which are often ignored. Many of the examples of data centres in Istanbul are of this size and capacity. What happens when other data centre examples are studied?

LOCATING DATA CENTRES

Data centres studied in relevant literature are mainly in rural areas. The data centres in Denmark, Iceland, Sweden and Finland are only some examples. Rem Koolhaas' fascination with the countryside where they pay a visit in order to understand data centre architecture is followed by a proposal of an exhibition.[12] The purity of intention in data centres, as Koolhaas explains, and the idea of a museum in the countryside have a rather shocking effect and therefore are worth pursuing.

11 Adam Fish and Bradley L. Garrett, "Resurrection from Bunkers and Data Centers," *Culture Machine* 18 Mél Hogan and Asta Vonderau, ed., (Part of Open Humanities Press, 2019), 8. https://culturemachine.net/vol-18-the-nature-of-data-centers/.

12 Rem Koolhaas, "Museum in the Country Side", Liam Young, ed, *Machine landscapes: Architectures of the post Anthropocene* (New York: John Wiley & Sons, 2019), 60–65.

This extreme and excessive reading of data centre architecture on the remote setting, arguably, is a continuation of imagining and representing these structures as excluding humans. This kind of approach relies on the shock effect, where the context is abandoned. The humans are replaced with spectators, and the spectacle relies on this shock effect. The abandoned context does not necessarily correspond to enormous settlements in wilderness. Many of the data centres are settled next to universities, military bases, secret agencies or financial institutions and are sometimes for commercial purposes. Only the very latter are easily accessible including data centre buildings of Facebook or Google. Smaller companies, which make up the majority of businesses, though, rely on data centre services to be rented out, sometimes within parts of buildings inside cities.

The site visits in Istanbul showed that some of the data centre structures could easily be mistaken for office buildings, while some could be for industrial facilities. Their relationship with their surroundings, however, are almost impossible to articulate. They are located either on major business arteries of the city or within industrial zones. Despite the media representations of data centres, the built structures of data centres are partly or completely abandoned, while the most active one within an industrial zone is the newest structure with the loudest fans and no transparency of its indoors despite its glass facade. The idea of publicness, visibility or even temporality work on the business' side on media representations, while on the built environment it is the opposite. It is rather difficult to adopt reflexivity when the two are in conflict.

Moving from how machine and early computation shaped architectural imaginary decades ago, this paper suggests to consider a few points on the way of theorising data centre architecture. The first one is about taking architectural reflexivity as an opportunity to challenge architecture's relationship with human subjects, is to pay attention to depiction of data centres as if they are completely non-human spaces. This is a partial visibility that not only shows what is safe and wanted for the businesses to continue, but also is dangerous in hindering existing labour relations while strengthening commercial imagery further. The second cue is similarly misleading if not dangerous and is about the idea of temporality that scholars outside architecture have pointed out. The reflexivity of the 1960s saw temporality as a way to experiment with architecture as buildings and structures were expected to adapt to changes and demands, whereas in data centre architecture temporality is something to stay away from. In fact, even the flexible design of these structures is not about finding new forms, but merely about extending the capacities of the facilities. The third and final cue has to do with the publicness of former structures of the 1960s. The reflexivity of architecture in these structures was ideally about being accessible by everyone, all of whom would transform the architecture, whereas data centre buildings today are not affiliated with anything public. Data centres are not public. How can this be when the cloud is not?

Appendix

Van den Broek and Bakema, Radar Station, Hoek van Holland, ca. 1980.
Image code BROX. 110427943. Het Nieuwe Instituut.

Original Call for Papers

Building Data: Architecture, Memory, and New Imaginaries

Vast amounts of built-environment data are continuously generated, stored, retrieved, updated, edited, and resaved—a seemingly endless cycle of coding and recoding of the past and the present, and of possible futures. In fact, this data's material infrastructures even disrupt national energy and water grids. We are looking at the ongoing construction of a new kind of living memory system that is generative and transformative.

Everything copied onto the zillions of hard drives and the cloud become part of our everyday world through constant repetition, finally becoming the cultural sediment of our societies. The increasing layers of data and their infrastructures offer an unexplored territory for new forms of storytelling for architecture, other kinds of imaginations and fields of knowledge.

Architects have become curators of a planetary (even beyond the planet) real-time database, through smart integration and recombination among other things. But while we operate with large-scale data sets of cities, public space and landscapes, it is not quite clear how we might address the actual building scale. Even when there has been radical experimentation before in the pre-digital era, with media architecture and form finding tools, with the streamlining of production flows and security protocols. Therefore we ask: where is the building in this vast, interactive and extractive information system of data production?

For possible answers we want to start with the role of repositories and data sets, digital archives and collections; they can help explore new thought-provoking opportunities to reinvent the building in our data society. We understand archives and repositories not as passive, aggregated information, but as open laboratories for knowledge production and, thus, the intellectual and cultural examination of the built environment.

Important questions we want to address include, but are not limited to:

- How can we explore digital archives to think new imaginaries and develop new narratives about and by buildings?
- In which visual and written languages are the new narratives and imaginaries created, and how are they organised?
- Are there other kinds of narrative systems, non-visual, non-linguistic? Material and sensory ones? And what would that mean? Who is developing the narratives, and for whom?
- If post-humanism might (re-)direct the new data-landscapes, what sort of data buildings might come out of this shift?

– And, how do data collections change architectural research and practice regarding the past, present, and future?

The conference is connected to The New Open, the new flagship project of the Faculty of Architecture and the Built Environment, TU Delft, led by Georg Vrachliotis and the Theory of Architecture and Digital Culture Group. It continues some of the themes of the 2020 conference: Repositioning Architecture in the Digital, in which we explored the emergence of the data society in the 1970s.

J. W. C. Boks. Bouwcentrum Rotterdam, exterior, 1946–1949. Photo by C. van Weele. Collection Het Nieuwe Instituut, Archive BOKS ph54. © C. van Weele/MAI

Georg Vrachliotis (TU Delft)

Bouwcentrum Rotterdam Reloaded: From Buildings to Data, and back again

Originally founded in 1948 as a statistical office to document the damage caused to the city of Rotterdam by the Second World War, the ‘Bouwcentrum’ became a leading institution linking design, statistics, the building industry, and social (post-war) realities. Working with statistics that were systematically collected and classified, architects, civil engineers, and researchers collaborated on planning methods, industrialised housing, urban planning, material standards, and building optimisation. The Bouwcentrum saw itself as an industry of architectural knowledge production. And that meant not only statistics and technology, but also research and education. ‘The knowledge of many. Processed by the few. For the benefit of all’—the Bouwcentrum’s credo shows the direction for us as well: It is nothing less than the idea of an open data society ‘avant la lettre’. In this time of global challenges, the keynote lecture aims to demonstrate the relevance of the Bouwcentrum in finding social and sustainable solutions for our data-driven built environment.

Biographies

ALEX BLANCHARD

Alex Blanchard is a doctoral candidate at Newcastle University, UK, and the current editorial assistant for arq: Architecture Research Quarterly. He teaches architectural design studios and workshops along themes of attention-to and mediation of site. His work explores the implications of design media for architectural practice and production of the built environment, developing a critique of contemporary forms of programming through construction of dialogical alternatives. He has contributed to academic volumes including Creative Practice Inquiry in Architecture, ed. by Ashley Mason and Adam Sharr (Routledge, 2022), presented research at academic conferences and festivals for the humanities, and regularly leads workshops on re-constructed programming methods.

ASHLEY PAINE

Ashley Paine is a Senior Lecturer at the University of Queensland where he teaches across architectural design, history and research. His current research interests include the collection and reconstruction of architecture by museums, contemporary pavilions, and the preservation of Frank Lloyd Wright's built works. He has contributed to international journals including *AA Files*, *Future Anterior*, and *Interstices*, and published widely in other academic, profession and popular journals. His most recent book, *Valuing Architecture: Heritage and the Economics of Culture* (co-edited with Susan Holden and John Macarthur) was published by Valiz in 2020. Paine is also a practicing architect, and co-founder of PHAB Architects—a Brisbane-based studio focused on public projects, exhibition design, residential and heritage works.

BERNA GÖL

Berna Göl (she/her) works as an assistant professor at Yeditepe University, the Department of Architecture (Istanbul) and coordinates the graduate program in the same school. She currently helps in organising the first of biyearly international conference series *Architectural Studies: Foundations, Positions, Words*, with the theme 'Encounters with the 21st Century'. She focuses on intersections of literature of architecture and critical theory. Her research areas cover architecture and the city, inadequacies of architectural practices and discourse in architectural design through changing modes of production and reproduction of things. Her dissertation 'Leisure as Criticism in Architectural Texts' (Istanbul Technical University) was followed by smaller texts such as 'Water as Fetish in Architecture,' and 'Limits and Ruptures: Discussing Criticism in Architecture through Capitalism.' She is a member

of the music duo *Kim Ki O* and a part of Root Radio. She is interested in vegan culture and other forms of non-violent practices.

CHIARA MONTERUMISI

Chiara Monterumisi is an Architect and currently Post-Doc Fellow at the University of Bologna. There, she is working on the research project ‘From the dress to the city. Projects, Spaces and Architecture of the Fashion System’. The study takes an architectural point of view, employing a historical and critical method of analysis along with the adoption of new digital opportunities.

She earned a PhD degree in Architecture and Design Cultures (2015) at the University of Bologna in co-tuition with the KTH Kungliga Tekniska Högskolan in Stockholm (Sweden), for which she analysed some as yet uninvestigated projects of the Swedish architect Ragnar Östberg. As Post-Doc Fellow (2016–2020), she joined the EPFL École Polytechnique Fédérale de Lausanne (Switzerland) where she conducted two studies on Nordic affordable inter-war housing examples, aiming to overcome the barriers between research domains in favour of active dialog among research by design and historical research, including analytical CAD re-drawing. The first study, ‘Stockholm: Housing in the Interwar Period’ (financed by the Swiss National Science Foundation), investigated the transformations in architectural models and residential layouts. After completing the SNSF grant, as Fellow for a further year she investigated Kay Fisker’s housing works in Copenhagen and his teaching method.

In 2018 she was one of the scientific curators of the exhibition *Housing. Frankfurt, Wien and Stockholm* at the EPFL Archizoom based on new archival items and analytical re-drawings, and also of the topical issue ‘Housing builds cities’ for the journal *Urban Planning* issued in September 2019. In 2017, she published the book *Ragnar Östberg. Villa Geber: a home on the archipelago* supported by the Italienska Kulturinstitutet in Stockholm. She is coordinator of the Nordic Node within the framework of the GUDesign network (since 2019), member of the AISU Italian Association of Urban History since 2018) and of the AHRA Architectural Humanities Research Association (since 2019).

CHRIS DÄHNE

Chris Dähne studied architecture at the Delft University of Technology and interior design at the Hochschule Darmstadt. She received her PhD from the Institute of History of Art, Architecture and Urbanism (IHAAU) at TU Delft with a thesis on the urban symphonies of the 1920s (scholarships from Bauhaus University Weimar and TU Delft). She has been a visiting scholar at Waseda University Tokyo, a guest lecturer at TU Delft, and has taught at various universities. In her teaching and research, she also draws on her knowledge with artistic and unconventional approaches from her work as a practicing architect. This enables her to think architecture beyond disciplinary boundaries of architectural history, media history and history of technology. She is currently researching data-based architecture, proto-digital and digital technologies and media in the *LOEWE focus: Architectures of Order* at Goethe University Frankfurt a. M. and in the DFG project ‘BAUdigital’ at TU Darmstadt. With her work she wants to critically reflect technologically inspired cultural transformations of space and make them productive for architectural discourse. Recent works and activities: ‘The Analog “Images” of Digital Architecture’ (2019/ 2022, essay in: *Cloud Cuckoo Home|Cloud Cuckoo Land*, *Journal on the Theory of Architecture*, No. 40 ‘Medial Practices of Architectural Design’), ‘Utopia Computer. The “New” in Architecture’ (2019, International conference at UdK Berlin and publication of the same name, 2022 together with Nathalie Bredella and Frederike Lausch, ‘Data Visualisation’ (LOEWE AO-Talks together with Nadja Gaudillière-Jami 2021–22), ‘Biased Drawing. “Representation bias” in spatial orders from the 1950s to the 1980s’ (LOEWE AO-Workshop Stiftung Bibliothek Werner Oechslin in Einsiedeln, Switzerland 2022).

DENNIS POHL

Dennis Pohl is a postdoctoral researcher at Theory of Architecture and Digital Culture at TU Delft, and at the chair of Architecture Theory at Karlsruhe Institute of Technology (KIT). His research interest lies in a material and cultural history of the digital in architecture. In his PhD research titled ‘Designing Europe: The Architecture of Territory, Politics, and Institutions’, he analysed how architectural design techniques historically impacted political planning in post-war Europe. Dennis was a research fellow at the DFG research group ‘Knowledge in the Arts’ at the Berlin University of the Arts (2015–2018), and DAAD fellow at the Graduate School of Architecture, Planning and Preservation at Columbia University New York (2018). He was co-director of the AA Visiting School Brussels ‘The House of Politics,’ and contributed to the project ‘Eurotopie’ in the Belgian pavilion at the 16th Architecture Biennial in Venice. He guest-edited issue 239 of the journal *ARCH+*, titled ‘Europe: Infrastructures of Externalization’. His writing has appeared in *ARCH+*, *Archiv für Mediengeschichte*, *History and Technology*, *Migrant Journal*, as well as a number of collected volumes.

DIEGO INGLEZ DE SOUZA

Diego Inglez de Souza is an architect and urban planner by the Faculty of Architecture and Urbanism of University of São Paulo (2003), Ph.D. in History and Architecture by the same institution together with the Université Paris 1 Panthéon Sorbonne (2014). He worked as assistant curator of the X International Architecture Biennial of São Paulo (2013), contributing also with the research for the exhibitions *Infinite Span – 90 Years of Brazilian Architecture* (Casa da Arquitetura, Matosinhos, 2018–19 and SESC 24

de Maio, São Paulo, 2021) and *Our Land is the Sea* (Centro Cultural de Belém / Garagem Sul, Lisbon, 2020–21). He was a lecturer at the Catholic University of Pernambuco between 2015 and 2019, fellow researcher at Laboratory of Landscape, Heritage and Territory (Lab2PT) of the University of Minho between 2019 and 2021, working on the 'The Sea and the Shore, Architecture and Marine Biology' research project (2019–2021) and currently research fellow of the ERC Starting Grant research project 'ReARQ. IB – Built Environment Knowledge for Resilient, Sustainable Communities: Understanding Everyday Modern Architecture and Urban Design in the Iberian Peninsula' (1939–1985) (Iscte – IUL, 2021–2026). Author of the book *Reconstruindo Cajueiro Seco: Arquitetura, Cultura Popular e Política Social em Pernambuco (1960–64)*, published by *FAPESP* and *Annablume* (2010), chapters of books and several articles and papers published on Brazilian, European and American journals, magazines and exhibition catalogues.

DIRK VAN DEN HEUVEL

Dirk van den Heuvel is an Associate Professor of Architecture at Delft University of Technology. He heads the Jaap Bakema Study Centre, the research collaboration between the Faculty of Architecture and the Built Environment of TU Delft, and Het Nieuwe Instituut in Rotterdam. The Jaap Bakema Study Centre develops a public research programme of exhibitions, books, events and PhD projects in connection with the Dutch national collection of architecture and urban planning, held by Het Nieuwe Instituut. Van den Heuvel received a Richard Rogers Fellowship from Harvard University in 2017, and was a Visiting Scholar at Monash University in Melbourne, in 2019. He was curator of the Dutch national pavilion for the Venice Architecture Biennale in 2014. Other exhibitions include *Changing Ideals. Rethinking the House* (Bureau Europa, 2008) and *Art on Display 1949–69* (Calouste Gulbenkian Museum 2019). Publications he (co-) authored include 'Habitat: Ecology Thinking in Architecture' (2020), 'Jaap Bakema and the Open Society' (2018), 'Architecture and the Welfare State' (2015), 'Team 10: In Search a Utopia the Present 1953–1981' (2005), 'Alison and Peter Smithson: From the House the Future to a House Today' (2004).

EMILY PUGH

Emily Pugh received her PhD in Art History from the CUNY Graduate Center, where her studies focused on modern and contemporary architectural history, as well as digital art history. From 2010 to 2014, Pugh served as the first Robert H. Smith Postdoctoral Research Associate, with special responsibilities for digital humanities projects, at the Center for Advanced Study in the Visual Arts at the National Gallery of Art in Washington DC. Since 2014, Pugh has led the Digital Art History department at the Getty Research Institute, overseeing research activities in connection with technology initiatives. Examples of such initiatives include 'Ed Ruscha Streets of Los Angeles and Understanding the Architectural Model', a project exploring the relevance of 3D scanning technology for providing access to the GRI's collection of architectural models. She is the author of *Architecture, Politics, & Identity in Divided Berlin* (University of Pittsburgh Press, 2014), and her essays on the Cold War urban built environment and on digital art history have appeared in the *Journal of the Society of Architectural Historians*, *Centropa*, and the *International Journal of Digital Art History*. Her work in architecture and digital art history has been supported by the Center for Architecture Theory Criticism History at the University of Queensland, the Center for Digital Humanities Research at Australian National University, the European Architectural History Network, and the Foundation for Landscape Studies.

ERIK HERRMANN

Erik Herrmann is an Assistant Professor of Architecture at the Knowlton School and co-director of Outpost Office, an award-winning collaborative design practice based in Columbus, Ohio. He was the 2016–2017 Walter B. Sanders Fellow in Architecture at the University of Michigan, Taubman College of Architecture and Urban Planning. In 2015, Herrmann was a German Chancellor's Fellow of the Alexander von Humboldt Foundation at the Institute for Computational Design (ICD) at the University of Stuttgart. His research interrogates how the biases and tendencies of digital technologies alter the design process, with a focus on the shifting role of the architect in the landscape of contemporary digital design. This research acknowledges the complexity of creative practice in an environment of rapidly developing tools of design and communication with contested notions of creativity, authorship, and design. His work seeks profound alterations to the habits and conventions of architecture, with an eye toward emerging sensibilities that suggest new ways of educating architects. Herrmann holds a Master of Architecture from Yale University and a Bachelor of Architecture from the University of Tennessee. His design work has been exhibited at the Chicago Architecture Biennial, the Tallinn Architecture Biennale, the Milwaukee Art Museum, Roca London Gallery, The California College of the Arts, Woodbury University, Yale School of Architecture, Princeton School of Architecture, Harvard GSD, and The Cooper Union. His work and writings have been featured in architectural publications including *Log*, *Perspecta*, *CLOG*, *Dimensions*, and *PLAT*. Before co-founding Outpost Office, Herrmannn practiced architecture with Trahan Architects in Louisiana and Gray Organschi Architecture in New Haven, CT.

FATMA TANIŞ

Fatma Tanış is the coordinator of Jaap Bakema Study Centre at Het Nieuwe Instituut, Rotterdam and lectures at the Faculty of Architecture and the Built Environment, TU Delft. Prior to Delft, Tanış trained as an architect in İstanbul and Stuttgart. She holds Master's degrees in Architectural History (ITU) and Conservation and Restoration of Cultural Heritage (MSFAU). Having a particular interest in the in-between realm, she has explored

the specificity of port cities through the notion of cosmopolitanism in her doctoral dissertation titled Urban Scenes of a Port City: Exploring Beautiful İzmir through Narratives of Cosmopolitan Practices (2022). Her other publications include ‘Spatial Stories of İzmir’ (2020), ‘Space, Representation, and Practice in the Formation of İzmir during the Long Nineteenth Century’ in ‘Migrants and the Making the Urban-Maritime World: Agency and Mobility in Port Cities, c. 1570–1940’, eds. Christina Reimann, Martin Öhman (New York, London: Routledge, 2020); and a themed issue Narratives #1: ‘Mediterranean and Atlantic Cities’ (2021).

GEORG VRACHLIOTIS

Georg Vrachliotis is a Professor for Theory of Architecture and Digital Culture at TU Delft. From 2016 Georg was dean of the Karlsruher Institut für Technologie (KIT) Faculty of Architecture and Chair for Architecture Theory (2014–2020). Previously he conducted research at the Institute for the History and Theory of Architecture at ETH Zürich. He studied architecture at the Berlin University of the Arts and did his PhD at the ETH Zürich in 2009. Besides that he was a visiting researcher at the Centre for Cognitive Science of the University Freiburg, at the Spatial Cognition Centre of the University Bremen, and at the UC Berkeley Department of Architecture in California. From 2006 to 2010 he was a guest lecturer on architecture theory at the TU Wien in Vienna. Georg Vrachliotis is member of the advisory board of the magazine ARCH+ and external examiner at Bartlett School of Architecture, UCL London. He curated the exhibition ‘Fritz Haller. Architect and Researcher’ at the S AM Swiss Architecture Museum in 2014 in collaboration with the Institute for History and Theory (gta) at ETH Zurich (catalogue published by gta Publisher in 2014, with Laurent Stalder), the exhibition ‘Sleeping Beauty. Reinventing Frei Ottos Multihalle’ (catalogue published by Spector Books in 2018) on the occasion of the 16th International Architecture Exhibition of the Venice Biennale in 2018. Most recently he curated the exhibition ‘Models, Media and Methods. Frei Otto’s Architectural Research’ at the School of Architecture at Yale University (2020).

INES TOLIC

Ines Tolic is an Associate Professor of the History of Architecture at the University of Bologna. After completing her studies in Architecture at the Iuav University in Venice (2004), she earned a PhD in History of Architecture and Urban History at the School for Advanced Studies in Venice (2009). Her dissertation, dealing with the role of the United Nations in the post-earthquake reconstruction of Skopje (1963–1966), won the Gubbio Prize in 2009. Since then she has written about the role of the United Nations as a global planning agency with a special focus on the decolonizing of territories, about post-war architecture and urban design in Japan, and about post-apartheid architecture in South Africa.

She has collaborated on a number of international projects, including ‘Unfinished Modernisations: Architecture and urban planning in the former Yugoslavia and the successor states’ (EU Culture Programme, 2010–2012), ‘Built city, designed city, virtual city’ (Italian Ministry of Education, University and Research, 2008–2011) and the long-term collaborative project ‘Visualizing Venice.’ The objective of ‘Visualizing Venice’ was to establish scientific protocols for mapping and modelling time and change in a city. The results have been published and exhibited on a number of occasions, all of which are collected in the ‘Visualizing Venice’ website. She is member of the Scientific Committee HPA Histories of Postwar Architecture and member of the Editorial Board of the *European Journal of Creative Practices in Cities and Landscapes* (CPCL). She is a Board Member of the Associazione Italiana di Storia Urbana (AISU, since 2017) and a representative for the region Emilia Romagna within the Associazione Italiana di Storia dell’Architettura (AISTARCH, since 2016).

JARED MACKEN

Jared Macken is an architectural designer and theorist who researches the intersection between architectural form, the city, and cultural production. He received his Doctor of Science in Architecture from the ETH-Zürich in 2018. He is now Assistant Professor of Architecture at Oklahoma State University where he teaches design studio and elective courses that research the typology of the town centre, and how the cities of American Expansion relate to architectural discourse on the city. He is also the author of the award winning book *The Western Town: A Theory of Aggregation* (Hatje Cantz, 2013), a project completed with generous support from The Graham Foundation which grew out of his master’s thesis at the University of Illinois Chicago (UIC). He previously taught at the ETH, University of Illinois at Chicago, University of Kansas, and Wichita State University.

JULES SCHOONMAN

Jules Schoonman is an architect and researcher working as a policy advisor at the Delft University of Technology Library, where he is responsible for the physical and digital presentation of academic heritage. He is project leader for the further development of the Allmaps Viewer, funded by the Dutch Digital Heritage Network and in collaboration with Bert Spaan and Leiden University Libraries.

KELLY GREENOP

Kelly Greenop is a Senior Lecturer at the University of Queensland where she researches the use of scanning in architectural heritage practice and its theoretical implication. Several of the sites digitally captured and researched have been included on the global digital heritage archive CyArk, including the

first Australian site to be CyArk-acquired. She created and co-convened the international conference series ‘digital cultural heritage: FUTURE VISIONS’ with iterations in Brisbane (2017), London (2017, UCL) and Shanghai (2019, Tongji University). Her digital preservation work of heritage sites with Queensland Rail won the National Trust Gold award for heritage contribution in 2017, and the highest honour, the John Herbert Memorial Award the same year. She supervises a number of PhD students researching digital heritage topics including the incorporation of digital techniques to record intangible heritage, visualising large-scale heritage routes using digital means, and utilising digital methods to record and analyse historic urban landscapes.

MARIJA MATELJAN

Marija Mateljan is a researcher and a PhD candidate at Delft University of Technology, at the Faculty of Architecture and the Built environment, in the Department of Architecture. She is a member of the Theory of Architecture and Digital Culture group and she teaches in several design studios, including the MSc 2 Studio ‘The Delivery Society’ and the MSc 3&4 Complex Projects graduation lab at TU Delft. At the intersection of Architecture, Computer Vision and Media Studies, her PhD research explores interfaces between design representation and description, visual reasoning, design methods, and the digitalisation of cultural techniques. Considering the importance of architectural representation for design and communication, she investigates if and how architectural visual data, e.g. drawings, diagrams, renders, photos, could be reused by state-of-the-art technologies to develop new building design methods employing data circularity. Between 2015 and 2021, Marija worked at KAAN Architecten on various Dutch and international projects, including Museum Paleis het Loo, currently under construction, and the New Schiphol Airport Terminal. Marija is experienced in design development and interdisciplinary coordination in various project phases. Before joining KAAN, she worked as a freelance architect in Rotterdam. In 2014 she obtained her MSc degree in Architecture with honours at the Faculty of Architecture and the Built Environment at TU Delft. Prior to her studies in Delft, she completed her undergraduate studies at the Faculty of Architecture in Zagreb.

MATTHEW MULLANE

Matthew Mullane is an Assistant Professor of the History and Theory of Architecture at Radboud University in Nijmegen, NL. He received his PhD from Princeton University and was a postdoctoral fellow at Harvard University’s Reischauer Institute of Japanese Studies, and Tokyo College, The University of Tokyo. His forthcoming book *World Observation* offers an alternative origin for global architecture history in nineteenth-century Japan and theorizes a new role for ‘observation’ in architectural thought. He is interested in the ways that architects have conspired with scientists to develop new epistemologies of ‘global history,’ a topic he has explored in articles featuring geologists and architects in England, and entomologists and engineers in colonial Japan. In addition to his historical scholarship, he has also published on the aesthetic and ethical dimensions of contemporary digital technologies impacting architecture, including social media, cryptocurrency, and blockchain. Forthcoming publications include a book chapter on the reception of global architecture history in Meiji Japan, and a monograph on the global networks of contemporary scientific observatories. His writing has appeared in *Architectural Theory Review*, *The Journal of Architecture*, *AA Files*, *Log*, and *Art Papers*, among others.

NICOLE KALMS

Nicole Kalms is an Associate Professor in the Department of Design and founding director of the Monash University XYX Lab which leads national and international research in Gender and Place. Dr Kalms is author of *Hypersexual City: The Provocation of Soft-Core Urbanism* (Routledge, 2017) and the forthcoming book *SheCity* (Bloomsbury 2022).

RICARDO COSTA AGAREZ

Ricardo Costa Agarez is an architect and architectural historian and theorist. He is currently Senior Researcher at Iscte – University Institute of Lisbon, Principal Investigator of the ERC Starting Grant research project ‘ReARQ.IB – Built Environment Knowledge for Resilient, Sustainable Communities: Understanding Everyday Modern Architecture and Urban Design in the Iberian Peninsula’ (1939–1985) (Iscte – IUL, 2021–2026), and Principal Investigator of the Portuguese research council-funded project ‘ArchNeed – The Architecture of Need: Community Facilities in Portugal 1945–1985’ (Évora University, 2021–2024). His research interests lie in the architectural humanities and the cultural and material studies of architecture and urban design, and he has specialised in the history and theory of 19th- and 20th-century cities and buildings, national and regional identity issues, dissemination and knowledge transfer phenomena, architectural cultures in bureaucracy, collective housing and facilities and public-sphere architecture. His PhD dissertation in Architectural History and Theory, ‘Regionalism, Modernism and Vernacular Tradition in the Architecture of Algarve, Portugal, 1925–1965’ (The Bartlett School of Architecture, University College London, supervised by Adrian Forty) was awarded the RIBA President’s Award for Outstanding PhD Thesis 2013 and published as ‘Algarve Building’ (Routledge, 2016). The Giles Worsley Fellow of The British School at Rome (British Academy) in 2014, he was FWO Pegasus Marie Curie Postdoctoral Fellow at Ghent University in 2015, and, in 2016–2017, postdoctoral assistant at KU Leuven, where, with Rajesh Heynickx and Fredie Floré, he created the FWO-funded Scientific Research Network ‘Texts » Buildings: Dissecting Transpositions in Architectural Knowledge (1880–1980)’. He was assistant professor at the University of Évora (Portugal), Department of Architecture between 2017 and 2021.

ROGER WINKLER

Roger Winkler studied architecture at the Technische Universität Darmstadt from 2012 to 2020. From 2019 to 2020, he was co-founder of the startup ‘FloorPlanMatch’ and from 2020 to 2021, he was a research assistant at the Digital Design Unit (DDU) at the Technische Universität Darmstadt. Since 2020, he is working for the DFG-funded ‘Fachinformationsdienst BAUdigital’ at the University and State Library Darmstadt (ULB), where he is responsible amongst other things for the conceptual development of the research data repository, working closely with researchers from the wide-ranging community. For a broad exchange, the FID BAUdigital also organizes the quarterly ‘DATA TALKS’, a public event in which current topics and developments are discussed with researchers. His research interests include the development of computer-based planning and design tools, digital fabrication technologies and the associated digital process chains.

TIMOTHY MOORE

Timothy Moore is a founder of Sibling Architecture, senior lecturer of architecture at Monash University, and the curator of contemporary design and architecture at the National Gallery of Victoria. Nicole and Timothy are co-editors with Jess Berry and Gene Bawden on the recent book *Contentious Cities: Design and the Gendered Production of Space* (Bloomsbury, 2021).

VÍCTOR MUÑOZ SANZ

Víctor Muñoz Sanz is an assistant professor of urban design at the Faculty of Architecture and the Built Environment, Delft University of Technology. His work examines architecture and urbanism at the intersection of technology, ecology, and labour. He holds a degree in Architecture and a PhD cum laude from ETSA Madrid, and a Master’s of Architecture in Urban Design from Harvard University. Muñoz Sanz was Harvard’s Druker Fellow 2011, emerging curator at the Canadian Centre for Architecture, coordinator of the Jaap Bakema Study Centre, co-principal researcher of ‘Automated Landscapes’ at Het Nieuwe Instituut, fellow at the Akademie Schloss Solitude, and postdoctoral researcher at Delft University of Technology. He is the co-editor of *Roadside Picnics: Encounters with the Uncanny* (DPR Barcelona, 2022), *Habitat: Ecology Thinking in Architecture* (NAI010, 2020), *Footprint 25: The Human, Conditioned* (2019), and has published essays in *Urban Planning*, *Articulo: Journal of Urban Research*, *Harvard Design Magazine*, *Bartlebooth*, *e-flux Architecture*, *Volume*, and *Domus*, among others. His research on automation with Het Nieuwe Instituut was exhibited at the 2018 Venice Architecture Biennale.

XENIA VYTULEVA-HERZ

Xenia Vytuleva-Herz is an art historian, theorist and curator. Her scholarship is focused on new modes of preservation and knowledge production, the intersection of architecture, technology and myths. Before joining the team of Philosophie II at ETH Zurich, Dr. Vytuleva was teaching at the Graduate School of Architecture Planning and Preservation at Columbia University in New York. Dr. Vytuleva has curated a number of exhibitions including: ‘Music on Bones’ in ‘Re-cycle’ at MAXXI Museum in Rome, ‘Experimental Preservation at the Venice Biennale’ and ‘a Diary of the Cold Universe’ by Walter Benjamin at Slought Foundation, Philadelphia. A recipient of various grants and awards, including from the Graham Foundation for the project ‘Secret Cities’, Vytuleva is currently working on the manuscripts *Secret Zones, A Journey through Architecture and Myth* (Contract with The Zone Books), and a project entitled ‘North Trans-National’. Her work has been published among others in *Perspecta* (MIT Press), *Future Anterior* (The University of Minnesota Press), *Avery Review* (Columbia University Press) and *Cabinet*.

Programme

23.11.2022
TU Delft
Berlage Zaal 1

10.30
Doors open

10.30
Opening words and introductions

Dirk van den Heuvel
(TU Delft, Het Nieuwe Instituut)
Georg Vrachliotis
(TU Delft)

11.00
Session Subjectivities

Moderated by Georg Vrachliotis
(TU Delft)

Programming a Record of Site:
Between Coding and Writing
/ Real-Time and Orthographic Time
Alex Blanchard
(Newcastle University)

Archives and Authorship:
A Case Study on the Impact
of Digital Architectural Collections
Ashley Paine and Kelly Greenop
(The University of Queensland)

The Omega Project:
Developing Architectural Narratives
for the Age of Mass Digitalisation
Chiara Monterumisi and Ines Tolic
(University of Bologna)

Designing Consent:
Emerging Spatialities in
Data-driven Work Environments
Victor Muñoz Sanz
(TU Delft)

Q&A

12.30
Lunch Break

13.30
Session Hybridisation

Moderated by Fatma Tanış
(TU Delft, Het Nieuwe Instituut)

Georeferencing Building Plans:
Revisiting Nolli Maps in the Digital Age
Jules Schoonman
(TU Delft)

Mambo Dogface to the Banana
Patch?
Talking Wrong with Deep Learning
Erik Herrmann
(The Ohio State University)

Seeing History with Computer Vision:
The Architecture of
Text-to-Image Synthesis
Matthew Mullane
(Radboud University)

Slides, Software, Data, Drawings:
The Frank Gehry Papers as Hybrid
Architectural Archive
Emily Pugh
(Getty Research Institute)

Q&A

15.00
Break

15.30
Session Inclusions

Moderated by Dirk van den Heuvel
(TU Delft, Het Nieuwe Instituut)

Reading between the Lines
and the Grammars of Concealment
Xenia Vytuleva-Herz
(Basel University)

Reconstructing the Speculative
History of Boley, Oklahoma
an All-Black Town in the Prairie
Jared Macken
(Oklahoma State University)

Smart Cities?
Try Harder with Gender-Sensitive Data
Nicole Kalms and Timothy Moore
(Monash University)

Collective Storytelling of Common
Architecture: Arquitectura Aqui
In Portugal and Spain
Ricardo Agarez and
Diego Inglez de Souza
(University Institute of Lisbon)

Q&A

17.00
Drinks

24.11.2022
Het Nieuwe Instituut
Auditorium

13.30 Session Exhibitions

Moderated by Dirk van den Heuvel
(TU Delft)

Alison's Room:
An Extended Reality Archive
Paula Strunden

Prototypes for a Virtual CIAM Museum
Dirk van den Heuvel
(TU Delft)

Open Archive 3.0
Eline de Graaf
(tbc)

Vertical Atlas
Klaas Kuitenbrouwer
(tbc)

Q&A

15.30 Session Precedents

Moderated by Dennis Pohl
(TU Delft)

From Structured Spaces
to Unstructured Data:
Herman Hertzberger from
a Computer Vision Perspective
Marija Mateljan
(TU Delft)

From Cybernetics to Datacenters:
Searching for Reflexivity
in Architecture
Berna Göl
(Yeditepe University)

How Can a Repository Become
a Digital Data Lab? About the
Future of Architectural Research
Chris Dähne
(Goethe University Frankfurt,
TU Darmstadt)
and Roger Winkler
(TU Darmstadt)

Q&A

18.00 Buffet at Het Nieuwe Café and visiting exhibitions

20.00 Keynote Lecture

Bouwcentrum Rotterdam Reloaded:
From Buildings to Data, and back again
Georg Vrachliotis
(TU Delft)

CONFERENCE

Conference organising committee:
Dirk van den Heuvel (convenor of the conference and head of the Jaap Bakema Study Centre)
Georg Vrachliotis (TU Delft)
Fatma Tanış (coordinator of the Jaap Bakema Study Centre)
Dennis Pohl (TU Delft)

Academic advisory board:
Tom Avermaete (ETH Zurich)
Hetty Berens (Het Nieuwe Instituut)
Maristella Casciato (Getty Research Institute)
Carola Hein (TU Delft)
Georg Vrachliotis (TU Delft)

PROCEEDINGS

Editorial team:
Dirk van den Heuvel
Fatma Tanış
Bing van der Meer

Graphic design:
Ronja Andersen with Bing van der Meer

Published by TU Delft and Het Nieuwe Instituut, Rotterdam, November 2022.

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