

# VOLUME

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# DEER BYE AUNT



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**SPRING WAS IN THE AIR, A SENSE OF CHANGE AND RENEWAL. MIGRATING BIRDS WERE GETTING READY FOR THEIR GRAND TOUR, NATURE WAS RETREATING. TEMPERATURES WERE STILL MILD, CONSIDERING THE SEASON AND MAYBE THAT HELPED. ALL AROUND THE GLOBE PROTESTS WERE HEARD, PEOPLE CLAIMING THEIR RIGHTS. MUFFLED BY FACE MASKS THE SOUND WAS NOT AS LOUD AS IN ORDINARY TIMES, BUT THE MESSAGE WAS CLEAR ENOUGH: THINGS HAD TO CHANGE.**

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# ON PREPPERS, DUTCH TOMATOES AND AUTOMATION

## GILLES RETSIN

**A 2016 study by McKinsey pinpointed the construction industry as the least digitalized sector, second only to hunting. Although screaming for innovation, Gilles Retsin warns about the pitfalls of the conventional mantra of digital architecture, and drafting a way to reclaim automation from the hands of tech platforms.**

In better days I would have commenced writing this article evoking a number of global crises, but the sheer number appearing on recent front pages has led to a form of linguistic inflation: crises are now the new normal – an expression in itself rising to become a cliché. If there is one community particularly pleased with this manifold of emergencies, then it's prepper culture, also known as survivalism. Widely ridiculed after the end of the Cold War, preppers are now again regularly sighted outside their respective dens donning long beards, beer-bellies, and automatic weapons. Stemming from libertarian ideology and an overdose of disaster movies, apocalyptic prepping feeds on the idea that both state and society have collapsed. The subsequent process of re-civilization requires strong, self-reliant white alpha-males, masters in martial arts, survival techniques, and DIY.

You might be wondering why we are talking about preppers, however, they are not unimportant to understand some of the thinking behind current architectural discourse on digital making and digital fabrication. As Evgeny Morozov aptly described in his article 'Making It' for *The New Yorker* 1, the idea that digital making will allow people to pull themselves out of misery – building their own houses, cars or businesses – is derived from the same libertarian ideology as the preppers. Cultural theorist Josef Nguyen further notes how the convergence of both prepper culture and the maker movement is rooted not only in the feeling of alienation from the globalized industrial world, but also in a shifting geopolitical context 2. For example, Nguyen describes how *Wired's* former editor Chris Anderson, a fervent advocate of maker-culture, sees 3D-printing as a means to compete with China: "Real countries make stuff". In brief, maker culture can be understood as a reaction to automation which privileges horizontalism and localism, but in its darker fringe also verges on the alt-right, libertarian side of an ongoing culture war.

This very notion of maker culture is heavily influential in contemporary architecture's discourse on digital fabrication and automation. While an initiative such as WikiHouse is arguably situated on the other side of the political spectrum, libertarian maker-ideology is present in their attempt to solve the housing crisis by giving entrepreneurial families access to fablab-tools to build their own houses. Reddit users have theorized this as the "political donut" theory, where ideas from the left end up on the right and vice versa, in a continuous loop around an inaccessible center 3. For example UBI (Universal Basic Income), a policy related to mitigate the loss of jobs caused by Automation, comes back in both the ultra-libertarian proposal and in those of the modern-day socialists.

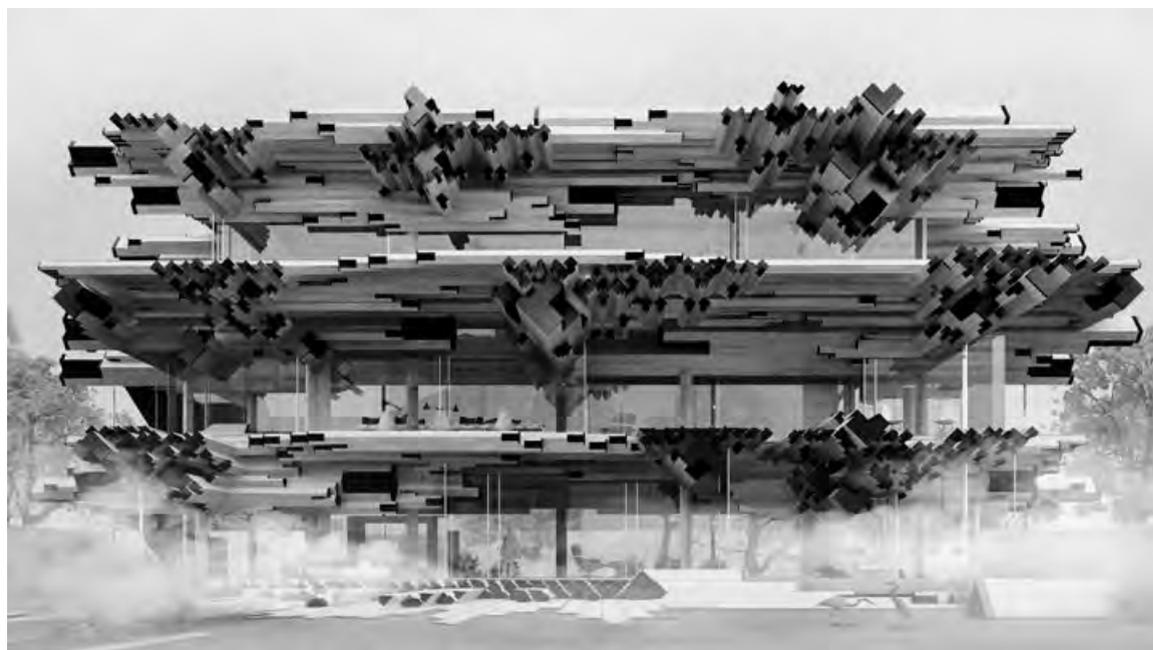
**WHILE PLATFORMS ARE BECOMING  
EVER-MORE POWERFUL, OUR  
HORIZONTALISTS ARE DIRECTLY OR  
INDIRECTLY PROMOTING THE  
IDEA THAT POLITICS HAVE FAILED**

One thing is for sure: once we embark on a discussion about automation, politics are unavoidable. Interestingly enough, this discussion is almost entirely non-existent in architectural discourse, despite more than three-decades of lasting engagement with the digital. However, it is not a stretch to link the theories around digital design to our previous debate: it sits firmly on the side of Kevin Kelly, Chris Anderson, and the crafty makers, preppers, and solutionists. As architectural historian Mario Carpo described in his book *The Alphabet and the Algorithm*, throughout the nineties, digital production was often framed as a paradigm of “Digital Craft”<sup>4</sup>. Carpo envisioned a Neo-Ruskinian world opposed to industrial mass-production, where the Digital craftsman – a novel William Morris – would collapse the bridge between architect and builder. The architect became a digital maker, creating unique one-offs, in every instance customized to the individual. In continuity with Postmodernism, the early digital was framed in direct dialectical opposition to Modernism and its vertical, state-funded universalism.

Just as with the preppers, the Covid-19 crisis only reinforced the maker-ideology of the early-digital architects<sup>5</sup>. Designers with access to 3D-printers started manufacturing face shields and masks to make up for the global breakdown in production and bureaucratic delays. Carbon dioxide emissions dropped, Greta moved to the back pages of the news, and both sides of the culture war seemed to agree on the future direction of the world: it will be local and horizontal.

## DIGITAL ARCHITECTS HAD HAILED FOR DECADES THE FUTURE ADVENT OF MASS-CUSTOMIZATION TO UNLOCK SUPERFORMS

But it is not that simple: While we were busy baking sourdoughs at home and 3D-printing face masks, the Covid-19 crisis also made us increasingly dependent on vertical platforms such as Amazon. While these platforms are becoming ever-more powerful, our horizontalists are directly or indirectly promoting the idea that politics have failed. This is great news for the Bezos’s and Zuckerbergs of the world, as breaking up their platforms would require strong politics. In architecture we are beginning to see a similar plot unfolding. While we are busy imagining self-built, digitally crafted houses, out of desperation that the housing crisis would ever be solved politically (let alone by the market), new vertical platforms active in construction and architecture are gearing up to disrupt the famously old-fashioned building industry, powered by an influx of venture capital. This new *space*, to use a word so dear to the tech world, ranges from AirBnB, which recently started a design branch, Project Samara, to Alphabet’s subsidiary Sidewalk Labs, to Softbank-funded timber-prefabber Katterra. Before it attempted to go public, we would have also listed WeWork here.



Diamonds House Belgium, Gilles Retsin, 2016

It is intriguing to see this new industry revive what postmodern and digital architects dismissed: modernist vertical production, universal modular parts for collective mass housing. What Charles Jencks declared dead after the demolition of Pruitt-Igoe is now firmly back, but this time around in the hands of venture-capitalists (as Marx famously said, history repeats itself first as a tragedy, then as a farce). While initiatives such as WikiHouse aim to provide polite single-family homes in plywood, *con-tech* platforms Katterra and Sidewalk Labs collaborate on an ambitious cross-laminated timber kit of modular parts to be used in high-rise offices and homes, fully integrated with digital management tools and on-demand services. On the other hand, *prop-tech* companies such as The Collective, Common, Sharedd, Lyvly or Bedly sell a lifestyle vision for the 21st century digital nomad, experimenting in a number of countries with new modes of shared living and working. In contrast, others experiment with new software platforms, AI-floor plan generators and blockchain contracts. These hyper-capitalist platforms are arguably more daring and experimental than many of our digital neo-Ruskinians and WikiHouse builders.

The emergence of construction-tech platforms is a sign of the much-needed change to happen in the construction industry, but also raises serious socio-economic questions. Under the pressure of venture capital, the centralized model of platforms seeks to establish quasi-monopolies akin to the likes of Uber and Airbnb, all started from the appealing value proposition of democratized production, or “sharing economy”<sup>6</sup>. As Srnicek explains, part of the reason why platforms such as Facebook, AirBnB, or Uber became unbeatable is because they got there early: the platform that obtains the largest user group is the first to benefit from the so-called network effect, which makes it increasingly difficult for alternative platforms to compete. The kind of automation that Katterra and Sidewalk Labs stand for is bound to completely alter the very idea of the home, turning it into a kind of modular service and a commodity on the market. The role of the architect is reduced to tinkering with an already pre-established BIM catalogue of parts within the rigid constraints inscribed in the software, not to mention the consequences for architects and contractors who are not integrated throughout the end-to-end business model<sup>7</sup>.

Sidewalk Labs' recently aborted attempt to build a neighborhood in Toronto raised serious questions on data collection, privatization of public space and legislation.

Of course, the potential danger posed by these new platforms has to be nuanced: at present, the emerging construction-tech space actually contributes to disrupting the prevalent quasi-monopoly of large developers and contractors in a classic design-bid-build model<sup>8</sup>, often offering lower quality and less environmentally friendly solutions than their upcoming competitors. However, it's important to explore alternative models of decentralized, open forms of automation which could empower a larger ecology of designers, builders and future inhabitants, but also prevent further privatization and homogenization of our build environment.

It's worth taking a little excursus into the world of food production as an analogy with the automated construction of our built environment. The Netherlands famously produces more food than it consumes, and despite its rather small size, is the largest exporter of vegetables worldwide. The reason for this remarkable achievement is the extreme degree of industrialization and automation employed in the sector. While this allows for incredible efficiency, it also results in arguably the world most tasteless tomatoes - the polar opposite of the artisanal, small-scale, flavorful crafty varieties found around the Mediterranean, sharing with its Dutch surrogate nothing but the name. However, as Mediterranean tomatoes are only available to the lucky few, they cannot compete in the market with the cheap Dutch ones, let alone supply the whole world.

## THIS 'DUTCH TOMATO' PRINCIPLE CAN BE APPLIED TO BOTH THE NEW CONSTRUCTION-TECH PLATFORMS AND THEIR DECENTRALIZED ALTERNATIVES

This 'Dutch Tomato' principle can be applied to both the new construction-tech platforms and their decentralized alternatives: on one side con-tech platforms like Katterra and Sidewalk Labs aspire to become the housing tantamount to Dutch tomato farms, pushing performance and mono-culture; on the other WikiHouse is the equivalent of the urban farm, interested in combining production and living together, yet unable to deliver a scalable alternative to global food production. Both the con-tech verticalists and their horizontal alternatives are platforms for housing, but not per se for architecture. In both scenarios, architects or *users* can choose materials and textures, façade panels or alter the shape of the roof, but they remain locked within the limited and pre-configured design space defined by the platform. Concentrating on the mere provision of housing in a rigid market, the cultural dimension becomes secondary - in the same way preppers and makers focus on supply rather than imagination.

We are left with either Sidewalk Labs - a vertical model of a *SmartCity* with neo-modern towers for an urban tech-elite - or Wikihouse - a horizontal *Prepperville* with CNC-fabricated low-rise, pitch-roof cabins built by individuals and enterprising families. But can we imagine an open, scalable and culturally relevant alternative to compete with the venture-capital backed construction platforms?

### Discrete Automation

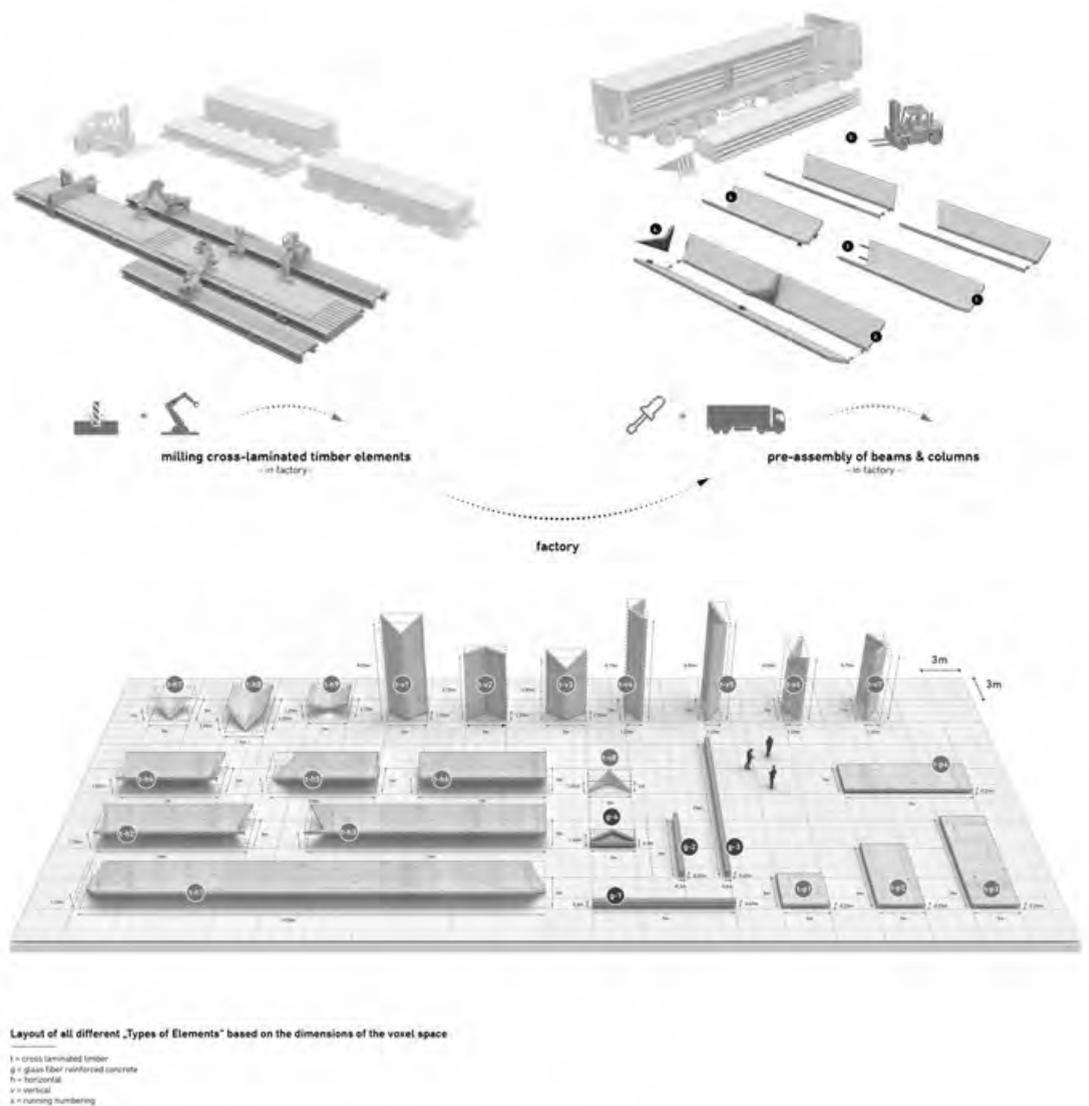
With a focus on complex curvilinear superform, digital experimentation in architecture has not entertained these questions until recently, leading to the notable absence of economic and social dimensions in the digital discourse. In the face of the increased homogenization of our cities, and still indebted to a crafty approach, architects have understood digital tools as benevolent means for formal exploration instead of understanding the digital as 'automation', - a technical and economic process with profound socio-political consequences. However, following the 2008 financial crisis, a loosely connected group of emerging architects, designers and theorists - including Jose Sanchez, Daniel Koehler, Rasa Navasaityte, Casey Rehm, and Mollie Claypool - attempted to critically re-frame the digital discourse, starting from the *discrete unit* and its potential to enable full automation of design and construction. It is in this re-framing around automation that we may find answers to our questions on alternative platforms.



Royal Academy London, Gilles Retsin, 2019. Photo by NAARO

The discrete approach to automation initially developed by focusing on the notion of the *elementary discrete unit* as the basis for computation, rather than the continuous, seamless curvilinear forms commonly associated with digital affordances. The digital architects had hailed for decades the future advent of mass-customization to unlock such superforms, manufactured by machines able to cut thousands of different components at no extra cost, the laborious process of assembling these thousands of bespoke elements was never part of the equation. Carpo critiqued the theoretical basis for the continuous early digital in his article 'Breaking the Curve', arguing that computation is in fact a discrete process of compiling bits of data, and has therefore little to do with curvilinear parametric geometry <sup>9</sup>.

At the same time, engineers and researchers in robotics and computer science, such as Neil Gershenfeld with the Centre for Bits and Atoms at MIT, had taken a very different stance towards robotic fabrication compared to the early digital architects, a position based on fundamental discreteness in both design and fabrication. Along with other scientists such as Hod Lipson, Gershenfeld argues that while we have digitally-controlled machines, the materials these operate on are still analog: we make objects by continuously adding or removing material, such as in 3D-printing or CNC-routing. In contrast, a "digital material" would be a one that has a limited number of joints – in other words, its connections are discrete (just like signals, an analog signal is continuous, whereas a digital signal is discrete, consistent of bits). A LEGO brick can be considered as a "digital" material, since it has a limited, discrete set of possible connections <sup>10</sup>. An actual brick wall, on the other hand, is analog because to link the elements it uses mortar, which has infinite connections possibilities – there is no discrete joint, it can continuously connect to other bricks. With digital materials, larger functional structures are created by assembling generic, function-less discrete building blocks together, which can then also be disassembled or altered again at a later stage. This idea is often compared to molecular biology, where all of life is composed of just 20 standardized amino acids as modular building blocks.



Nuremberg Concerthall, Gilles Retsin and Stephan Markus Albrecht, 2018

The proposition that there is such thing as "digital" organizations of parts was what initially triggered the curiosity of the post-2008 generation of discrete architects, as this would mean that the elementary composition or syntax of a building could be "digital", rather than modern. More importantly, however, the economic processes and politics of construction could, in turn, become digital and automated as well. Just as with the example of the amino-acids, a digital understanding of the architectural part could lead to a high amount of diversity and functionality while remaining efficient and scalable. The incredibly complicated world of commodified building elements laid out in Rem Koolhaas' *Elements of Architecture* could potentially be bypassed by a digital understanding of the part and its platforms. While an interest for composition and part-to-whole relations was generally considered stuffy and dull, for the emerging Discrete architects it presents the opportunity to propose alternative economic platforms and a radically different architecture.

## COMPUTATION HAS LITTLE TO DO WITH CURVILINEAR PARAMETRIC GEOMETRY

The industry of end-to-end integrated building platforms such as Katerra and Sidewalk Labs, needs huge, capital-intensive factories to produce an endlessly repeating set of the same modular elements – columns, beams, slabs, façade panels – effectively turning them into the venture-capital backed version of 1950s Soviet house builder. The discrete shifts this industrial model from mechanized production to digital production, using versatile industrial robots and simple base materials. Just like designers have switched their production from teapots or chairs to facemasks, a discrete automation factory – operating with universal machines – can produce difference at no extra cost, based on the robotic assembly of repeating, serialized parts. Therefore, this discrete approach is able to construct a complex variety of outcomes from simple base materials, unlike the modernist cookie-cutter modularity and its contemporary reincarnation as the integrated building platform. The discrete discourse advances a process of design and automation based on assembly, modularity and seriality – tropes we know all too well from Modernism. However, a digital understanding of parts means that these elements are always generic and preemptive, and they have no specific single function. Consider a column that is a beam but also a floorplate: discrete elements independent from the building they will eventually construct, can be assembled into distinct formations that could vary in every instance with their function emerging after assembly. This is an informational process that comes at no extra cost, where a robot, worker, or self-builder is instructed to position a part in a certain position and orientation – without having to customize it. Combining the efficiency and scalability of modular prefabrication with the complexity, open-endedness, and adaptability of the digital, discrete automation allows for small, distributed factories with a high degree of automation, able to operate at scale without a long and capital-intensive production chain.

With my own practice and research, we have tested this approach on 1:1 prototypes, full-scale architectural proposals and speculative housing schemes. This is perhaps most emblematically demonstrated with Diamonds House (2015), a project for a multi-family house in Belgium. The residence consists of a limited set of autonomous, discrete building blocks cut from standard timber sheet materials, combined to establish higher-level organizations. No Slab, beam, wall or unit: the architectural features and functions emerge from the granular assembly of the building blocks, rather than being predefined by architectural or structural types. This allows the actual mass-customization of every instance, at the resolution of the part itself, while not requiring any additions to the production chain. The resulting house is not a one-off but exists parallel to endless granular variations. To test the process and demonstrate the spatial qualities of the discrete, a section of this project was built at the Royal Academy of Arts in London (2019).

## THE DISCRETE FOCUSES ON SCALE AND SOCIAL IMPETUS RE-CONNECTS WITH THE POLITICAL AMBITION OF MODERNISM



Nuremberg Concerthall, Gilles Retsin and Stephan Markus Albrecht, 2018. Rendering by Filippo Bolognese

A competition proposal for the Nuremberg Concert Hall developed with Stephan Markus Albrecht (2018) scales up the approach to large Cross Laminated Timber sheets (CLT) assembled into repeating elements, with a hollow cross-section that contains building services. To organize the hundreds of generic timber modules into a functional building, an algorithmic procedure was developed based on a so-called 'voxel-space', or a volumetric pixel: an algorithm assembles digital, v-shaped patterns into larger structural elements surrounding the functional program of the concert hall. The voxels translate into repeating CLT plates, which then again form large modules that cluster into specific spatial patterns such as a wall, corner or ceiling. The resulting architecture can be understood as an engineered timber monolith: walls, ceilings and columns don't exist as functional types, but the repetition of one single material operation structures the entire housing block. This form of automation doesn't result in a hyperbolic, shiny language, but returns architecture to its primordial core, stripped of the complicated, wasteful and alienating industrial commodification exposed in Koolhaas' Elements of Architecture.

A further, speculative proposal for the 200M Housing Block (2018) continues this approach: the 200 meters long residential block consists only of repeating building elements assembled in a different position in every instance. The final building is merely 'compiled' from elements, a 'granulate', a strange hybrid of the modernist legacy of large-scale housing projects with digital design thinking resulting in the almost primordial aesthetic derived from the granular agglutination of modular parts. This project is more aligned with the new construction-tech platforms than with WikiHouse: not a single-family home, but hundreds of meters long, digitally-manufactured, cross-laminated timber housing-block, algorithmically designed and assembled by robots, but as the speculation goes, commissioned by the State or by a massive peer-funded cooperative, rather than SoftBank.

Discrete Automation is neither exclusively vertical nor horizontal: the serialized building blocks and their robotic assembly mechanisms could be organized top-down through research institutes backed by state or venture-capital. To enable horizontal eco-systems of actors, these could then be licensed out to preppers and wiki-house enthusiasts. Better still, local contractors, cooperative communities and private developers could make use of these automated discrete assemblies, in turn, contributing to the discourse on new modes of living, as well as new platform models.

The discrete approach is not dialectically opposed to neither modernism nor the early digital: it effectively combines the seriality, scalability, and part-focused assembly of the former with the complexity, variability, and customization of the latter. Its focus on scale and social impetus re-connects with the political ambition of modernism. Yet, developing the ability to understand every instance of a home and lifestyle as unique and particular, it defies modernism's universality. The discrete demonstrates how the prevalent digital design discourse, with its focus on formal complexity, could be subverted to form an alternative imagination leading to the automation of the built environment, a condition able to deliver low-cost, scalable differentiation for mass-housing.

This summary on Discrete Automation wants to encourage architects to escape the prepper-logic and again boldly speculate on how we could live in the future. Critically reflecting on the emerging con-and prop-tech platforms, it wants us to think about how to turn the cold, cynical, and logistical reality of automation into a project with an architectural agenda that creates value for all. Just as when the recent EU bio-diversity strategy wants to plant 3 billion trees, our challenge to house 2 billion people in the next few decades cannot just be considered as a mere logistical project. Discrete automation can allow us to deliver this project with 'granular diversity', at scale and for no extra cost. In fact, both the EU's plans for reforestation, the production of tomatoes, and new housing platforms could be considered part of the same agenda: the design of the automated management of our forests, our food, and our cities.

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- 3 [https://www.reddit.com/r/ENLIGHTENEDCENTRISM/comments/8m616l/the\\_political\\_donut\\_a\\_horseshoe\\_theory\\_in\\_two/](https://www.reddit.com/r/ENLIGHTENEDCENTRISM/comments/8m616l/the_political_donut_a_horseshoe_theory_in_two/)
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## Colophon Volume 57

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**Nonprofessional** features designers, curators, writers, architects and students who took part in the Non-Professional Practice course at Harvard GSD. With Åbåke, Antwaun Sargent, Arta Perezic, Carlos J. Soto, Connie Trinh, Durga Chew-Bose, Elif Erez, Eva Lavranou, Faris Al-Shathir, Felix Burrichter, Jeremy Benson, Jennifer Bonner, Jiangpu Meng, JIM JOE, Karen Wong, Klelia Siska, Kofi Akakpo, Malkit Shoshan, Oana Stanescu, PLAYLAB, INC, Troy Conrad Therrien and Yasong Zhou.

**Peripheral Visions** occur away from the center of gaze, crucial for sensing motion and detecting threats. The vast majority of the visual field is Peripheral Visions. Look away.

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