

Rustic figuration exemplifies recent trends in digital research, which is now engaging with long-standing questions of architectural representations and discourse instead of breaking with them.

## Rustic figuration

Ulrika Karlsson

The ubiquitous presence and use of computational techniques to capture, retrieve, extract, 3D scan, process, model, simulate, augment, connect, assemble, upload, print, disseminate, and produce material; to fabricate and manufacture; to engage in social interaction; through the use of computers and different mobile devices, machine vision and computer numerically controlled (CNC) techniques, Internet, various apps and social media, permeates our culture, including architecture. These entwined relationships between the physical and the digital continue to produce sensibilities where our understanding of the division between the virtual and the real is becoming blurred.

In the exhibition catalogue to *Archaeology of the Digital* (2013), Greg Lynn points out that design experimentation using digital tools at the time when digital media was extensively integrated in the architectural field, paralleled a break between design and history/theory; between design and a critical, disciplinary use of technology, a link that had been so important to postmodern architecture before it.<sup>1</sup> Designers embraced computational experimentation and ‘mindless variety was celebrated for its own sake, without theoretical, cultural, artistic or disciplinary criteria’<sup>2</sup> according to Lynn. In the project *Archaeology of the Digital* there is a focus on a recent past with a closer look at architectural practices Peter Eisenman, Frank Gehry, Chuck Hoberman and Shoei Yoh, which engaged in logics of computation just prior to the abundant introduction of computers for design and simulation at architecture schools world wide. This was the 1990s, when computers replaced the drawings boards and the paperless studio at Columbia University became a sign of that time.<sup>3</sup> This educational paperless culture successively embraced physical output, through means of computer-aided manufacturing such as CNC routing.

In parallel, in universities and at schools of architecture, the use of evidence such as historical precedents to support the development of architectural projects, gave way to other evidentiary material, such as visualisations of data

in diagrams, flow charts, maps, and numbers.<sup>4</sup> Quantitative information and data became at least as important as cultural, artistic, and disciplinary reasoning. Zeynep Çelik Alexander describes it as a naturalising tendency or as what she calls a ‘neo-naturalism’.<sup>5</sup> As such, these early explorations of digital technology seemed to mark a shift with the more traditional concerns of design criteria architectural discourse.

However, the period since the mid-1990s has entailed shifts, turns, and multiple trajectories in architectural practice, design research, and architectural discourse, both in terms of techniques and in architectural discourse. It has fostered discussions around the ‘critical’ versus the ‘projective’, and produced many narratives of digital turns, the material turn, and most recently discussions around the post-digital.<sup>6</sup>

As computers and computer technology have taken the place of drawing boards, it has become clearer that drawing, as a core disciplinary activity and technique for architectural design development and of representation, has changed. Nevertheless practitioners and theorists continue to challenge the role of the architectural drawing, and to engage in discourse around architecture and representation in broad terms, including drawing as an activity for design development and exploration.<sup>7</sup>

For example, in his article on post-digital drawing, Sam Jacobs argues that the culture of digital rendering and the desire ‘to make the fiction seem “real”’, almost killed the architectural practice of drawing. But he identifies that architectural representation and ways of drawing are today marking a change in architectural culture.<sup>8</sup> The production and use of representations, images, and different modes of drawing are, with the use of computers and their continuous connectivity, both technically and conceptually different. They change both how we draw and make images and what we draw and make images of. Through a survey of historical drawing precedents from architects such as Piranesi, Boullée, Mies, Stirling, Hejduk, and Hadid, Jacobs has hybridised drawing projections, ‘digital and hand drawn, rendered and etched, part

painting and part assemblage'.<sup>9</sup> Jacobs proposes a post-digital approach to architectural drawing, which not only represents the world, but also makes the world as a disciplinary tool.

These various techniques and ideas about representation in architecture today give rise to ambiguities in distinguishing between them. John May gives a historical and philosophical account of the technical basis of photography, drawing, image, and the status of the computational image in architecture in his article 'Everything Is Already an Image'.<sup>10</sup> Where computational images and drawings produced with the aid of computers are discussed as real-time simulated representations, he argues that the models we generate digitally are simultaneously a model and an image; 'Our models contain simulations of all possible future drawings.'<sup>11</sup>

In response to the numerous and varied representations in contemporary architecture, another account is given by Gail Peter Borden and Michael Meredith. They propose two categories; drawing and medium, where drawing represents intent and medium is a methodological approach or a combination of methodological approaches. They argue that the notion of drawing remains a primary instrument of architectural mediation. Embedded in history of architectural practice and thinking, drawing continues to be a tool for understanding and investigating the discipline of architecture.<sup>12</sup>

#### The work of servo and Brrum

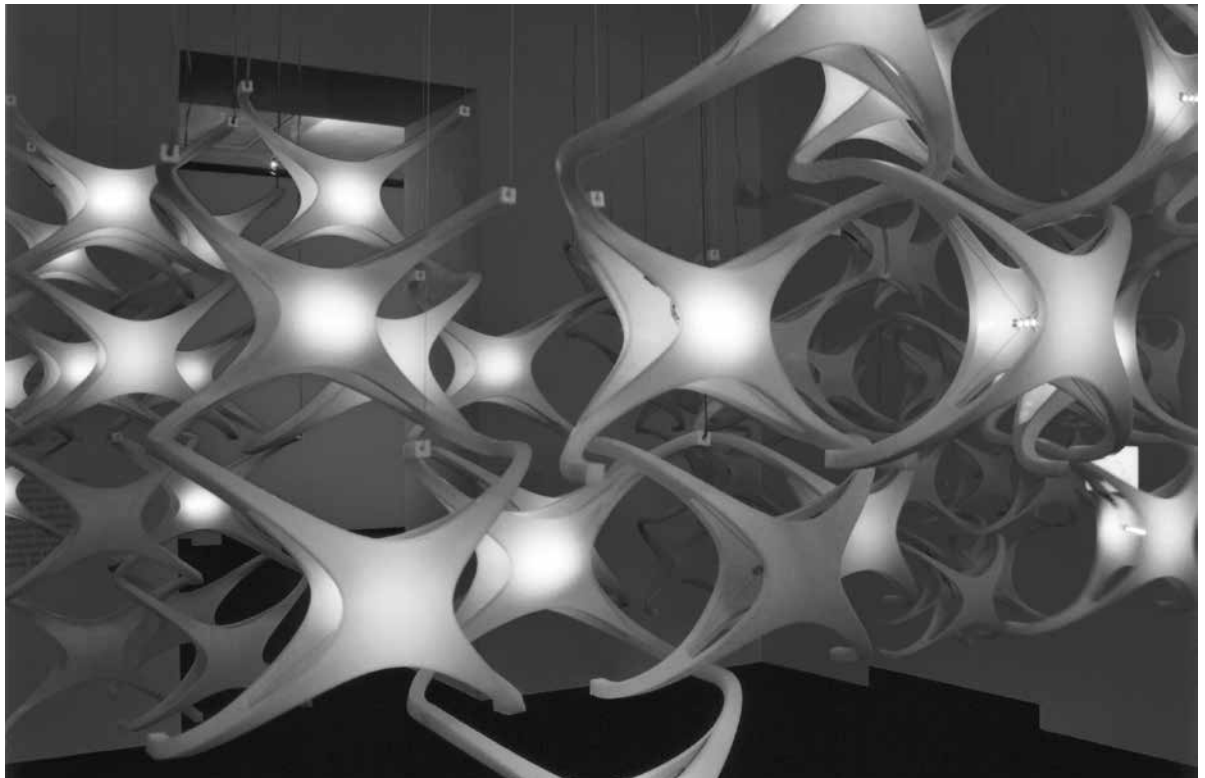
In the work of my own practices, servo and Brrum, I have observed a similar shift since the 1990s, away from seeing the digital as marking a break with architecture's previous concerns, towards

understanding the digital as another set of tools with which to explore architectural discourse and design. In common with other practices, we continue to explore the mediation between drawing (or a set of notations) and its material manifestation in architecture and design; for example where material qualities are neither bound by the unique properties of the physical material, nor bound by the machined or digital information, but happen in the translations between digital information and the material manifestation.<sup>13</sup> This approach will be explored in detail in the text below on rustic figuration.

Concerns with the role of history, for example, or an engagement with precedents, or with techniques of architectural representation inform our work differently from project to project. Two very different projects, *Lattice Archipelogs* by servo in collaboration with Smart Studio/ Interactive Institute from 2002 and *Blockterräng* ('Boulder Cluster') by servo in collaboration with Brrum from 2014–17 exemplify this [1, 10]. In both projects, stereotomy, or the cutting of solids, has been a point of departure for the development of the design.<sup>14</sup> *Lattice Archipelogs* is a site-specific interior modular installation that integrates a responsive LED light system. The geometric logic of the modular cells is based on the formal device of constructing groin vaults, through two intersecting barrel vaults. In the case of *Lattice Archipelogs* it entailed the intersection of two half cylinders and techniques of offset. The cells only need to be

1 *Lattice Archipelogs*, 2002, servo in collaboration with Smart Studio/ Interactive Institute.

2 T+E+A+M, Detroit Reassembly Plant, Perspective and section, 2016.



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abutted at its four corners and by interlocking they form a counterbalanced lattice network that is vertically staggered in space. The cells are threaded with an infrastructure in a helical pattern that enforces the geometric logic.<sup>15</sup>

*Blocketerräng* is a competition proposal for a residential/public use building on the central square of a town in Sweden (Katrineholm). In *Blocketerräng* there is a specific interest in the relationship between classical rustication techniques and their reference to the stone substrate of the ground and how it can be recast in the context of contemporary architecture. In this case it is not only about the relationship between the lightness of stereotomy and the heaviness of rustication, but about how the rusticated surface has the capacity to blur the legibility of the figure of geometry. Whereas *Lattice Archipelogs* design was based on geometric modeling, the stereotomic technique of rustication in *Blocketerräng* was based on a digitally mediated process where intensities in 2D raster images translated to relief maps, provided the instructions for the rustic articulations. There is a shift in focus from geometry informing a solid, to a 2D image storing information for the articulation of a three-dimensional solid.

The following text about 'rustic figuration' and the three related projects explore the architectural problem of rustication. Digital design research is used to contribute to the framing of an aesthetic and material concept with a long history in architecture. As such it is exemplary of these more recent approaches in digital design research that I have framed above; the growing interest in disciplinary questions about architecture and its relationship to the history of digital tools and techniques, which includes the role of architectural

representations and their translations from one media to another, the role of history and precedents to support and understand the cultural context of architecture and questions about relationships between geometry and material.

#### Rustic figuration: Introduction

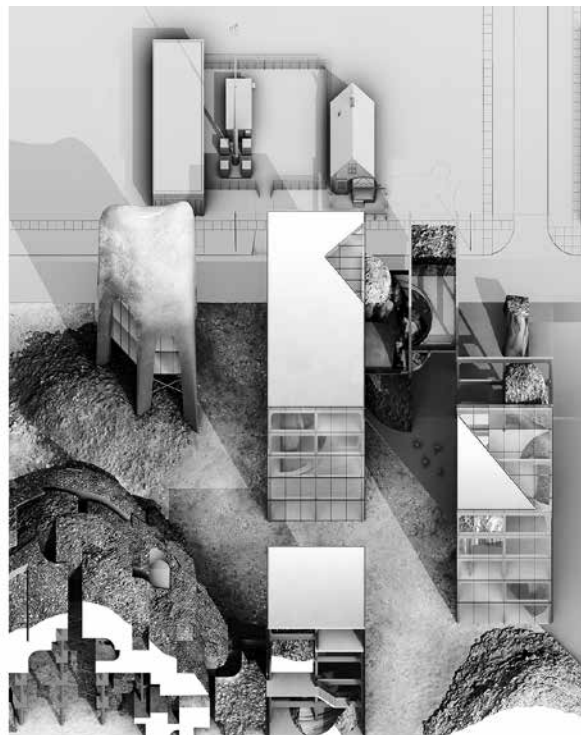
This text tries to describe, define, and situate rustic figuration as an aesthetic and material concept in architecture. Rustic figuration as a concept has developed through architectural design research in parallel with a research into the history of rustication. The notion of rustic figuration is imbued with architectural qualities that oscillate between the legibility of form and geometry and the disappearance of that legibility. It operates between clearness and unclearness, creating architectural and material ambiguities.<sup>16</sup>

The first part of the text situates the concept of rustic figuration in relation to related discourses in architectural history, as well as in the context of a few contemporary practices and projects that engage both computational and analogue techniques for design, communication, and fabrication. The second part of the text discusses several projects by the author, design-based research conducted in the contexts of servo stockholm, servo los angeles, and Brrum.<sup>17</sup>

#### Rustication

*Rusticated masonry was a conceit, representing the crude roughness of unworked stone in various ways, as if the aspiration to rise above the ground had not quite succeeded.*<sup>18</sup>

Rustication in architecture is traditionally used to mediate between the roughness of the ground





3 Grottes des Pins, at Château de Fontainebleau (1541–3).

4 Architecture de Philibert de l'Orme, Livre VIII, Philibert de l'Orme, 1648.

and the refined tectonic of the architectural building mass above. Conventionally, it refers to rustic stonework, formed out of large blocks with roughened surfaces and sunken or bevelled joints. A variety of masonry techniques such as the rustic versions of polygonal or cyclopean stonework, lacking vertical or horizontal joints and the regular rectangular ashlar blocks, where forces are directed orderly, horizontally and vertically, have been used for different purposes in architecture. Rustication can also appear as roughly cut timber or untrimmed branches, sometimes creating a stone-like surface. This technique is also called feigned rustication.<sup>19</sup> Rustication has been used by many cultures; in ancient times, during Antiquity, and it became popular in Western culture during the Renaissance. The Mannerists further developed rustication, and it was frequently employed up until the late nineteenth century.

In contemporary architectural practice, we see the ubiquitous use of numerically controlled digital geometries, machine vision, and robotic techniques for design and production and at the same time an embrace of rough material experimentation and the capturing of generic low-resolution information, contributing to architecture with a rough, rustic-like appearance. Techniques may entail remote material deposition,<sup>20</sup> the reuse and recasting of concrete, rubble, and other building debris [2],<sup>21</sup> or an interest in capturing and using machinic errors, to inform the architectural tectonics with a numerically roughened effect.<sup>22</sup>

'Rusticate' originates in the English word 'rusticus', which refers to someone or something that is lacking in elegance or refinement; unmannerly, unrefined, or rough, relating to, or suitable for the country. The Latin adjective *rusticus* means rural, simple, rough,



or clownish. Rustic figuration, as this text is entitled, can be described as the ambivalent architectural qualities of the rustic, sometimes unruly materials or pixels, over the legibility of form and geometry or vice versa. Something that is clearly legible as geometry and figure at one moment, and at the next moment is read as simply brute material or as an unclear blur.<sup>23</sup> An example of rustic figuration can be found in the rustication at the Grotte des Pins (1541–3) at Château de Fontainebleau [3]. The ambivalence of the appearance and disappearance of the Atlantes figures and the rustic quality of the rough-cut or roughly hewn stone with sunken joints, blurs the contour or outline of the figure. The breasts, the six-pack, and the muscles of the figure share the material articulation and grain size of the stone blocks.

Another example of the proposed concept of rustic figuration would relate to the Latin adjective *rusticus* and be described as clownish.<sup>24</sup> For example, Philibert de L'Orme's drawing of a rusticated temple from *Architecteure de Philibert de L'Orme, Livre VIII* (1648), depicts an almost 'clownish' mass of a temple [4]. The exhaustive use of different rustication techniques and applications in this illustration, mocks the clarity and formal legibility of many other Renaissance temples. The rustication breaks up parts of the mass and the volume of the rotunda, as well as the figure and geometry of the pediment. As Evans puts it, 'Philibert Delorme himself had published a proposal in which he used every imaginable rustication device to emphasise the mineral weight of rock as recalcitrant to human will.'<sup>25</sup> It is relevant to ask whether the (contemporary) interest to defy the legibility of formal logics in architecture is a technological or cultural phenomenon.<sup>26</sup>

### Legibilities

Acknowledging complexities of legibility has been a topic of interest in fields such as art and literature as well as in architecture, as pointed out by Robert Venturi in his seminal book *Complexity and Contradiction in Architecture* (1977). In this book, Venturi ventures into the project of exemplifying different perspectives on complexity and contradiction and constructs his arguments by analytically using precedents from the history of architecture. Ambiguity is the third notion he explores. He begins by locating it between perception and the process of meaning, between, 'what an image is and what it seems'.<sup>27</sup> Such complexity of meaning results in an ambiguity and tension that is often characteristic of painting and recognised in art criticism. For example, Venturi points out that the pilasters on Bernini's Palazzo di Propaganda Fide could be either protrusions out of the facade or negative panel divisions, or asks whether Villa Savoye has a square plan or not. Venturi argues in favour of a 'richness of meaning over clarity of meaning', an approach to legibility that is equally relevant to architecture as it is to art and poetry. Throughout the readings, aspects of architectural ambiguities are exemplified in photographs of built work, as well as in architectural representations such as sections and plans.

The oscillating relationship between what something is and what it appears to be, had been further elaborated by Heinrich Wölfflin. His concepts of the painterly and the linear are often referenced in both art and architecture. Less discussed is Wölfflin's use of clearness and unclearness. One of the chapters in his book *Principles of Art History* (1932) unfolds the role of absolute clarity and relative clarity in art and architecture.<sup>28</sup> In terms of relative clearness, or the unclear, the appearance of art and architecture no longer coincides with the maximum of objective clearness, but rather eludes it: 'Absolute clearness is obscured even where a perfect rendering of

facts is aimed at.'<sup>29</sup> Absolute clearness implies the perfect legibility of figure and form; it fixates the figure, whereas unclearness eludes perfect comprehensibility.

The inclination to embrace rustic, messy, and unruly architectural qualities and aesthetics today, where the legibility of figure and geometry oscillates between clearness and unclearness, can be considered to be a cultural phenomenon aligned with Venturi's interest in the 'richness of meaning, over clarity of meaning'. By pointing out that even when the perfect rendering of fact is sought, the appearance of figure and form is elusive and fuzzy, this tendency could even be seen as aligned with Wölfflin's. Alternatively, it may simply be a by-product of technological possibilities.

Mario Carpo has described the recent shift in the aesthetics of architecture as a product of technological and computational change. He argues that this change is characterised by the digital use of myriad discrete fragments when designing architectural objects, instead of the use of digital spline modelling tools. The technique of joining a set of nonaligned points with a continuous curve (called a spline) tends to generate smooth curvilinear qualities, which 'do not fit with the phenomenological world we inhabit'.<sup>30</sup> The possibility today to digitally manage huge amounts of data, using a multiplicity of small dumb parts when designing, has generated another aesthetic according to Carpo:

*Yesterday's spline-dominated environment was elegant and modern; today's data-driven design environment is messily post-modern: disconnected, broken, fragmentary, rickety, patchy, and aggregatory.*<sup>31</sup>

Carpo describes an aesthetic more closely aligned with a material world built up of distinct parts of matter, all the way down to electrons.

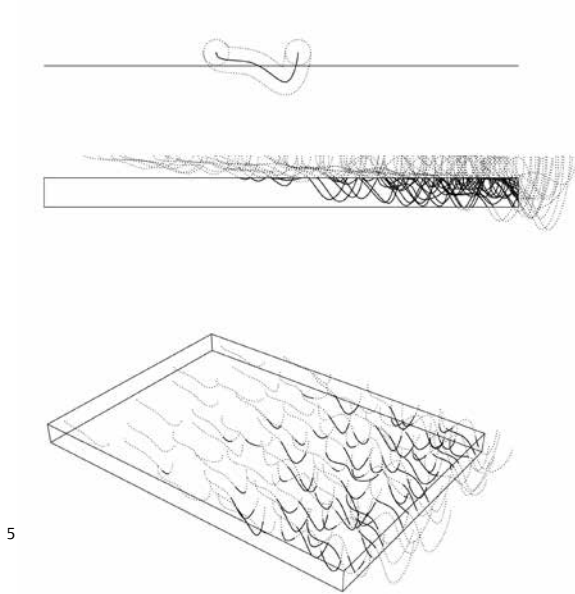
The contemporary interest in the enmeshed relationship between the digital and material also entails many other narratives beyond concerns for novelty. As we on an everyday basis engage with the ubiquity of physical things ingrained with traces of computational processes – such as images, objects, buildings, and atmospheres – technology potentially keeps changing how we perceive the world, flattening the distinction between physical and digital material.<sup>32</sup> This is not necessarily only a by-product of technology but a more entwined relationship between the physical and the digital, producing ambiguous associations and sensibilities.

### Three projects

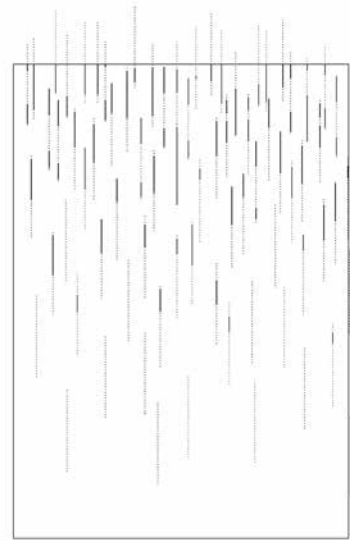
#### 1. Vector Interference 2

*Vector Interference 2*, is a proposal for a multipurpose building at the KTH – Royal Institute of Technology in Stockholm, which incorporates a biotic roofscape in conjunction with flexible lecture, gathering, and exhibition facilities.

Aspects of rustic figuration in this project for KTH occur where clusters of small scalloped intersecting cavities moving across the roof surface [5, 6] illusively break the structural logic of the curve

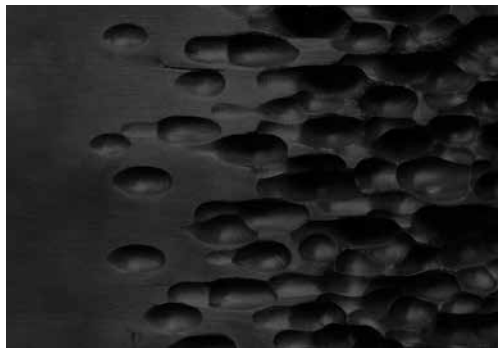


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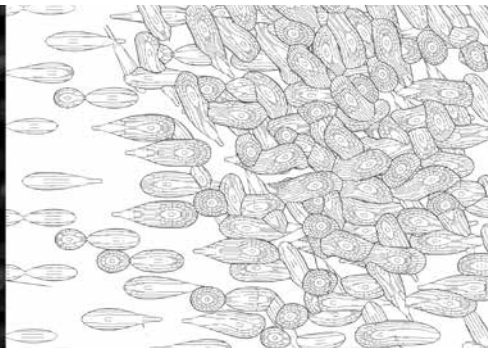


5 *Vector Interference 2* / KTH multipurpose building – vector toolpath drawing, 2013, servo stockholm/los angeles.

6 *Vector Interference 2* / KTH multipurpose building – left: CNC-milled and blackened wood; right: simulated drawing of resulting geometry, 2013, servo stockholm/los angeles.



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7 *Vector Interference 2* / KTH multipurpose building – roof view of model with clusters of small scalloped intersecting cavities moving across the roof surface, illusively break the structural logic of the curve network, 2014, servo stockholm/los angeles, 2014.

8 *Vector Interference 2* / KTH multipurpose building – left: model; right: roof plan, 2014, servo stockholm/los angeles.



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network [7, 8]. The eroding effect on the surface is a result of the non-dimensional vector toolpath being translated by a thick CNC router, which due to its share drill-bit size intersects its own path. An underspecified drawing, in relation to its material manifestation, yields a series of intersecting cavities that visually break the structural logic of the curve network of the roof.

Simple vector techniques were used for the design, in terms of massing and subdivision, to generate architectural specificities as well as to inform the logics of machinic processes for fabrication. The project embraces small corruptions and instances that produce an eroding effect on the



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9 Terrain with boulder cluster (Blockterräng in Swedish).

10 *Blockterräng*, Residential / Mixed-Use Centre, 2014, south elevation of competition proposal for Katrineholm Stora torget, 2014, Brumm in collaboration with servo stockholm/los angeles.



figure of architecture. The resulting cavities and niches of the vector interference provide a rough surface for the adherence of a low maintenance moss roofscape.

## 2. Blockterräng

*Blockterräng*, which borrows its name from the terrain type of boulder clusters, is a proposal for a residential/public-use building on the central square of Katrineholm, Sweden. The project considers the connection between architectural form and forms derived from elements of landscape. Specifically, the relationship between classical rustication techniques and their reference to the stone substrate of the ground is recast in the context of contemporary architecture. A boulder cluster is a small, distinct group of large stones located in such close proximity to one another that they cannot be identified individually [9]. In this project four variable building masses, with differential facade orientation, are bound together by rustication.

The masses comprising the building (akin to several large stones or boulders) are situated to create a facade that has multiple orientations. Thus while the new building as a whole completes the 'urban wall' of the central square and establishes continuity with the buildings on the opposite side of the square, it also creates the effect of several smaller masses that have been combined. The four

building masses are all black, but constructed in different materials: wood, ceramic, and concrete. This creates variation while maintaining the continuity of the whole ensemble [10].

Rustic figuration in this project happens when there is an oscillating relationship between the clearness of the figures of polygonal building masses and the dissolving of these geometries into an overall rustic envelope. In this proposal for a residential/public-use building in Katrineholm, rustication is used to suggest a connection between the materiality of the ground and the entire building mass, thus it proliferates, becomes over-scaled and migrates to unlikely locations in respect to the architectural body. The smaller-scale surface articulation serves as a contemporary form of ornamentation.

The character of the project's rustic figuration is produced somewhere between the digital process and the analogue and material constraints. The rustic material qualities are based on a digitally mediated process. The values or the intensity of the rustic articulations are stored in 2D raster images and height maps. The building masses are rusticated through digitally produced relief maps that are later translated into CNC-milled formwork for casting into or pressing onto, or directly used. While rustication in architecture was traditionally used to create a transition between the roughness of the ground and the refined tectonic of the

architectural form, here it is provided through a technique usually used for building digital terrain models, which translate light and darkness into different heights and can be used in land use studies, water flow analyses, and landslides studies.

The qualities of rustic figuration in this project are neither bound by the unique properties of the building materials, nor by the computational information translated/captured from rural images of the Katrineholm surroundings. Rustic figuration happens in the translations between digital information and material manifestation.

### 3. Rusticus

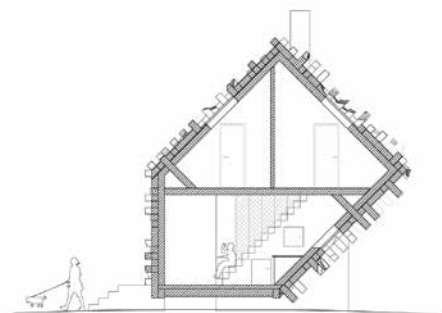
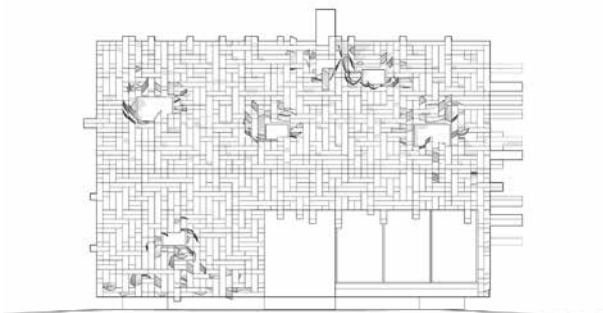
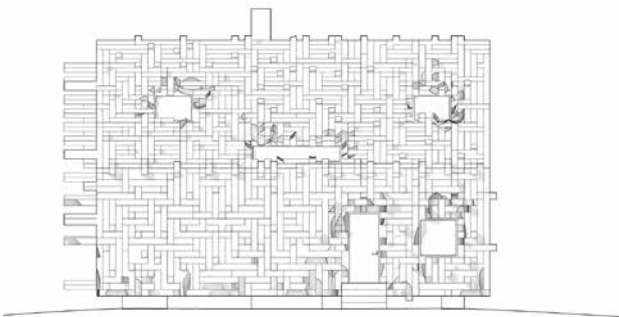
*Rusticus*, a competition entry for Dalslandsstugan 2.0, is another contemporary take on the notion of rustication, but here it envelops the entirety of the building. The interplay between the simple and familiar figure of a cabin and the building technique of rustic, or rough-cut, laminated timber, specifically developed for the project, gives the house its specific architectural character.

A cohesive volume is enclosed and dissolved by a rugged and rusticated envelope, which grounds the building to the variegated landscape. Through the



11 *Rusticus* Dalslandsstugan 2.0, view of Upperud proposal, 2015, Brrum in collaboration with servo stockholm.

12 *Rusticus* Dalslandsstugan 2.0, elevations and section, 2015, Brrum in collaboration with servo Stockholm.





development of a so-called 'false rustication', when wood is rusticated instead of stone, this proposal for a house, creates a dialogue between landscape, architecture, and the local tradition of timber buildings in Dalsland and Värmland (Årjäng).

The traditional cabin in Dalsland, Dalslandsstugan, with its characteristic closed, compact but tall elevated form, is the point of departure for the design of *Rusticus*. The traditional floor plan layout with the kitchen at the entrance level and a more general and changeable second floor is also considered in the project

A plinth foundation with its small footprint creates a light and adaptable meeting to the ground and the differentiated landscape topography. The building is placed in relation to landscape elements such as water, depressions, heights, woodlands,

existing buildings, and views. Additional landscape elements such as low embankments, cultivation beds, step stones, and wooden crosses are proposed to define and support the definition of site, room configurations and relationships between the building material, construction and the site.

The building is constructed by a series of wood elements of different length that are stacked in a wild bond, directed horizontally, vertically and in 45 degree angles. The massive wood elements protrude from the facade of different lengths and create a play of light and depth, which is further articulated by the rustication of some of the wood elements. The rustication is achieved by CNC-cut cavities into the logs. They are then spread unevenly, but foremost around apertures of the building, to disturb the reading of the precise figure [11, 12].

## Notes

1. Greg Lynn, ed., *Archaeology of the Digital* (Canadian Center for Architecture: Sternberg Press, 2013), pp. 11–19.
2. *Ibid.*, p. 11.
3. The author of this article, Ulrika Karlsson, was herself a student in the paperless studios in advanced architectural design at GSAPP, Columbia University, New York, 1995–6. It was also in New York in 1999 that she formed her first practice servo, together with David Erdman, Marcelyn Gow, and Chris Perry.
4. Zeynep Çelik Alexander, 'Neonaturalism', in *Log 31: New Ancients* (2014), 23.
5. *Ibid.*
6. Robert Somol and Sara Whiting, 'Notes Around the Doppler Effect and other Moods of Modernism', *Perspecta, Mining Autonomy* 33 (2002), 72–7. The authors define criticality as situating practice between different discursive positions in a dialectical framework, while projective practice considers what architecture is doing rather than what it is. For further reading on the digital turn, see: Mario Carpo, ed., *The Digital Turn in Architecture* (Chichester: John Wiley & Sons, 2013) and for discussion of the material turn in architecture, see: Daniel Norell, *Taming the Erratic: Representation and Materialization in Post-Digital Architectural Design* (Stockholm: KTH Royal Institute of Technology, 2016).
7. See, for example, 'Architecture and Representation', a ten-part lecture and publication series organised by Het Nieuwe Instituut, The Berlage, and e-flux Architecture (2017/2018); 'Is Drawing Dead?' symposium at Yale School of Architecture (2012); 'Does Drawing Have a Future?' symposium at MIT School of Architecture + Planning (2014); 'Drawings' Conclusions' symposium and exhibition at SCI-Arc (2017).
8. Sam Jacob, 'Architecture Enters the Age of Post-Digital Drawing': <<http://www.metropolismag.com/author/samjacob/>> [accessed 5 January 2018].
9. *Ibid.*
10. John May, 'Everything is already an image', in *Log 40: Observations on Architecture and the Contemporary City* (2017), 9–26.
11. *Ibid.*, 19.
12. Gail Peter Borden and Michael Meredith, *Lineament: Material, Representation, and the Physical Figure in Architectural Production* (London and New York: Routledge, 2017), pp. 1–4.
13. The enmeshed relationship between the digital and the material is further discussed by Ellie Abrons, 'For real', in *Log 41: Working Queer* (2017), 67–73.
14. For further elaboration on stereotomy and the cutting of solids, see: Robin Evans, 'Drawn Stone', in *The Projective Cast: Architecture and Its Three Geometries* (Cambridge MA: MIT Press, 1995), pp. 178–239.
15. *Lattice Archipelogs* is as an installation that was specifically designed for the exhibition *Latent Utopias*, which servo participated in, curated by Zaha Hadid and Patrik Schumacher at Steirischer Herbst, Graz, 2002.
16. This text has been developed through several discussions and joint interests in notions of rustication with the close servo los angeles partner Marcelyn Gow.
17. The partners and founding members of servo stockholm is Ulrika Karlsson; of servo los angeles is Marcelyn Gow with William Mohlin; and of Brrum are Ulrika Karlsson, Cecilia Lundbäck, and Veronica Skeppe.
18. Evans, 'Drawn Stone', in *The Projective Cast*, p. 210.
19. See <[https://en.wikipedia.org/wiki/Rustication\\_\(architecture\)](https://en.wikipedia.org/wiki/Rustication_(architecture))> [accessed 5 January 2018]. Mount Vernon is an example with particularly extensive use of so-called feigned rustication.
20. 'Remote Material Deposition Installation', at Sitterwerk, St Gallen, 2014. Elective thesis (6CP) of Gramazio Kohler Research, ETH Zurich ([vimeo.com/100784860](https://vimeo.com/100784860)).
21. The Detroit Reassembly Plant by T+E+A+M (Thom Moran, Ellie Abrons, Adam Fure, and Meredith Miller), exhibited at the US Pavilion, Venice Architectural Biennale, 2016.
22. Liam Young, 'An Atlas of Fiducial Landscapes: Touring the Architectures of Machine Vision', in *Log 36: Robolog* (2016), p. 131.
23. There are other instances where one can find aspects of rustic figuration apart from those relating to the physical built environment. For example when browsing map engines online, one can find themselves puzzled at moments when a site or a terrain suddenly lacks sharpness.
24. According to <<https://en.wikipedia.org/wiki/Rusticus>> *rusticus* is a Latin adjective meaning 'rural, simple, rough or clownish' [accessed 5 January 2018].
25. Evans, *The Projective Cast*, p. 211.
26. This question was earlier touched upon in the collaborative text by Marcelyn Gow, Jonas Ivarsson

- and myself, Ulrika Karlsson; 'Architecture in the Penumbra', published in conjunction with the 103<sup>rd</sup> annual ACSA meeting conference *The Expanding Periphery and the Migrating Center* (Washington: ACSA Press, 18 April 2015), pp. 324–32.
27. Robert Venturi, *Complexity and Contradiction in Architecture* (New York: Museum of Modern Art, 1966), p. 20.
28. Heinrich Wölfflin, *Principles of Art History: The Problem of the Development of Style in Later Art*, trans. by M. D. Hottinger (New York: Dover, 1950), pp. 196–225.
29. *Ibid.*, p. 196.
30. Mario Carpo, 'Breaking the Curve: Mario Carpo on Big data and Design', *Art Forum* 52, No. 6 (New York: Artforum International Magazine, February 2014), 169–73.
31. *Ibid.*, 173.
32. Abrons, 'For real', p. 68.

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*Lattice Archipelogics*  
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 Project Design: servo – David Erdman, Marcelyn Gow, Ulrika Karlsson, and Chris Perry  
 Design Team: Daniel Norell, Clare Olsen, and Jonas Runberger  
 Responsive System Design: Smart Studio/Interactive Institute – Tobi Schneider, Fredrik Petersson, Olof Bendt, Magnus Jonsson, and Pablo Miranda Carranza  
 Fabrication Consultants: CARAN  
 With generous support from: Zaha Hadid and Patrik Schumacher (Steirischer Herbst), CARAN, IASPIS (International Artists' Studio Program in Sweden), KTH Royal Institute of Technology, SSARK medialab, and White arkitekter  
 Permanent collection: SFMoMA, San Francisco

#### Vector Interference 2

Multipurpose Building, 2013–14  
 Architecture: servo stockholm / los angeles, KTH School of Architecture – architecture design research group  
 Project Design: Ulrika Karlsson and Marcelyn Gow  
 Design Team: Einar Rodhe, Veronica Skeppe, Jonah Fritzell, Christian Madsen, and William Mohline  
 Structural Engineer: Oliver Tessmann  
 Energy Systems: Ivo Martinac, KTH ABE Civil and Architectural Engineering Consultant: Mikael Lindström, Innventia

Educational Researcher: Jonas Ivarsson  
 Green Roof / Ecology Consultant: Tobias Emilsson  
 Special Thanks: KTH and KTH School of Architecture

#### Blockterräng

Residential / Mixed-Use Centre, 2014–17  
 Project design: servo stockholm / los angeles in collaboration with Brrum Design Team: Ulrika Karlsson, Marcelyn Gow, Veronica Skeppe, Cecilia Lundbäck, and Selma Udriot-Johansson

#### Rusticus

Competition entry for Dalslandsstugan 2.0, 2015  
 Project Design: Brrum in collaboration with servo stockholm  
 Design Team: Cecilia Lundbäck, Ulrika Karlsson, and Veronica Skeppe

#### Author's biography

Ulrika Karlsson is an architect and founding member of servo, servo Stockholm, and of architectural design collaborative Brrum. She is a Professor in Architecture at KTH School of Architecture, with a focus on digital methods and tools. Karlsson is also a professor at Konstfack – University of Arts, Crafts, and Design.

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