POSITION PAPER

The Tools of the Architect: Towards a New Historiography, Following the EAHN's Fifth Thematic Conference (Delft/Rotterdam 22–24 November 2017)

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In depictions of architects up to the 20th century, tools have always been the main marker of the profession. Tools not only served as easily recognisable iconographical attributes, but also came to embody architects' professional identity. While architects have always relied on a wide array of tools, ranging from practical instruments and to conceptual apparatus, architectural history has only recently started to profoundly engage with their characteristics and function. The goal of the fifth thematic conference of the EAHN (Delft/Rotterdam, 22–24 November 2017, https://toolsofarchitect.com) was to promote a deeper cultural investigation of the tools of the architect and to acknowledge their agency in architectural culture. After three days of rich presentations and fruitful discussions, the study of tools emerged as a central theme of architectural historiography that requires more scholarly attention.

Introduction

Architects have always depended upon the potential of particular tools for their drawing, writing and building activities, from practical instruments such as straight edges, French curves, compasses, rulers and pencils to conceptual apparatus such as working drawings, collages, photographic surveys, infographics, diagrams, casts and mass models. As technologies advanced, this practical and conceptual toolbox changed and expanded. Today architects have an extraordinary array of sophisticated tools at their disposal; nevertheless, they still rely on many of the same tools as their 18th- and 19th-century peers. Working drawings, pencils and tracing paper continue to appear in the designer's studio, though their role and potential is being redefined.

Given the very central role that these practical and conceptual tools continue to play in architectural practice, it comes as a surprise that architecural historians have only recently begun to engage systematically with the characteristics and functions of these tools (for example, Piedmont-Palladino 2006; Gerbino, Higgott, and Johnston 2009; Bork 2011; Lang 2012; Fitzner 2015; Frommel and Tassin 2015). Moreover, in the historiography of architecture, tools have too often been understood as purely instrumental devices. While studies have identified relationships between specific tasks and particular tools, few have tried to understand the cultural dimension of the instruments and conceptual apparatus of the architect. And while the cultural significance of the architectural drawing has been explored, other instruments and apparatus have attracted much less interest.[1]

The root of this lack of interest may lie in the apparent dichotomy between the conception of the design in the mind and its materialization on paper, a separation that goes back to Renaissance art theory.[2] In 1607 the painter and architect Federico Zuccaro identified two distinct conceptions of *disegno*: *disegno interno* and *disegno esterno* (Zuccaro 1961). For him *disegno interno* represented the superior intellectual, conceptual and idealistic aspect of designing, whereas *disegno esterno* referred to the practical and embodied aspects of making drawings. Historians have long worked along this Cartesian divide, defining their field of interest primarily within the realm of the architect's mental conceptions. However, the recent interest in situated cognition within the history of technology and art history acknowledges the complexity of the engagement with tools and its potential for generating knowledge (e.g. Smith 2004; Fentz and McGuirk 2015). Scholars like Lucy Suchman have, for instance, suggested we look upon practices — such as those of the architect — as 'situated action', because 'every course of action depends in essential ways upon its material and social circumstances' (Suchman 1999: 50; Suchman 2009). However, the effect of such a perspective on the history of the tools of the architect remains very limited.

Engaging with a *Terrain Vague*

The intent of the fifth thematic conference of the EAHN (Delft/Rotterdam, 22–24 November 2017) was to contribute to a deeper cultural investigation of the tools of the architect, in both their capacities and their limits. By casting new scholarly light on the practical and conceptual instruments of the architect, not only do we add nuance

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to our architectural historiographies, but we also explore the importance of tools — in the past and the present — as central actors in architectural culture. During the conference, scholars considered the way tools have been appropriated by architects and how other tools are specific to the discipline of architecture. They also examined how the use of tools was culturally determined, and how tools have contributed to revealing distinguishing attributes of individuals in architectural practice.

Whereas in the Dutch, French and German languages the translation of tool — *gereedschap*, *outil* and *Werkzeug* — relates first and foremost to a concrete, manual tool, the English language allows for a much broader definition. The definition given by the *Cambridge Dictionary*, for instance, is rather ambiguous: a tool is 'something that helps you to do a particular activity'. The conference papers reflected this diversity in subject and approach, and the definition of the tools of the architect was applied in widest sense of the word: ranging from handheld devices to intangible conceptual tools, and even to creative and communicative strategies. The different readings of 'the tool' at this conference challenge us to rethink its meaning and limitations for architecture.

The response to the call for papers from both early-career as well as established scholars revealed that the conference theme is very timely. The immense scope of the 120 selected papers provided a good cross-section of current scholarship. Trying to address here the content of the papers presented, and the inspiring discussions that followed, in a way that is fair and comprehensive, would only be bound to fail. Therefore, we will confine ourselves to some general observations, discerning several tendencies that demonstrate the study of tools is a central and important theme of architectural historiography that has long remained understudied and requires more attention.

Periods and Geographies

The contributions covered a broad period of time, from the Renaissance to the present, but with a clear prevalence of subjects from the last 150 years. The geographical range of the conference was striking, with 120 contributions from 25 countries. Most of the speakers came from universities in Western Europe and the USA, but there were also numerous contributions from Eastern Europe, the Middle East and Australia. Other areas were less well represented: only one speaker from East Asia (South Korea) and one from South America (Colombia). The subjects of the papers offered an equally global perspective: in addition to Europe and USA, countries included were Russia, Iran, China, Japan, Brazil and Chile. Some areas were less well covered, Africa in particular. Periods and areas that were lacking at this conference were Antiquity and the Middle Ages in Europe, and non-western countries before the 19th century. It would have been interesting to see if coverage of these areas would have provided us with a different angle on questions about the importance of tools as central actors in architectural culture. Studying 'the other' would undoubtedly enrich answers as to which tools were ubiquitous to the trade of the architect and which were

specifically bound by time and place. Do we, for instance, consider the graphite pencil as an ubiquitous utensil that survives generations of architects and eras of architecture, or is it a tool that was specific to the architectural culture of the past that is now being gradually replaced by the digital stylus?

Tradition and Innovation

Central to the profession are, of course, drawing instruments, and a great number of papers explored different drafting devices, ranging from the 17th-century *parallelogramum prosopographicum* to contemporary 'hacked' digital drawing pens. But as the second keynote speaker of the conference, Michiel Riedijk (Neutelings Riedijk Architects, TUDelft), remarked in his lecture 'Manner or Method: The Tools of the Architect', architects have an extraordinary array of tools at their disposal to perform a great many different activities. There are tools 'to document, to explain, communicate, guide, express ideas, explore and to formulate ideas'. A great variety of such tools — their uses and the context in which they appeared — were treated at this conference. For instance, to record sources of inspiration, sketchbooks came into use from the late Middle Ages onwards, but over time, the architect's toolbox expanded significantly to include detailed measured drawings, photographs and digital images.

Architectural culture has often maintained an ambiguous relationship with the development of tools, acting simultaneously as a field of slow adoption and fast innovation. To communicate a design with a client and with builders, architects still rely on many of the same tools as their counterparts from the Middle Ages and Renaissance — drawings, models, templates and specifications — but the methods and media for making them have changed profoundly. These changes have led to new conventions, some of which are so fundamental to the discipline of architecture that it is hard to imagine that one could do without. Anthony Gerbino (University of Manchester) presented a case in point in his keynote address 'Architecture, Mapping and Early Modern Instrumentality', in which he considered the reluctance of mapmakers to use scaled drawings (**Figure 1**). Even though scale was first introduced in France in court circles in the first half of the 16th century, it did not become a requirement for land surveyors until the 17th century. Maps were typically made by artists working in a painterly tradition who did not always care about drawing to scale, and who took care instead to carefully depict the easily recognisable details of a landscape. The slow adoption of a convention that now is so fundamental that it is taken for granted demonstrates that the use and implementation of tools is to a great extent determined by cultural factors.
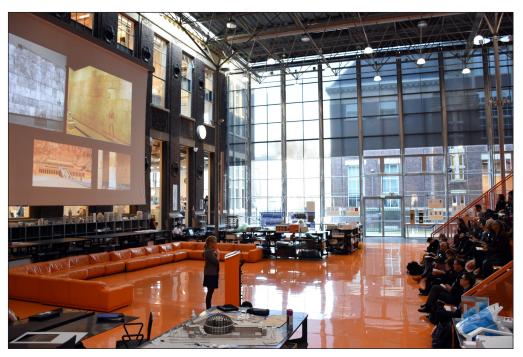
New tools have continuously affected the imagination, character and quality of architectural projects. Ellipsographs made it possible to precisely draw an elliptical space in the 19th century and computer-aided drafting software has allowed for a new conception and construction of complex geometries in the 20th and 21st centuries, while augmented reality tools and BIM are currently redefining communication between architect, builder and client.

New technologies also had a decisive impact on design practice. Not only did they allow the design of completely new forms, the classic example being the Guggenheim Museum Bilbao, but they also affected the design process itself. As Riedijk put it provokingly, 'at the time of Durand making a design started from the overall conception and continued up to the smallest details, whereas nowadays computer-aided drafting software forces the architect to depart from a single accurate point in space for his drawings'.

Another important category of tools that either strengthened existing traditions or helped to shape new ones was tools used to educate young architects. The conference began with the keynote by Mari Lending (Oslo School of Architecture and Design), 'Teaching Architecture Full Scale', on the plaster cast, which became a vital educational tool in French Beaux-Arts training (**Figure 2**). Since the 19th century many other educational devices have been invented, perhaps the most curious examples

Figure 1: Anthony Gerbino delivering his keynote address at the EAHN's fifth thematic conference. TUDelft, Friday 24 November 2017. Photo by Chris Maijstré.

Figure 2: Mari Lending delivering her keynote lecture at the EAHN's fifth thematic conference. TUDelft, Wednesday 22 November 2017. Photo by Chris Maijstré.

coming from the Soviet Union. What to think of Nicolai Ladovsky's *liglazometr* (line-eye-meter) and *prostrometr* (space-eye-meter), which he invented to train architectural students in estimating distances and dimensions?

Instruments of Politics and Positions

Generally, the realm of architecture has held overly positive understandings of the roles that tools can fulfil. The architect's tools have been often considered to be harbingers of change and transformation, as the very loci of innovation in the architectural field. The strong belief in the performativity of software programmes at the end of the 20th century and the enthusiasm about various forms of virtual and augmented reality at the beginning of the 21st century are just the latest expressions of this firmly rooted belief in the inherent progressive qualities of such tools. At the same time the tools of the architect have also been perceived as mediators of new developments or even as obstructions to innovation. Many architects have been cast as retrograde because they did not engage with revised or new tools, or lacked sufficient speed in taking up such tools. The tools of the architect have also functioned as main elements in the definition of discriminative architectural positions. Architects who acted as early adopters of certain tools thereby claimed an avant-garde position in architectural culture, while those who persistently refuted the newest developments in tools thereby defined themselves as an exceptional arrière-garde.

The choice of an architect to work consistently with a particular tool has been looked upon as a marker of certain architectural sensibilities, linking for instance the use of pencils to a more phenomenological conception of architecture and the use of computer software to a more rational understanding, and vice versa. Tools have also acted as discriminators with other professional groups; the watercolour pencils of the architect distance him from the engineer, who shares with the architect the knowledge of the technical pen but not that of the artistic painting tool.

Not only do tools contribute to differentiating various architectural practices from each other, but they also regulate access to the profession. Knowing how to operate a particular set of instruments or conceptual tools has been a main prerequisite to being part of the profession. To be able to handle the pencil or to steer the curve was as much a requirement to enter the world of practice in former times as the practical knowledge of particular drawing software programmes is in the present. Until recently, it was self-evident that an important architect had fully mastered the tools of the trade, and that this capacity was one of the main factors distinguishing the master from the apprentice. Over the course of the 20th century, an important transformation seems to have taken place, where some master architects — wholeheartedly or not — came to strongly rely on younger generations of collaborators to handle some of the newest tools.

Appropriation

Since the time of Vitruvius, the architect has not only had to be knowledgeable about his craft, but ideally had to be educated in a constellation of 'sciences'. The quest to find adequate conceptual tools —diagrams, charts, maps, formulas — to articulate, test and communicate design ideas never ends, and in this pursuit architects have appropriated tools from other disciplines, such as art, history, sociology, computer sciences and engineering. The tools of the architect have thus become a field of intense exploration of the encounter of architecture with other disciplinary approaches and methods. At the conference, examples were offered of how conceptual tools of the fields of mathematics and social sciences were acculturated in architectural practice.

The introduction of technologies not specific to the architectural discipline, but that nevertheless had a lasting impact on the profession, provided another avenue for discussion during the conference. Examples include the photography camera, light-sensitive sheets to produce blueprints, faxing machines and the recent photo-sharing applications, such as Flickr, Pinterest and Instagram. All of these new technologies intensified — both in time and space — the circulation of visual and textual data and thereby recalibrated the praxis and logos of architects. Papers explored how these tools created new opportunities for architects, but also questioned how architects developed modes of use that were typical to the discipline.

Tools for a New Architectural Historiography

The conference illustrates that the tools of the architect have thus far been a *terrain vague* of contemporary historiography; they deserve more attention. As our historiographies have been moving to more culturally, socially and politically 'situated' narratives, we have also widened our perspectives to include other human (constructors, commissioners, developers, politicians) and non-human actors (buildings, elements, materials). However, in this process of situating we seem to have forgotten about one particular non-human actor: the tools of architects.

The histories of architecture have always paid ample attention to the agency of the architect, to which the architect's tools were subordinate. However, the contributions to the conference demonstrate that these tools are full-fledged actors of architectural culture in their own right. Yet, as several papers illustrated, the inclusion of these actors within our historiographies does not come without challenges. We must conceive of new theories and methodologies to engage with the proper agency of the tools. How to assess their impact on the design and construction process? How to conceive of the reciprocal relationship between the agency of the tool and the agency of the architect? Developing methodological and theoretical tools to situate the tools of the architect within our histories seems to be the main challenge ahead.

Notes

[1] The cultural and conceptual dimensions of the architectural drawing have been explored, as in the recent publications of Thomas (2018) and Cook (2014).

[2] For a critical analysis of this division, see Ajmar (2014).

Competing Interests

The authors have no competing interests to declare.

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