The Rise and Fall of Visual Paradigms: An Interview with Mario Carpo

Interview conducted by Stephannie Fell Contreras

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As a historian of technologies, your research highlights several moments in history when the work of architects and historians is directly influenced by their technical conditions; in other words, when their architectural aspirations become part of a feedback loop between media technologies and cultural demands. You write of Alberti's efforts, preceding modern media theory and technology by several centuries, in creating mechanisms of data compression and transmission that consciously avoid visual

depiction (like** Descriptio Urbis Romae[1]**); or, following advances in printing technologies, Serlio's[2] visual standardization of ancient constructive elements and the transmission of an idea of architecture conceived for its modern mechanical reproduction. Besides the content of your work, I am interested in discussing your experience researching, writing, and teaching architectural history, which you have been doing since the late 1980s. To begin, what drove you to study, in the late 1970s, Architecture at the University of Florence?

There was an expectation that I would do something in building and construction because that was my father's business. Since childhood I was *predestined* to become an engineer: in primary school, I was given books by Jules Verne, so I would learn about all the engineering in the world; my games were Lego to introduce me to the tools of the mechanical-industrial world. You know, *Twenty Thousand Leagues Under the Sea*,[3] or *From the Earth to the Moon*[4] are a celebration of a century of engineering, the idea that

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[1] *Descriptio Urbis Romae* is a short work of Alberti published in the mid-fifteenth century. Presumably in the late 1430's or 1440's Alberti had measured and drawn a precise map of the city of Rome to scale. As manual copies would not have preserved the exact measurements of his map, he published instructions for an instrument and a set of 'digitized' data to reproduce it. See: "Introduction: The Reproducibility and Transmission of Technico-Scientific Illustrations in the Work of Alberti and in His Sources," in *Leon Battista Alberti's "Delineation of the City of Rome" ("Descriptio Vrbis Romæ")*, ed. Mario Carpo and Francesco Furlan (Tempe, AZ: Center for Medieval and Renaissance Texts and Studies, 2007), 3–18.

[2] Sebastiano Serlio (1475–1554) was an "Italian Mannerist architect, painter, and theorist who wrote the influential architecture treatise *Tutte l'opere d'architettura, et prospetiva*." Fuente: britannica.com

[3] *Twenty Thousand Leagues Under the Sea* is a novel by Jules Verne (1828–1905), first published in 1869-70 by Pierre-Jules Hetzel, a visionary editor who advised Verne to put the emphasis on the scientific side of his adventures. "It is perhaps the most popular book of his science-fiction series *Voyages extraordinaires* (1863–1910)." Sources: britannica.com; gallica.bnf.fr/blog

[4] *From the Earth to the Moon* is a novel by Jules Verne (1828–1905), first published in 1865. It was the inspiration to one of the first great films in the history of cinema, Georges Méliès' *Voyage dans la lune* (1902). Sources: britannica.com; gallica.bnf.fr/blog

with precise calculation and the prediction of the behavior of all materials we can improve the world. That is, with a minor caveat: the engineering blueprint only works if all materials behave as expected and all human workers do as being told. This is the Albertian paradigm in its industrial epiphany: everything has to be scripted, everything can be predicted, and everything will happen as it has been anticipated and designed by the engineer. The worker, in this engineering view of the world, is devoid of all intelligence – meaning, just carrying out the script, a robot, a slave. It is a general plan of de-skilling the world because all the skill is concentrated in the thinker, the engineer, the designer; the person who can anticipate the behavior of the inanimate world and can plan the behavior of the organic world. This is the dream of modernity, where everything can be predicted because everything can be calculated. In a famous exchange between Laplace,[5] the mathematician, and Napoleon, the former tells the latter that "if you give me a precise description of the universe at the moment zero, and I have all the factors in play, I can tell you precisely what the world will be in the moment zero plus one" to which Napoleon replies "what is the role of God in your system?" "God? I do not need that hypothesis". So, this is the world of engineering, the universe for which I was trained – to go back to your question, which was not about engineering but my education…

Which in a sense, was mechanically predestined.

Well, that story itself was ideally part of a mechanical world, where everything can be anticipated and calculated. But of course, things never play out as parents anticipate. As a teenager, I had been a political activist, and so when I turned eighteen an agreement had to be reached between my humanistic ambitions and the technological expectations of my family. My father would not pay for my education if I wanted to study art history and I

[5] Pierre-Simon Laplace (1749–1827, Paris) was a French mathematician, astronomer, and physicist who proved the stability of the solar system and made major contributions to difference differential equations, mathematical astronomy, and to the theory of probability. He is considered "one of the most important and influential scientists that the world has seen." Source: mathshistory.st-andrews.ac.uk

made it clear that I did not want to become an engineer. Architecture became a middle point because it joined these two aspects, technology and humanism. The problem is I never had a real vocation for architectural design, even though I was very good at drawing. So, I ended up being, not a designer but a design historian and a historian of design technology. I studied and understood architecture and the history of architecture as the history of a system of production of technical objects. I am of course interested in the way things look (and I am a keen observer of that!), but only in so far form relates to the way things were made. This is my contribution, and also the self-imposed limit of my studies, because I am well aware that there may be more to architecture than that, but there are other people who do what I chose not to do much better than I would if I chose to.

Did you find strong political involvement at the University of Florence?

There was, but very different from what I knew back then. I had been a political activist in my hometown — when I was 17 and 18, I was the leader of the left in my high-school — and was considered an extremist there. Then I went to the University of Florence and realized that the activists there were of a quite different ilk. It was the late 1970s, Italy was on the brink of civil war and the Red Brigades were advocating a shift to violent upheaval. People were shooting on the streets: The Red Brigades firing at policemen and policemen firing back. In Italian political history, the period is known as the *Anni di Piombo*, the 'Years of Lead.' Years of terrorism, of political extremism; the only way of being interested in politics at the time was violence. And this was not the kind of activism that I was prepared to advocate, so I stepped back.

I am on the fence to call it activism — in light of what you're mentioning —, but there had been other forms of political engagement coming from the school, for instance from

some of the students of Leonardo Savioli,[6] like Adolfo Natalini[7] or Alberto Breschi.[8] Was the presence of the so-called Radical Design Movement[9] or their influence still felt at the school in the late 1970s?

Well, it is odd, but I arrived at the University of Florence at a point in time when the Superstudio[10] guys, the Architettura Radicale people were more or less invisible. Their golden years had been from 1971 to 1974, and then their movement had collapsed, due to the political climate, but also due to the rise of postmodernity — of which in a sense they had been the forerunners. But postmodernity turned out to be not what they had

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[6] Leonardo Savioli (1917–1982) was an Italian architect and painter who taught in the Interior Architecture and Design programme from the mid 1960s to the early 1970s. Historian Lara Vinca Masini regards his courses, focused on a critique of the modern city, as the experimental grounds for some of the radical design studios that would emerge in Italy in the late 1960s, like Superstudio and Archizoom Associati.

[7] Adolfo Natalini (1941–2020) was an Italian architect. He is one of the founding members of Superstudio.

[8] Alberto Breschi (Florence, 1943) is an Italian architect. He is one of the founding members of the avant-garde group ZZIGGURAT. Source: breschistudio.com

[9] The Radical Design movement "grew to give voice to a new generation of architects who wanted to critique the traditional methods of planning and question the very nature of what cities might become in the future. These architects adopted an explicitly speculative approach to both the critique of architecture and the envisionment of future cities." Source: "More essential history for Speculative Design by Michael Smyth," published in speculativeedu.eu

[10] Superstudio was an Italian architectural group (1966-1986) "formed in Florence in 1966 by Adolfo Natalini and Cristiano Toraldo di Francia" "The group explored concepts in radical architecture and urban planning, such as negative environments and an anti-architectural utopia where the need for consumer goods had been eliminated." Source: getty.edu

imported to Italy from England, but Charles Jencks,[11] Robert Venturi.[12] We had our way to postmodernity with Aldo Rossi,[13] who nobody liked at the time, particularly in Florence. In the late 1970s the Architettura Radicale generation was put on an ice-floe, so to speak; they had already been kicked out of the university but what they did had not yet been the object of a historiographical revaluation.

What they did, which was so meaningful in the early 1970s, was emphasizing the implosion of the late modernist environment with a caricature, and by the renunciation to the tools of design. Natalini famously claimed in 1971, that architecture should think of committing suicide because that was the only thing it could do well. These were arguments that were meaningful but very time-specific. Only a few years later — due to the sudden change of political and cultural climate, the shift from political confrontation to almost civil war, the collapse of modernity due to the irruption of postmodernity — their arguments were completely outdated, like something on the shelf of a supermarket. The expiry date of their argument was 1974, and after 1974 it simply did not register.

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[11] Charles Jencks (1939–2019) was a US born architect, landscape designer, theorist, and historian. He is the author of *The Language of Post-Modern Architecture* (1977), the first publication to define and historicize Post-Modernism as a stylistic movement in architecture. Source: domusweb.it

[12] Robert Venturi (1925–2018) was a US born architect and educator. After working for Eero Saarinen and Louis Kahn, Venturi spent two years in Europe studying buildings by Michelangelo, Bernini and Gaudi resulting in the publication of *Complexity and Contradiction in Architecture* (1966). In partnership with Denise Scott Brown, they led a series of research studios at Yale; from the standpoint of a critique of modernism, they explored architecture's potential to communicate and its engagement with pop culture. The findings of the studio led to the publication of *Learning from Las Vegas* (1972). Source: princeton.edu

[13] Aldo Rossi (1931–1997) was an Italian architect and theorist. He rejected modernism, seeking instead a form of architecture that could take into account historical precedents and the context of the city understood as the "*locus* of collective memory". He is the author of *The Architecture of the City* (1966) and *A Scientific Autobiography* (1981). Source: yalebooks.yale.edu

One of the reasons why these arguments of the early 1970s did not register in the late 1970s, is that in 1971 and 1972 they advocated, they represented, and they depicted — in a sense, they invoked — the collapse of the late mechanical world, at a time when late modernity was still a driving force. Whereas in 1978 or 1979, there was no need to invoke the collapse of the late mechanical world. Late modernity had imploded of its own failings. There was no point in shooting a corpse. Making an argument against the evils of late modernity was a good point in 1971, but in 1979 late modernity did not exist anymore. In a sense, they had won, so the argument was irrelevant.

So, between the late 1970s and the 1990s, they were nowhere to be found. Some of them went into very different careers, some became postmodernists, one of them became a railway car designer specialized in designing trains for the Italian State Rail. Then, starting in the early 1990s, they became famous because Rem Koolhaas[14] found a connection between what he was doing and what they had been doing. But we did not know at the time, that the seed they had been disseminating, transplanted in a different context would become a tree that did not blossom in Italy: I mean, Rem Koolhaas did what he did because he was at the AA and went to Cornell, and he was exposed to these seeds early on, but in Italy, they did not produce any blossoms.

There were historians of technology in this group who also taught at the school, like Giovanni Klaus Koenig[15] (who later also become a train designer). Was the subject of technology similarly put on an ice-floe at the school after 1974?

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[14] Rem Koolhaas (Rotterdam, 1944) is a Dutch architect and theorist. "He is recognized as one of the foremost architects working today, acclaimed not only for his pioneering buildings around the world, but also for his books, exhibitions, teaching and various projects in the realm of media, sociology, fashion and technology with OMA's think tank, AMO." He is the author of *Delirious New York* (1978). Source: aap.cornell.edu

[15] Giovanni Klaus Koenig (1924–1989) was an Italian architect and historian. "Director of the magazines 'Casabella' and 'Parametro,' Koenig always shifted from different disciplines with the declared intention of blurring architectural criticism between semiology, history of industrial

Technology in the 1970s was not a good topic. The technological optimism of the 1960s was in a sense justified: in 1961, President Kennedy said, “We shall go to the moon” and in July 1969, we did. In ten years, we did the unthinkable. Computers and cybernetics were promising to change the world. In the 1960s technology promised to fix all problems, including social and political problems; technology was the answer. Ten years later, technology was the problem. Technology had created problems that demanded a political fix. It had imploded in a way so colossal, that we needed politics and, even sometimes, a social upheaval to try and fix the mess technology had created. So, technology was a friend in the 1960s, but an enemy in the 1970s. By the way, at the time we already knew that cybernetics and artificial intelligence did not work, they had already failed. What they promised in the 1960s was not delivered in the 1970s. ‘Cybernetics,’ such a trendy word in 1968, was the laughingstock of the academic world in 1978. I do not think I heard the word ‘cybernetics’ even once in all my years at school, in the late 1970s and early 1980s.

In 1998, at the outset of a career as professor and lecturer, you published L’architettura dell’età della stampa [*Architecture in the Age of Printing****]. Originating from your PhD research and two previous publications in Italian, the book conveys the story of architects and early architectural historians dealing with technologies in the Renaissance, particularly that of the printing press. How did media impact Alberti and Serlio’s theoretical work? And by a similar token, how did media impact your work as a historian writing a book on architecture and technology in the midst of another ‘media revolution’?***

When I wrote *Architecture in the Age of Printing* — this was the 1990s — there was a notion that a media revolution was ongoing. It was for me a second wave because I

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design, history of material culture, history of the technics.” Source: Lorenzo Ciccarelli, published in mac.hypotheses.org

remember reading passages by Marshall McLuhan[16] when I was twelve or fourteen, when the media revolution he depicted was very much still alive. I remember learning from friends of my parents — I think it was my uncle, who was a student at the University of Turin, who explained to me what "the medium is the message" meant. I became interested in media theory, but of course the media theory Marshall McLuhan was describing in his ground-breaking work *The Making of Typographic Man*[17] was the technology of mass communication. He was describing the revolution of broadcasting and the 'global village': one antenna broadcasting — through radio and television — the same message to an entire global population at the same time. Everyone receiving instantly the same message, that was the global village. When I was becoming a scholar in the 1990s, we were aware that we were going through a new media revolution, which was in many ways equal and opposite to that which Marshall McLuhan had described. It was not the global village of electronic communication: it was the fractured, fragmented, particularized new village of the Internet. This is not about mass media but about mass customization: the idea that communication is automatically targeted, algorithmically adapted; each one of us receives a different message. Exactly the opposite of what Marshall McLuhan had in mind. But what he had described, applied to Serlio very well, because that was really the making of a typographical architect.

What was the argument behind the making of a typographical architect?

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[16] Marshall McLuhan (1911–1980) was a Canadian media theorist and educator, Director of the Centre for Culture and Technology at the University of Toronto. He is the author of *The Gutenberg Galaxy: The Making of Typographic Man* (1962) and *Understanding Media: The Extension of Man* (1964). Source: marshallmcluhan.com

[17] *The Gutenberg Galaxy: The Making of Typographic Man* (U. of Toronto Press, 1962) is a book by M. McLuhan. As stated in a review from 1963, "According to the thesis of this book, the printing press not only has provided the literate population with a means of communication but has also formed the language and thoughts and the social organization and way of life of all Western society." Source: Winger, H. (1963). *The Library Quarterly: Information, Community, Policy, 33*(4), 352−356.

It is simple. A big shift in visual communication occurred with the invention of not so much the printed book, not so much print with movable types, but with the possibility of printing alphabetical text and images together — what William Ivins Jr.[18] calls "exactly repeatable pictorial statements." A woodcut, an engraving that can produce 100, 200, 300 identical copies. As the artist, you know everyone will see the exact engraving you made. As the reader, you know that the picture in the book is exactly what the engraver made. This mutual understanding of the reliability of visual communication is what made visual communication possible. Serlio could take this for granted; he knew that if he made 120 woodcuts in his *Fourth Book*[19] (1537) his readers would find the exact images he produced. Alberti, 100 years before, knew that if he made a drawing, his readers would never see it because there was no way to make many identical copies of a complicated drawing. And so, Alberti being a rational guy — what some could call a control freak —, wanting to be in charge of his communication, said, "well if I write an alphabetical text, I can be fairly confident that my readers might read more or less what I wrote. If I include a drawing, I can be fairly certain that what the reader will see has nothing to do with the drawing I made, because each hand-made copy of my original drawing will be different from the original, and different from all others." He was not willing to take that risk, so he wrote an entire book on architecture with no drawings at all (*De re aedificatoria,*[20] ca.

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[18] William M. Ivins Jr. (1881−1961) was a US born art historian and the first curator of Prints at the Metropolitan Museum of Art, New York. He is the author of *Prints and Visual Communication* (Harvard University Press, 1953) Sources: britishmuseum.org; enacademic.com

[19] *Regole generali di architettura* (also known as *Book IV – Architectural Orders*) is a printed book with woodcut printings written and illustrated by Sebastiano Serlio and published by Francesco Marcolini da Forli in Venice. "At a time when the illustration of printed architecture books was still in an early stage of development, Sebastiano Serlio started work on a series of books in which the illustrations would be just as important as the text." Source: metmuseum.org

[20] *De re aedificatoria* is a treatise written in Latin by Leon Battista Alberti (1404−1472). "Combining scholarly knowledge of ancient sources and models and an innovative architectural technique (…) *De re aedificatoria* provided the Renaissance with an organized program for architectural design. By using new mathematical techniques and relationships found in musical harmony, Alberti

1450), and published a map of Rome that was not a drawing but a set of instructions and a list of data whereby each user could produce a new map (*Descriptio Urbis Romae*, ca. 1448-55). Drawings would be, not only useless but counterproductive to the dissemination of his message; as he had no technical way to control it, he abolished visual communication altogether. While Serlio, for the first time ever, could rely on the dissemination of printed images; with printed images, precise quantitative information (or data, as we would say today) could be recorded and transmitted in a reliable visual format. Alberti could not do it, but Serlio could. This is a big shift.

Your argument goes further, implying that Serlio fashions a style of architecture to fit this media environment of visual standardization.

If you are going to illustrate your ideas with 121 woodcuts, or engravings, inevitably you are going to conceive an idea of architecture that can be built upon those images. And so, if architecture is made of a finite list of exactly repeatable visual parts, these models are destined to identical reproducibility in print, in technical drawings (because architects would copy those drawings from the book into their own designs), and then in building, where workers on site will have to replicate it once again. So, identical reproduction shifts from a printed book to a handmade drawing to an actual physical building, which is why we find in a Palladio building a capital identical to one in a Palladio book. The same model migrates from print to drawing to building, and it is all based on this assumption of identical reproducibility.

During the 1990s, while I was writing about the making of a typographical architect in the 16th century, I was well aware that we were witnessing the unmaking of this paradigm. The Internet and electronic communication were, in a sense, the printed book in reverse. What print did, the internet was undoing; it was the history of a rise and fall.

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achieved a balanced proportion which was emulated throughout the Renaissance." Source: www.lib.uchicago.edu

The reason I found the argument of a typographical architect so fascinating in the 1990s, is because it described the making and raising of a world that we were just about to destroy. We could describe even better what print did to architecture in the Renaissance because it was equal to what the Internet was unmaking in the 1990s. What print did to Serlio in the 16th century, electronics and computers were doing to Zaha Hadid or Greg Lynn in the 1990s. It was a weirdly symmetrical argument, the rise and fall of one core paradigm of modernity.

Which is almost precisely the plot for *The Alphabet and the Algorithm*[21] ***(2011). In it, Alberti becomes a key character in the rise of this paradigm of standardization that would be undone in the early 1990s, in what you termed the 'digital turn.' You have said elsewhere that Peter Eisenman gave the book its title, but how did the plot come into being?***

These ideas resulted from my acquaintance with some of the protagonists of the first digital turn (back then just *the* digital turn). I knew Greg Lynn, not particularly well, but Bernard Cache was a good friend of mine, so I knew what they were up to, what they were discussing. In the early 2000s, we could already trace a historiography of what had started to happen in the early 1990s: from deconstructivism to folding, to the rise of the blob — what we now call parametricism. There was a logic, there was a story we could tell. *The Alphabet and the Algorithm* was my first attempt to try and make a simplified, streamlined historiographical reconstruction of what happened in the early 1990s — which, when I started writing the book in 2007–2008, had already changed the history of architecture forever. It was already in the history books, so to speak. But how did it start? How did it unfold? And where was it going?

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[21] *The Alphabet and the Algorithm* (MIT Press, 2011) is part of the Writing Architecture series, edited by Cynthia Davidson. "The modern power of the identical, Carpo argues, came to an end with the rise of digital technologies. Everything digital is variable. In architecture, this means the end of notational limitations, of mechanical standardization, and of the Albertian, authorial way of building by design." Source: mitpress.mit.edu

The teaching of Peter Eisenman (who was my colleague at Yale back then) influenced the story I was telling, because he had given the embryonic formulation of the digital turn from his formalist standpoints. The idea of the 'notational bottleneck,' describes what he, Greg Lynn, and Bernard Cache were doing, it was all inscribed in this formalist view of architecture, fully authorial. In a phrase Greg Lynn used as a proverb at the time: "if you cannot draw it, they cannot build it." That means the universe of what you can build is determined by the potency of the geometrical tools at your disposal. And these geometrical tools were historically constrained to the geometry we knew. If you want to notate and build a shoebox, it is easy. But with complex non-geometrical forms — topological geometries for example, or free-form objects like a potato — you would need so many drawings that you would rather not do it. This notational bottleneck was simply exploded by the potency of the computer, which could do in a minute what would take us a year. So, what was conceivable before but not really practical, became feasible and affordable. Even streamlining, which was a very difficult thing to do — you did it with expensive objects like airplanes because otherwise they would not fly — became feasible when affordable spline modelers like Form Z or Rhino came out in the 1990s. If you wanted to streamline your library in the same way you would streamline a fighter jet, you could. *Why* would you? That is a different story because libraries are not meant to fly. But you could in 1992, whereas in 1982 you could not.

In hindsight, a lot of these buildings, the 'flying libraries' kind, were associated with what was then a thriving neoliberal global economy. Two decades later, they are criticized as representations or tokens of some of the very same principles of "irrational exuberance."[22] Did the formalism of the 'first digital turn' become an obstacle, or in

[22] The expression "irrational exuberance" was coined in 1996 by Alan Greenspan, then chairman of the US Federal Reserve, as a warning to the risks of a speculative bubble based on stock market overvaluation.

other words, did it overshadow the discussion on the changes in technical logic that digital technologies brought about in architecture?

Well, we were already aware 15 or 20 years ago that streamlining was, in a sense, an accident of history. It was an unfulfilled ambition of designers — a pent-up demand that had been accumulating for centuries — that suddenly became affordable and feasible. This created inflation of streamlining, which was then justified and warranted. But we all knew that unless you design the hull of a sailing boat you do not need so much streamlining in architecture.

Due to the particular socio-economical context in the 1990s, there was the idea that digital technologies were subservient to neoliberal, neocapitalist, right-wing neoconservative politics. It is true that *some* protagonists of parametricism endorse right-wing political doctrines, but not *all* of them, in fact only a few of them — who make a lot of hullaballoo. But digital mass customization is to electronics, what mass production was to the mechanical environment: it is the technical logic inherent in the new technical object of the digital age. The assembly line, whether we like it or not, was the most effective way to use the mechanical technologies of the early 20th century. Henry Ford invented it, but throughout the 20th century, every social system wanting to exploit the mechanical technologies of the time adopted mechanical mass production and the moving assembly line. Stalin did it, the Soviet Union did it, Social Democracies did it, so did liberal and capitalist countries, so did the Nazis and the Fascists. It does not have a particular political orientation, everyone used it, it was, in a sense, politically neutral, it was just the technical logic of a mechanical age.

The *choice* of mass customization, on the other hand, is as much a technology as it is an ideology; and as with every ideology, it is arbitrary. If you assume that most consumers need the same object, technologies of mass customization are not necessary. That is an ideological choice. In a socialist system, where it was assumed all persons were

equal, everyone needed the same car — in theory, in practice, there were several models —; everyone lived in the same apartments — in theory, in practice there were several types of apartments in a building —; etcetera. But when it comes down to the specificities of the human body, well they are all different. It is not by chance that many digital fabrication technologies were inaugurated in the medical professions. Some of the early 3D printing technologies were launched in the 1990s by a Dutch company that specialized in dental implants. Some of the digital blob-makers in the 1990s adopted these technologies early on, so there was a practical joke in the late 1990s whereby "all digital blobs look like teeth" and there was a contingent reason: the software those offices were using was actually made to design tooth implants and crown replacements. Dentists are aware there is no point in producing a standardized universal tooth nor a standard crown; every tooth replacement must be custom-made, so a mechanical imprint of the patient's mouth was used. In this case, mass customization can save lives, the same for a knee replacement, a hip replacement, or cardiac valves: when you need to put a fabricated piece inside the human body, it has to be custom made. If you can digitally customize it you can make it faster, cheaper, and for more people. And then, there is the opposite case, which Bernard Cache always mentions, the Bic ballpoint pen. I could download the file to 3D-print this pen, customize it, make it in the shape of Mickey Mouse. I could do it, but why would I? After all, there is a reason why the standard Bic ballpoint pen, which has been made in billions of identical copies since 1954 (when Baron Bich[23] invented it or patented it) is the same for every human being who needs to write. So, here is one case where mass customization is cheap, affordable, possible — but there is no social demand for it. And then there is a gray area in between, which applies to architecture. In many cases, standardized mass-produced items are probably all we need. And then, there are cases where we need something else, where mass production does not fulfill the basic requirements. There is no point in mass customizing stuff that might be easily mass-

[23] Marcel Bich (1914-1994) was an Italian entrepreneur. With Édouard Buffard, he founded a pen parts business in France. In 1950, Bich improved the László Biró ballpoint pen and launched its own ballpoint pen under the BIC® brand. Source: bicworld.com

produced; but there is equally no point in insisting on mass production of stuff that can easily be mass customized.

In your latest book *The Second Digital Turn*[24] **(2017) planar projections, introduced by Brunelleschi and described by Alberti, are singled-out as forms of data compression we no longer need, that would lead to a demise of the bidimensional-image-based culture of modernity. I can see how this could play out with technical drawings: if buildings were increasingly designed in 3D informational models like BIM, data for construction could be extracted directly from a model; architects could forget about the technical need to draw scaled plans. At the same time, walk around any architecture school (or scroll through their course offerings) and you will find a widespread preoccupation with representation 'styles'; with developing individual aesthetics, with producing images as arguments. So, I am wondering, do you see this demise as related to one specific role or function of images? Likewise, is their potential disappearance solely predicated upon a change in the means of transmitting information digitally — the further development of the technologies themselves? Do media technologies play a part?**

Technically speaking, the shift from a perspectival projection to a 3D scan has already happened. The next generation of phones will probably have a camera which will not take a perspectival imprint but make a 3D scan of the object you are looking at, and record it as a wireframe, point cloud, or 3D model. Now, navigating 3D models in virtual reality is still complicated, whereas images have the advantage of portability and ease of use: you do not need any technology to see a picture. For daily life, I guess that even though images will be stored as 3D models they will be consumed as two-dimensional perspectival

[24] *The Second Digital Turn: Design Beyond Intelligence* (MIT Press, 2017) is part of the Writing Architecture series, edited by Cynthia Davidson. "The design professions are now coming to terms with a new kind of digital tools they have adopted — no longer tools for making but tools for thinking. (…) Designers have been toying with machine thinking and machine learning for some time, and the apparently unfathomable complexity of the physical shapes they are now creating already expresses a new form of artificial intelligence, outside the tradition of modern science and alien to the organic logic of our mind." Source: mitpress.mit.edu

images, because they are more user-friendly, we are used to them, and nobody wants to keep a virtual reality headset on their head all the time. So, the recording and the transmission is probably increasingly going to be based on 3D models and not on an accumulation of pictures. But the way to consume these models will probably be still based on the generation of traditional images. Unless of course for certain technical purposes where virtual reality or 3D models can stand in for training in high-complexity scenarios — for example, if you are an engineer and have to navigate a ventilation duct to understand where you need to replace a valve, or if you are a fighter-jet pilot in training. In architecture, engineering, or building, you could probably conceive of using a headset to navigate a model in virtual reality, but not to look at a picture of your cat. Still, stored as a 3D model instead of a 2D image, you could print out a statuette of your cat. Now, most of the time we do not need statuettes, because images are easier to manipulate than sculptures, so we will probably keep a lot of pictures of cats, but not many statuettes of them. My mother has statuettes of cats all over the house, but she is the exception. Images are still more transportable and more user-friendly than sculptures. So, we will keep using more images than statues, even though the technology is now shifting from 2D to 3D. That is my guess seeing that 3D entertainment, which has been around for 25 years, is never taking off. It is always seen as... 'the next big thing' in entertainment technology, but it has been 'the next big thing' for almost two generations now, so, evidently, most people do not like it, except for some video games, but again, you need a helmet, you need to move around in a physical space and then you bump your head against a wall because you cannot see because of the helmet, so you need to put up pillows everywhere. It is not... user-friendly.

As a historian, you avoid resorting to narratives of successive technological inventions as a model to explain the present. Rather, your work traces a history of ideas or technological aspirations (and many failed inventions) that shape cultural demands, which in turn explain the adoption or failure of certain technologies. This allows you to draw links between the Renaissance and the 1990s as two mirrored ends of "the

Albertian paradigm" for example, or write a history that leaps back and forth "at the pace of a breathless fable" as a reviewer to one of your books wrote. Is the combination of storytelling, personal anecdotes, and extensively researched footnotes a conscious strategy you developed at some point in your career? And how does this jumping back and forth in pursuit of explanations of the present relate to your understanding of history and the work of the architectural historian today?

I come from a culture of storytelling, that is what my friends do, what my grandparents did, you know, a tradition that is stronger in some countries. But also, at the end of the day, the practicalities of teaching show that it is easier to remember a story than trying to remember a mathematical demonstration — unless of course, you are a mathematician who probably likes mathematical demonstrations, but most of us are not. So, my usual narrative strategy is that every lecture should tell a story, but then every story should have a meaning. When you tell a story, you might think "well it is just a stupid story" but you remember that story, because it is stupid or even funny, and then, by remembering the story, you will also remember its meaning, which is what a fable (a parable, or anecdote) is about. Of course, you cannot always teach this way, but I find that often it helps. And then, if you write a book there can be some storytelling, but you also have to leave a lot of footnotes because the arguments you present must be verifiable — these are the rules of scholarship —, so that everyone can check your sources. That is the way you tell stories.

Every history we write is storytelling and it is always motivated, which is why history — as a repository of facts — might always look the same, the sources are always there, but every generation, or even more often, will tell a different story because we look at what has happened from different vantage points. There is no history by itself; when we do historiography, when we write history, we actually tell a story, and when we tell a story there is a process of selection of what is relevant to it. After all, storytelling — or historiography — is another data-compression technology. In the past, this selection

happened from the very beginning because a lot of events were not recorded, archives were not kept, documents were discarded. So, as a historiographer, you were dependent upon a random selection that had already been made. Increasingly, digital technologies can keep everything — Google already has every email I wrote in the past 18 years —. To take the argument to the limit, imagine there is a universal Google archive of everything that has ever happened, and one can search in this universal archive of all precedents. Just repeating every event recorded in it is not history; the universal archive of what is happened is just what happened. History is a selection of facts that are meaningful to the story you mean to tell. All storytelling is prompted and motivated by an argument you want to prove; and the arguments we have in mind today are not the arguments we had in mind 20 years ago.