

Design Thinking for the Global Community in an Era of Disruption

Madlen Simon

University of Maryland, College Park, MD

ABSTRACT: What can the entrepreneur's version of design thinking teach architects practicing globally in an era of disruption? A literature survey and comparative analysis of design thinking in architecture and the business community leads to a set of recommendations for architectural educators preparing students to enter a rapidly changing, globalized practice environment. Two aspects of design thinking particularly relevant to this endeavor are teamwork and problem definition.

Architectural projects often begin with a defined problem that embodies its solution. Typically, a client seeks an architect when the organization has determined that it needs a building. The architect's design challenge contained within that solution space. Programming process refines that design challenge by defining elements, qualities, and performance requirements of any potential solution. Programming may be performed by the design architect, but often by a consultant, and considered additional services. Consequently, architects often enter the scene after the problem has been defined. Design thinking in architecture tends to focus on individual cognitive processes.

By contrast, the entrepreneurial community stresses the importance of discovering the right problem to solve. The foundation of this process is empathy; the underlying theory is that a product or service will only be embraced if it addresses the needs, desires, and emotions of its users. The next step is to define the problem, based upon insights gained through empathizing. At this point in the process, the solution is still far in the distance. Defining the problem is like discovering a research question in what Herbert Simon termed the science of the artificial (Simon 1996), pursuit of knowledge about what might be. Entrepreneurial design thinking tends to focus on collaborative process and value of diverse teams.

Lessons from this form of design thinking can prepare students for a practice environment characterized by diversity and disruption of familiar institutions and typologies.

KEYWORDS: design thinking, programming, architectural education, globalization, disruption

INTRODUCTION

Two current forces, globalization of practice and disruption of business models, are transforming the environment of architectural practice. Once a profession of the elite for the elite, the profession and its clientele began to democratize in the early twentieth century. The growing globalization of the architecture profession and its markets amplifies the magnitude of the issue that architects increasingly work with and design for people unlike themselves. Architects work in diverse teams, sometimes virtual teams that collaborate across countries and continents. And they may serve clients and users around the world. Architecture students need to develop cross-cultural capacity in order to succeed in this globalized practice context.

The era of disruption offers both challenges and opportunities to the architecture profession. Disruptive innovation is changing industries and institutions – and the architectural typologies that have developed to house them. For example, consider how Amazon's leadership in online retail has led to the closing of physical stores and the death of malls, transforming urban fabric and suburban landscapes, and offering opportunities to repurpose and adaptively reuse those places. And, consider how Airbnb has transformed the concept of travel lodging, challenging the hotel and motel typologies by adding a flexible network of accommodations that challenges notions of what is public and what is private. This disruption challenges the nature of the architect's role. Scott Simpson sees this change as follows:

While architects have traditionally seen themselves primarily as creators of static objects called buildings, buildings are never really static. They are teeming with human activity, constantly changing and adapting to the needs of their occupants. Disruptive technology opens up all kinds of opportunities for architects and engineers to be the designers of processes as well as places. (Simpson 2014)

Architects, therefore, become the designers of settings for change. And, their responsibility to their clients and users of those settings is not necessarily to serve their espoused needs, but perhaps to challenge their assumptions, to search for the seeds of change in those industries and institutions, and to offer creative visioning expertise to move those organizations into the future.

For architects to succeed in global practice in the present era of disruption, they need to develop cross-cultural capacities that equip them to thrive on diverse teams, communicate with clients around the planet, and understand the needs of users beyond their own experiences. And they must use their design expertise to serve clients operating in a rapidly transforming environment, in which envisioning the future may be a more valuable service than accommodating known needs. A form of design thinking popularized in the business community offers lessons for architects and architectural education.

We will briefly survey the literature of design thinking for architecture and entrepreneurship to identify the divergence of perspectives and identify the concepts relevant to practice in an environment characterized by globalization and disruption.

1.0 THEORIES OF DESIGN THINKING IN ARCHITECTURE AND ENTREPRENEURSHIP

1.1. The term design thinking

Design thinking has divergent meanings in different branches of the literature. The term “design thinking” emerged out of a pool of alternate terms from the 1960’s onwards as architects, engineers, designers, social scientists, psychologists, computer scientists, and philosophers explored design. Although much of the literature of design thinking traces its roots to Herbert Simon’s *The Sciences of the Artificial*, first published as lectures in 1968 and as a book in 1969, the term design thinking does not appear in that work in which Simon discussed the science of design and the psychology of thinking (Simon, 1996). The first published instance of the term “design thinking” relevant to the field appears in Bryan Lawson’s book, *How Designers Think*, first published in 1980, in which Lawson devoted a chapter to exploring and explaining the modes of thought involved in design (Lawson 1980). Three years later, Donald A. Schon investigated the same subject in *The Reflective Practitioner: How Professionals Think in Action*, using instead the term “reflective practice” to focus attention on the way that design insight results from a feedback loop in which action is followed by thoughtful consideration that in turn leads to new action (Schon 1983). When Rowe wrote *Design Thinking* in 1987, he adopted the term “design thinking” without defining it or referring to its source (Rowe 1987). Rowe’s book firmly claimed the term “design thinking” for the discipline of architecture. Horst Rittel, who introduced the concept of wicked problems in design, used the term “design reasoning” in “The Reasoning of Designers” in 1988 to describe the mental process of designers (Rittel 1988). Richard Buchanan, in “Wicked Problems in Design Thinking” of 1992, united the terms “wicked problems” and “design thinking (Buchanan 1992).” Nigel Cross used “design thinking” as the title of his book, *Design Thinking*, of 2011 (Cross 2011).

Case studies in *Design Thinking* by Rowe and *Design Thinking* by Cross report behaviors of designers as evidence of their thought processes. Rowe chose three particular case studies “because they illustrate three different styles of design thinking.” (Rowe 1987) In each case, Rowe introduced the reader to a sequence of design activities in order to illuminate the underlying thought processes. He proceeded to survey the development of design process to gain insight into how architects think by interpreting the activities of design and surveyed architectural theory to offer insight into the source of ideas. Cross’s book alternates chapters of case studies with chapters of analysis. He described his search for insight as follows,

My approach to trying to understand how designers think and work is research-based: I look for and report evidence that comes from observation, experiment, analysis, and reflection. My aim is to reveal and articulate the apparently mysterious (and sometimes deliberately mystified) cognitive and creative abilities of designers, that are common across many design domains. (Cross 2011)

While authors have used a variety of terms in their explorations of a theory of design, the one term that has developed the most traction in the field is “design thinking.” While general agreement seems to have emerged on the terminology, there is no consensus on the exact meaning of the term. All of the works discussed above consider design thinking as cognition. It is interesting to note that design thinking is taught as a topic by the faculty of Cognitive Science at the ETH Zurich and design thinking is an area of interest in cognitive science research (Alterman and Kirsch 2003).

Cross characterized design thinking as a cognitive ability, saying,

The most significant outcome from the varied studies and research into design practice has been the growth of respect for the inherent, natural intelligence that is manifested in design ability. Early attempts to reshape the process of design into something more rational and systematic were founded perhaps on a disrespect for this natural design ability, and a strong desire to impose order onto design thinking." (Cross 2011, 29)

In this quote, Cross not only sums up the predominant credo of current thought on design thinking for architecture that the term design thinking refers to a cognitive ability of an individual. He furthermore repudiates the architecture discipline's scholarship of design methods that formed part of and related to the emerging discourse of design thinking in the 1960's and 1970's.

1.2. Teaching and learning design thinking

A result of this current view of architectural design thinking is that the practice of architecture is characterized by the absence of an explicit design process, consequent lack of agreement on what constitutes design methodology, and a general reluctance to bring this discourse into the open. This may be construed as a way of protecting the central mystery of the profession. It results in a form of architectural design studio education in which students are typically left to discover how to design.

The meaning of the term "design thinking" has taken on a new identity as a liberal art. In "Wicked Problems in Design Thinking," Buchanan heralded design thinking as a "new liberal art of technological culture." He identified the problem that the traditional subject matters of the liberal arts have narrowed in scope, proliferated, and become disconnected from one other and the concerns of daily life. Buchanan explained the potential for design thinking to address this problem as follows:

The emergence of design thinking in the twentieth century is important in this context. The significance of seeking a scientific basis for design does not lie in the likelihood of reducing design to one or another of the sciences – an extension of the neo-positivist project and still presented in these terms by some design theorists. Rather, it lies in a concern to connect and integrate useful knowledge from the arts and sciences alike, but in ways that are suited to the problems and purposes of the present. Designers are exploring concrete integrations of knowledge that will combine theory with practice for new productive purposes, and this is the reason why we turn to design thinking for insight into the new liberal arts of technological culture. (Buchanan 1992, 5-6)

There are some important implications here. When design thinking becomes a liberal art, it emerges from the silos of the professional schools into the university at large and from the discourses of the design disciplines into the broader academic discourse. And, when design thinking is recast from a discipline-specific mode of cognition to a way of developing general intellectual capacity, it becomes a subject for general education. An example of an institution that has adopted design thinking as a liberal art is the University of Maryland, where the Academy for Innovation and Entrepreneurship teaches design thinking across the curriculum. And, design thinking is no longer just for design professionals, but for everyone. It is significant that it is design thinking, not design, that is the term of choice for the new integrative field. The design professions still maintain control of design, but design thinking has entered the public realm.

1.3. Design thinking: for architects or for everyone?

In *A Whole New Mind*, published in 2005, Daniel Pink reinforced the idea that design (he used the term design, not design thinking) is for everyone. He characterized design as one of the six senses, claiming that,

In the Conceptual Age, we will need to complement our L-Directed reasoning by mastering six essential R-Directed aptitudes. Together these six high-concept, high-touch senses can help develop the whole new mind this new era demands." (Pink 2005, 65)

The concept of design as an aptitude is related to Cross's characterization of design as an ability. The key difference is that, while Cross views the ability as particular to designers, Pink advocates for everyone to develop that ability. The discourse of creativity addresses the ability to design. *The Universal Traveler*, by Don Koberg & Jim Bagnall, first published in 1974 offers an amusing travel guide for everyone to the realm of creative problem-solving, which the authors claim is "synonymous with design process" (Koberg and Bagnall 1974, 10). The concept that everyone is creative when they tap into their right brain was popularized by Betty Edwards in *Drawing on the Right Side of the Brain*, first published in 1979. Edwards drew the link between creativity and problem-solving and illustrated her point with an example of a designer at work:

This is my major premise: having learned to *know* perceptual skills through actually using them in drawing will enhance your success in transferring your visual skills to thinking and problem solving...These visual skills are useful for problem solving of all kinds, in every field of human endeavor, from solving business or personal problems to enhancing general thinking about world problems (large scale) or local problems (smaller scale). More important, they can help you produce new and unique innovations of social value. (Edwards 2012, 248)

In *Creative Confidence*, published in 2013, IDEO founder David Kelley and his partner/brother Tom Kelley situated themselves within this tradition as they set forth their belief that “we are *all* creative” (Kelley and Kelley 2013, 3).

1.4. Design thinking: mode of cognition or methodology of action?

As design thinking has moved into the public domain it has undergone a shift from mode of cognition to methodology, from a way of thinking to a way of acting. In an article titled “Design Thinking” in the *Harvard Business Review* in 2008, IDEO CEO Tim Brown characterized design as,

...a methodology that imbues the full spectrum of innovation activities within a human-centered design ethos...it is a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.” In this definition, Brown shifts the territory of design thinking from thought to action. He also claims design thinking for the business community. Brown has recast design thinking from a way that design professionals think to a way that business people act.

IDEO essentially recast design thinking from a mode of cognition to a methodology. In *Creative Confidence*, David Kelley and Tom Kelley characterized design thinking as “a methodology for innovating routinely” (Kelley and Kelley 2013, 4). This seems to be result from a return to the earlier literature of design thinking that deals less with cognition and more with the activities of design. This particular statement, however, is particularly significant, because *Creative Confidence*, a *New York Times* Best Seller, has been widely read outside the design community. The Kelleys, partners in IDEO, a firm noted for expertise in branding, have effectively branded design thinking as a methodology.

This brief review of the literature of design thinking illustrates a shift from the use of the two words design and thinking in conjunction to the popularization of the term “design thinking.” In the discourse of architecture, design thinking refers to the way architects think during the design process. In the discourse of business, design thinking refers to the process itself.

1.5. Design process models

Architectural projects often begin with a defined problem that embodies its solution. Typically, a client seeks an architect when the organization has determined that it needs a building. The solution is the building; the architect's design challenge contained within that solution space. Programming process is intended to refine that design challenge by defining elements, qualities, and performance requirements of any potential solution. Programming may be performed by the design architect, but programming services are often provided by a consultant, and considered additional services. Consequently, architects typically enter the scene after the problem has been defined. The architect's project process is a series of iterations through which ideas are generated, represented, tested against client criteria, at increasingly greater scales and specificity, then translated into built form by a constructor under observation of the architect. The five process steps are known as schematic design, design development, construction documents, procurement, and construction administration (Architect's Handbook 2014). The first three steps form the design process. They are essentially iterations of the same process, with design exploration increasing in scale and level of detail throughout the sequence.

The version of design thinking codified by the Stanford d.school faculty and popularized in the entrepreneurial community, on the other hand, promulgates a clear and simple process model with five distinct and clearly defined modes of design thinking, Empathize, Define, Ideate, Prototype, and Test (Bootcamp Bootleg). And, it stresses the importance of discovering the right problem to solve. The foundation of this process is empathy; the underlying theory is that a product or service will only be embraced if it addresses the needs, desires, and emotions of its users. The next step is to define the problem, based upon insights gained through empathizing. At this point in the process, the solution is still far in the distance. Defining the problem is like discovering a research question in the science that Herbert Simon termed the science of the artificial, the pursuit of knowledge about what might be (Simon 1996). In the next step, ideation, the designer seeks to discover the solution set for that research question. Prototyping makes the idea visible and testable. Testing elicits user feedback. The designer iterates in response to feedback.

1.6. Defining the design problem

The American Institute of Architects (AIA) is the authoritative source for current design process in architectural practice, because AIA contract documents are typically used to establish the legal environment of projects. *AIA Document B-101-2017 Standard Form of Agreement Between Owner and Architect*, establishes the mutual responsibilities of Owner and Architect (AIA website). The Owner is assigned responsibility for providing the architect a written program. The architect's basic services are defined as schematic design, design development, construction documents, procurement (assisting the Owner in getting construction services through bidding or negotiation), and construction phase services. This document makes it clear that

the architect's work begins after the development of the program, the document that defines the architectural problem. The work of the architect, therefore, is to solve a pre-determined problem.

Some owners may have in-house programming capacity; others may out-source the programming function, sometimes to architects. The Architect's Handbook of Professional Practice offers guidance to architects on how to perform programming as an additional service to clients. The key concept reflected in the contractual structure, however, is that the architect's leadership in programming is considered optional.

Architectural education tends to reflect this de-emphasis on the architect's inclusion in the design process.

In the 1980s and 1990s, some architectural schools began to drop architectural programming from their curricula. The emphasis of the Post-Modern and Deconstruction agendas was instead on form-making. Programming and its attention to the users of buildings was not a priority. Now, several generations of architects have little familiarity with architectural programming and the advantages it offers... (Cherry and Petronis 2016)

In her earlier book on programming for design, Cherry points out that programming began to become a discipline in response to the availability of computer technology. Computer programming required explicit definition of information and operations, making it imperative that "...ideas frequently processed at the unconscious level had to be brought up to the conscious level and described to others, either people or machines..." (Cherry 1999, 6). Interestingly, one of the pioneers of design methods in architecture, Christopher Alexander, became influential in the field of computer science, with his concept of pattern language (Alexander 1977) translated into object oriented programming (Alexander 1999).

Two seminal texts were particularly influential in the development of programming methodologies and process for architectural practice. *Problem Seeking*, written in the 1960's at the Texas firm Caudill Rowlett Scott by William Pena and others argued that programming is separate from design and that the two activities require different modes of thought. Programming requires analysis; design requires synthesis. Programming is problem seeking; design is problem solving. For Pena, problem definition is the overlap zone, the passing of the baton from programmer to designer. Problem Seeking posited a 5-step programming process: (1) Establish Goals, (2) Collect and Analyze Facts, (3) Uncover and Test Concepts, (4) Determine Needs, and (5) State the Problem (Pena 1987). Note that these five steps precede the present-day architectural design and construction phase services.

Henry Sanoff's 1970's text on the programming process, *Methods of Architectural Programming*, lays out a five step project process: Program Development, Preliminary Design Phase, Production Phase, Construction Phase, and Evaluation Phase (Sanoff 2016 reprint). In Sanoff's model the present-day architectural design and construction phase services are bookended by Program Development and Evaluation. At present, programming is not included in architects' basic services, and evaluation, often termed post-occupancy evaluation, is considered an additional service and rarely provided by architects.

In the Stanford d.school design thinking model, problem definition is the second step of the five-step process. The Define mode follows the Empathy mode. Whereas empathizing requires "flaring," defining requires "focus." In the Define mode, the designer develops "how might we?" statements that become design research questions to be addressed in the next step, Ideation. The "how might we?" question functions like Pena's handoff between program seeking and problem solving.

1.7. Individual thought vs. collaborative activity

As noted above, the literature of design thinking for architecture tends to focus on the thought processes of individuals. While architectural practices typically organize teams of people to execute projects, there is little study in the discipline of how teams design and little guidance for students in the literature. *The Architect's Handbook of Professional Practice Student Edition* (Haviland 2014, 545-555) offers some information about team management, along with a few suggestions about team building. In the section on "Managing Personalities," architects are advised to use the Meyers-Briggs Type Indicator to develop self-awareness and learn to work with others by understanding their personality types.

In the fields of business and software development, by contrast, there is substantial research on team process. For example, Google recently completed Project Aristotle, a study of team process that concluded that the most important characteristic of successful teams is psychological safety (Duhigg 2016). And there is a body of scholarly work on diverse teams and virtual teams in journals in the field of business. For example, Gibson and Gibb's work examining the effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on teams similarly concludes that "a psychologically safe communication climate" is instrumental in mitigating these factors (Gibson and Gibbs 2006). Harvey, Novicevic, and Garrison's work finds human, social, political, and cross-cultural capital to be essential to successful virtual teams (Harvey,

Novicevic, and Garrison 2005). While there is a considerable body of work highly relevant to architectural practice for the global community, there is little evidence of application to the discipline of architecture.

2.0. LESSONS FOR PRACTICE IN THE GLOBAL COMMUNITY IN AN ERA OF DISRUPTION

2.1. Focus on learning to collaborate in diverse teams and in the global arena

As the literature review reveals, the area of team collaboration has been well-studied, with work on diverse teams and virtual collaboration, areas of teamwork implicated in both innovation and global practice. Not well-studied, however, are the applications of this research to architectural practice, with its unique aspects of intensive local engagement in the global community, where international practice means working with local practitioners and designing for local cultures and environments. This is a research opportunity for scholars of architectural practice. Lack of a literature of teamwork in the discipline means that students are typically not exposed to this area of theory of practice.

The lack of a theoretical underpinning for teamwork in architecture manifests itself in the design studio. While, in the author's experience as design studio faculty and guest critic at a variety of institutions, she has noted that team projects have become the norm in many studios, team assignments are typically made without explicit guidance and preparation for collaborative work. This contrasts with the author's experience participating in a Design Thinking Bootcamp, aimed at educating professionals to become agents of disruptive change in corporations and institutions, at the Stanford d.school. In this executive education program, team process was an explicit part of the curriculum, with game storming (Gray et al 2010) type activities to warm teams up and guide team interactions.

The author has applied this experience of explicit teaching of collaborative process to fostering a diverse, virtual team in the Bridging the Gap studio that brings architecture students from the University of Maryland (UMD) in College Park and Al-Nahrain University (ANU) in Baghdad together to design projects in one another's countries. The objective of preparing students for practice in the global community is reflecting in the learning outcomes for this architectural design studio course:

1. Demonstrate the ability to work effectively in international teams to study sites and propose urban design and architectural responses
2. Identify the challenges and benefits of international teamwork in urban design and architecture projects where the project is located in an international location
3. Be able to articulate commonalities and differences in international perspectives on the design of public urban places and how these result in physical form and space
4. Identify their own cultural assumptions and reflect on how these shape their attitudes and behaviors in design thinking



Figure 1: UMD and ANU students share each other's foods at video-conference. Source: Z. Alwash 2016



Figure 2: ANU students researching Karrada Market to inform UMD students. Source: S. Hussein 2018

2.2. Importance of empathy

A practice environment characterized by globalization and disruption requires architects to exercise empathy. Understanding the feelings, thoughts, and experiences of those unlike oneself is a capacity for creating trust, identified as the key factor for success of collaborative teams. And, empathy is a key skill for building cross-cultural capital, identified as a factor for success in virtual teams. Not only is empathy important to building strong collaborative relationships on teams, it is also key to designing for clients and users. While architects typically design for clients unlike themselves in important ways, for example, client organizations engaged in a variety of different industries, the globalization of markets for architectural services magnifies the aspect of difference.

Architectural education would benefit from the emphasis that the business and entrepreneurship community puts on empathy as the foundation of the design thinking process. Architectural design studio courses have traditionally provided students with a project brief outlining client's needs. In the case where students are asked to develop a project program, they may have access to clients and users, for example, in community-engaged studios. In this situation, students would benefit from instruction in how to engage with communities.

In the more typical situation in which students do not have access to clients and users, their only resource for determining human needs is to use their imaginations. This poses the risk of students imagining that their own feelings, beliefs, and cultural norms are shared by the users of their designs. As students move into a practice environment where they will serve a diverse and globalized community, ability to discover and design for human needs is clearly required.

The five-step design thinking process developed by the Stanford d.school grounds the design process in empathy, offering guidance on how designers can build empathy through the activities of immersing, interacting, and interviewing. The Stanford d.school's model for teaching design thinking offers methods and resources to teach students how to practice empathy to discover human needs.

2.1. Defining the problem

The sub-discipline of programming that flourished during the 1960's and 1970's, concurrent with the interest in design methods, has faded from prominence in the discipline of architecture. Programming courses have largely disappeared from architecture curricula. A study of professional degree programs in architecture at the Big Ten universities, by the author, reveals that none require courses in programming. This means that students graduate ill-equipped to discover the present needs of clients and users. And, in this era of disruption, they are consequently unprepared to take the next step of creatively envisioning future needs for individuals, industries, and institutions.

Empathy is considered the foundation of design thinking for innovation. A key concept of designing for disruption is to focus on extreme users, those found on the tails of the bell curve, in order to discover needs that can lead to innovative solutions. Another key concept is to clearly separate the modes of empathy, problem definition, and ideation in the design thinking process. This helps designers to avoid defining problems on the basis of assumptions and to avoid pre-determined solutions. To better prepare students for practice in an era of disruption, architectural educators have an important opportunity to replace the extinct programming course with a new pedagogy of empathy-building and problem-definition that can teach students how to practice design thinking in an era of disruption.

CONCLUSION

The challenges of practice for the global community in an era of disruption demand a set of competencies that are key to a form of design thinking popular in the entrepreneurial community that has some key differences from what architects are talking about when they use the term design thinking. First of all, designing for the global community requires the ability to practice empathy, both to function effectively as a member of diverse, sometimes virtual teams, to insightfully discover the needs of clients and users different from oneself, and to discover the new ways of working, inhabiting, living, etc. that can lead to disruption of traditional building typologies and offer innovative proposals to clients in ways that serve emerging needs of users.

While architecture schools typically currently incorporate team projects into design studio curricula, they typically do not explicitly teach collaborative team processes. A study of the literature of design thinking, including some of the foundational texts from the discipline of architecture as well as recent material from design thinking in the service of innovation and entrepreneurship, reveals rich material on techniques and modes of thought for effective team process. Incorporating this knowledge into studio would enhance students' preparation for practice on diverse teams. A further recommendation is to give students opportunities for cross-cultural engagement, such as virtual and on-site studio collaborations between universities in diverse settings.

And, along with opportunities to engage, students will require explicit instruction in cross-cultural communication, diverse team collaboration, and design thinking process.

The seminal texts of architectural programming and current material on design thinking offer specific techniques, activities, mindsets, and principles to guide designers in collecting and acting upon information in ways that can lead to innovative problem definition based upon insightful understandings. A recommendation for architectural education is that the time is ripe to replace the programming courses that have largely disappeared from architecture curricula with innovative instruction that conveys the value of and capabilities required to discover information and define architectural problems both current and emerging.

Armed with the knowledge and capabilities to operate across cultures and to act upon emerging tendencies, architectural students will be better prepared to become change-makers in the global community in an era of disruption.

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