

# The Architecture of ScarCity Game

## *The craft and the digital as an alternative design process*

Axel Becerra Santacruz<sup>1</sup>

<sup>1</sup>Master in Advanced Design, Facultad de Arquitectura, Universidad Michoacana de San Nicolas de Hidalgo, Morelia, México

<sup>1</sup>axbesa03@gmail.com

*The Architecture of ScarCity Game is a board game used as a pedagogical tool that challenges architecture students by involving them in a series of experimental design sessions to understand the design process of scarcity and the actual relation between the craft and the digital. This means "pragmatic delivery processes and material constraints, where the exchange between the artisan of handmade, representing local skills and technology of the digitally conceived is explored" (Huang 2013). The game focuses on understanding the different variables of the crafted design process of traditional communities under conditions of scarcity (Michel and Bevan 1992). This requires first analyzing the spatial environmental model of interaction, available human and natural resources, and the dynamic relationship of these variables in a digital era. In the first stage (Pre-Agency), the game set the concept of the craft by limiting students design exploration from a minimum possible perspective developing locally available resources and techniques. The key elements of the design process of traditional knowledge communities have to be identified (Preez 1984). In other words, this stage is driven by limited resources + chance + contingency. In the second stage (Post-Agency) students taking the architects' role within this communities, have to speculate and explore the interface between the craft (local knowledge and low technological tools), and the digital represented by computation data, new technologies available and construction. This means the introduction of strategy + opportunity + chance as part of the design process. In this sense, the game has a life beyond its mechanics. This other life challenges the participants to exploit the possibilities of breaking the actual boundaries of design. The result is a tool to challenge conventional methods of teaching and leaning controlling a prescribed design process. It confronts the rules that professionals in this field take for granted. The game simulates a 'fake' reality by exploring in different ways with surveyed information. As a result, participants do not have anything 'real' to lose. Instead, they have all the freedom to innovate and be creative.*

**Keywords:** *Global south, scarcity, low tech, digital-craft, design process and innovation by challenge.*

## THE CRAFT VS. THE DIGITAL

As a result of the Industrial Revolution, the shift to urban and machine-based manufacture led to the decline of non-industrialised skills in western countries such as Britain and USA compared to the prevalence of non-industrialised skills in countries of the global south such as Mexico. Along with the loss of this tradition, other vernacular architectural processes were also lost including traditions of self-building and communal sharing. These have been replaced by huge advances in knowledge of materials and engineering. Today in a 4th industrial revolution or Digital era, as has been by theorist, advancements in communication, artificial intelligence, big data, cloud computing, blockchain, nanotechnology, biotechnology, robotics, 3d printing, biological and digital systems of production, etc. are redefining established concepts of production and unlocking accelerated changes to the everyday live.

In contrast to the industrialized western condition accustomed to a 'top-down' pattern, civil order, urban law and 'perfection'. Since post-colonial times the Mexican context has reversed this trend in certain areas of the population due to its chaotic history. Ramirez-Ugarte goes onto clarify;

"The 'bottom' end of society obtains control of areas that are fundamental to their survival and welfare" (Ramirez Ugarde 2008).

After Mexican industrialization between the 1940s and 1970s, this condition has been exacerbated rather than reduced out. The largest Mexican cities such as Mexico City, for example, became a refuge for migrant masses of the countryside, looking for new industrial jobs. Even so, the government did a huge effort to provide social housing, it wasn't enough to provide the explosive workers' demand. Consequently, informality based on Craft turned into the most common path of survival for immigrant communities. According to Iriarte, "Buildings

are always embedded within a specific labor culture and working conditions. In semi-peripheral countries, construction still relies heavily on manual labor. It is not a coincidence that these countries have a high carbohydrate-based diet, which provides fuel for such work" (Iriarte 2018). Present and future scenarios don't seem to be changing, instead, it is predicted that informality based on non-highly industrialized skills will carry on increasing. Estimations suggest that in the coming decades 2035-2050 living and functioning within informality will continue to be the most common pattern in Latin American cities (Ravalion 2007).

## Designing the Game.

The journey through the design process of this game could in some ways be seen as having been developed intrinsically by a 'process based on craft' if one compares it to the 'traditional design process'. Expanding this point in more detail means that under -traditional design process- the architect works through a linear or determinate path (Jones 1990). This means that the architect labors under the belief that she/he has systematic control of procedural rules to follow. In the words of Sarah Wigglesworth "The traditional architectural inclination is to take a set of "raw" ingredients and produce his building design following a recipe" (Wigglesworth 2005).

Secondly, the architect will probably simulate possible scenarios to predict different risks or outcomes, or maybe consult a related bibliography. Thirdly, he/she will develop his 'optimal' design without limitations. Finally, he/she will claim all economic resources to afford all 'necessary' elements in order to develop his proposal exactly as it was designed. This is because architectural ideology holds the will of the creator (their creativity) to be sacred and something that should be allowed free reign (Habraken 2005).

However, one of the main concerns as it has been

argued previously is that under this perspective an excessive amount of resources are necessary to make this proposal feasible. Also, a level of limitations can exist due to the lack of consideration of additional issues related to the 'unpredictability' of the users' interpretation (Till 2006). The main concern about this approach is that it confuses an original contribution with the capacity for control. In other words, an approach produced by entirely controlled design process does not necessarily mean a new contribution to design knowledge.

In contrast, the Architecture of Scarcity Game was intrinsically developed under the 'design process of scarcity'. In this case, a preliminary design stage was developed, although it only focused on understanding the basic elements of the design process rather than on the final product. This means analyzing the spatial model of interaction, available human and natural resources, and the dynamics of its relationship (Preez 1984). Additionally, limiting the exploration to the available, recycled materials further developed the game. Subsequently, through researching the issues that arose, they were examined and simulated until a satisfactory stage was reached. In other words, the key elements of the informal design process of traditional communities were identified providing the opportunity for them to be manipulated to affect the resultant outcome structures (Preez 1984). At this stage, the informal design process and possibilities of the architect's intervention were demonstrated. This was developed organically and with openness to modification. In this process, improvisation and imperfection were an integral part of the design tactics.

### ***Basic concepts: The Craft***

Explaining the concept of the craft further means that a set of available materials such as improvised pins, pieces of wood, pennies, different empty boxes, recycled paper, and magazines, etc. were used at the preliminary stage to identify basic elements, test key ideas and produce the first prototype. Furthermore, recycled catalogs, magazines and cardboard

boxes, materials on accessible, refilled printing cartridges and donated paintings, were used to develop the prototype further. As a consequence, some sizes were negotiated between the design and volume of recycled materials, colors, types or what was available. Also, some pieces from older games were adapted.

An aptitude for the reconciliation of contradictory elements old vs new was a compulsory skill. For example, the use of mixed media modern-traditional was used; materials such as plastic were mixed with more 'traditional' ones such as wood. In summary, the designer was working with what was available rather than against it. Consequently, neither homogeneity nor any specific features of a specific 'style' appeared in the initial game sample.



As a result, the first prototypes were probably seen as imperfect objects, not produced by a 'good designer'. However, the key concept of the process was understood. Finally, different prototypes were refined and tested by a process of filling in the gaps with the knowledge gained through listening to the questions and suggestions of critics and participants. Their opinions both about the physicality and the mechanics of the prototype were crucial to its development. In the final analysis, it became clear that the input of the participants proved to be indispensable to the evolution of the prototype and in turn, the creation of the final, improved artifact.

Figure 1  
First impressions of  
Architecture of  
Scarcity Game



Figure 2  
Crafting the  
Architecture of  
Scarcity Game

**Indeterminate design process.** From a 'traditional design process' perspective, the aforementioned process could itself be viewed as a 'design process of scarcity' or of limited resources. It would be possible from this perspective to consider that this research simulator may have suffered from a lack of economic resources, which would provide for all necessary materials for its development, or perhaps the designer's inability to follow a straight path. As a consequence, this can be classified as 'imperfect' 'chaotic' or indeterminate design process. This is especially pertinent if a designer cannot have control over all the elements that he is used in a determinate design process.

Nevertheless, from a non-western point of view, a design process based on the craft can mean the first step of the design challenge using the limited and minimum resources available. Secondly, if there is the opportunity, to ask for more sophisticated re-

sources if it is really necessary. It is possible in this scenario that the author was subconsciously suffering from the non-western tendency not to dispose of any material simply because it had stopped working as it was originally designed for. Instead, the first action was to try to find other uses for this considered 'waste'. In other words, the design process of the Architecture of Scarcity Game was intrinsically using a design process of the empirical practice of many different communities in Mexico. This experience highlighted the possibility of a non-predetermined process based on the craft that has not total control upon all factors. It thereby demanded a methodology that had no clear end. Generally speaking from the perspective of the global south in these specific areas of limited resources, this process is part of everyday life and the only choice for their citizen (Certeau 2011).

As a result, the main aim of this speculative simulation is not to romanticize scarcity and its design process based on the craft but, rather, to learn the main lessons of this challenge including how the process could be enhanced by introducing support from an agency and its digital tools.

**Design Participation.** Due to participant's collaboration, it can be used as a metaphor that can be compared to reality. In this sense, the game has a life beyond its mechanics. This other life challenges the participant to exploit the possibilities of breaking the actual boundaries. The result is a tool to stop controlling everything by a prescribed design process. It confronts the rules that professionals in this field take for granted. The game simulates a 'fake' reality by exploring in different ways with surveyed information. As a result, participants do not have anything 'real' to lose. Instead, they have all the freedom to innovate. Future challenges call for a new generation of architects capable of dealing with these issues by breaking down boundaries. Very few have broken the traditional architectural value system by looking towards non-west or undervalued environments in order to bring alternative solutions into practice (Livingstone, Palich and Carini 2002, 321-326)).

### Aim & objectives

The main aim of this speculative simulation is not to romanticize scarcity and its design process base on the craft, but rather, to learn the main lessons of this challenge including how the process could be enhanced by introducing support from an agency and its digital tools. Some key principles will emerge through this exploration. In other words, this game explores an action research approach through the production of experimental design (Wisner, Stea and Kruks 1991). Participants were challenged to think in different ways thought contrast and discomfort as key elements to promote creativity (Livingstone, Palich and Carini 2002, 321-326).

To achieve such goal the main aim-message of the game is to let the participants know that Architecture of Scarcity board game, is not principally about building up physical architecture, but it is about pedagogy for developing a Strategic Framework implied in the game. It challenges the participants' capacity of reflection, organization, and decision. In this sense, this game first explores the building up of social networks (the basis of design participation), environmental links, technicalities and a series of actions to achieve later physical architecture in a community. In short, the game aims to unlock collective consciousness about people's capacity to generate, claim, change, participate and transform the built environment eliciting specific local possibilities. If the Architecture of Scarcity Game can reflect these issues and transfer them to the participants through a test we will have achieved our goal.

nized within three main zones. The 1st area corresponds to settler's zone; the 2nd area to the Strategic Framework and supportive tools of Design zone and the 3rd area is where the production of Architecture of Scarcity takes place.

Figure 3  
Board of  
Architecture of  
Scarcity Game



Figure 4  
Main elements of  
the Architecture of  
Scarcity Game



Figure 5  
Description of the  
main elements of  
the game

### THE DIGITAL: BOARDS, ELEMENTS, AND MECHANICS OF THE GAME

The Architecture of Scarcity Game was designed around different board layouts informed by research data in order to cover aims and specific intended objectives. The boards are abstractions of research areas in Mexico such as vernacular towns, informal and semi-informal modernism settlements. Studies of these areas were used to develop the game's board layout (Becerra 2017). The boards are orga-

1. Board Layout
2. Agent Tool-Kit V2010
3. Settler's base cards
4. Consent forms and questionnaire
5. Agent's card
6. Institutions of Support Tray
7. Locally available resources
8. Cards of Issues of Scarcity
9. Tool Box of available resources
10. Card of plot location
11. Cards of Contingencies
12. Catalogue of Design tactics
13. Itinerant office of architect
14. Settler's base card
15. Cards of Individual Family support
16. Cards of Community support
17. Socio-Economic programmes in action
18. Area of private land with one dwelling
19. Area of public land with various amenities
20. Participants production of Architecture of Scarcity
21. Environmental programmes in action
22. Technical programmes in action
23. River
24. Forest
25. Main road
26. Rubbish

## ***Stages of the Game***

a) The introduction of the session was composed of a 5 minutes visual PowerPoint presentation. It included a rich mix of quotations coming from the theoretical background of the game and visuals to set the context. Simple exercises were used as a starting point to provide clarification of the theoretical concepts.

b) The first stage and further developing understanding of the condition of scarcity, also entitled "Pre-agency" addresses what can be learned from the existing features of the architecture produced by a condition of scarcity? This stage helps the participants to understand why, even under the condition of scarcity, there is a huge amount of architectural production based on local skills. In other words, this stage of the game aims to introduce the concept of - The Craft- in building your housing or neighborhood even when you do not have all the necessary funding to do it in one go. Even without state agencies, bank support, mortgages or huge savings. At the same time, it is expected that participants develop or identify further lessons. This is a stage mainly driven by chance. Between 15-25 minutes were required to cover these issues.

c) The second stage and testing the validity of founded lessons and designed tools, supported by -the Digital- also entitled "Post-agency" addresses how such lessons can be used to challenge contemporary architectural design process production to speculate and explore the interface between craft (local knowledge and low technological tools), and the digital, (new technologies available and construction).

This stage introduces the participants to the revised architect's role inside these marginalized communities, which is represented by the Agency and its tools. This stage tests if the Agency makes a difference to the organization, the power of collective endeavor, access to other types of skills & resources and economies of scale. In short, this stage also encourages the participant to question what can be the added value of working with the Agency and its

tools? How could the Agency accelerate an alternative process? This stage also suggests accepting chance as part of the design process however put forward strategy as the main new driver of intervention. Between 35-40 minutes are necessary to cover this stage.

d) The Questionnaire and final discussion of the session were composed of 5 minutes in the end. In this stage, students expressed their ideas and rationale behind their final Architecture of Scarcity's production. At the ending, participants are asked to complete a questionnaire giving general perception about their experience. The questionnaire was designed as an additional tool to assess how the whole experience works and if the main objectives were covered. Students took an average of 5 minutes to complete all the questions.

## ***Pre-Agency stage: Analyzing Interesting moments and lessons***

After participants became comfortable and engaged with the game (approximately 10 minutes on average), the first lessons began to emerge. Different situations challenged participants to negotiate, to discuss, and to propose some solutions. At the same time, participants revealed part of their real personalities in taking some of the characters too seriously. They were able to start using in their small informal housing production, key elements and basic design tactics of the non-prescribed design process introduced in different catalogs. In other words, participants understood citizen's tactics of everyday practice (Certeau 1974).

Some of these Issues of the craft in practice were: self-construction, use of local natural resources available, use of local techniques and skills, low energy consumption, flexible design, which allow flexible financial, to mention several. However, the most interesting moments emerged when participants unlock a set of new possibilities such as different service exchange, suggestions of another kind of self-construction techniques, alternative prototype production, different use of materials and functions, etc.,



just to mention some examples. Some of these new tactics were never explored or cataloged before. Participants demonstrated not only have begun to understand the discussed to develop their proposals, under the design process of craft but also they began taking them on board with improvements and modifications. As a result, participants can innovate using their actual knowledge added with fresh acquired creating a new hybrid (Livingstone, Palich and Carini 2002, 321-326).

Figure 6  
Participant  
demonstrating local  
skills and  
techniques



### **Post-Agency stage**

The Post Agency Stage developed even more interesting and at the same time stressed moments. Sometimes bipolar ones such as settlers' partnership or settlers' conflicts appeared. At this stage, participants were really engaged and confident after 30-35 minutes developing their personal strategies to tackle given scenarios. The introduction of the Agency and by implication supplementary data lessons, tools, new technologies available and different programs such as subsidies, consultancy, information, etc. raised expectations. Participants began to get engage with introduced design tactics, but also suggesting their own personal interpretation. In other words, participants have begun to understand

the value of linking citizen tactics to new techniques and technologies available. In this sense, the introduced programs supported by different structures of power began to unlock the participant's own creativity to face their specific challenges.

## **CONCLUSION**

This test demonstrated respect to the variance of participants' individual interpretation of the design process base on the craft. Encourages participants' expression with the support of data lessons and designed tools. The test activity not only simulated different patterns of the non-prescribed design process in informal and semi-informal communities in Mexico but also was a media to unlock other contingent factors involved in the design process such as different participants' patterns of social-economic thinking (Till 2009). At the same time brought to the table discussion that required intuitive, strategic and logical thinking of different participants to face coming challenges involved in the informality agenda. In specific the critical analysis of the hybridization of the craft and the digital. This means "pragmatic delivery processes and material constraints, where the exchange between the technology of the digitally conceived and the artisan of handmade is explored" (Huang 2013). Researchers suggest, "Rethinking the Informal City" in order to understand the complex processes involved in informal developments (Hernandez and Kellet 2009).

### **Acknowledgments**

Remarkable thanks are due to Jeremy Till for his kind mentorship and support during the first stage of my Ph.D. Special thanks are due to Sarah Wigglesworth for her many comments and suggestions on the conception of this game during the second stage of my studies. Many ideas and reflections took place during reviews challenging me about the imaginable contributions of design to the Mexican context. Thanks to all participants testing this art fact on the top floors of the Arts Tower of the School of Architecture, especially to my brother Habid Becerra for his long hour's

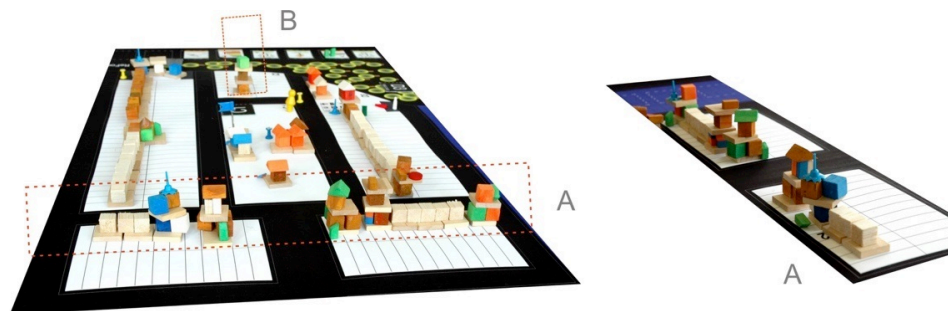


Figure 7  
The architecture of  
ScarCity production

analysis. Also, thanks to Rosie Parnell and Felipe Hernandez, external examiners for her/his ultimate observations. Last but not least, thanks to Mariela Pedraza my wife, for all her unconditional support. This research has been developed as part of the Ph.D. Studies at the School of Architecture of the University of Sheffield by the generous support of the Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Mexico, and also has been possible thanks to the financial support of CONACYT (Mexican Council of Science and Technology).

## REFERENCES

- Becerra, Axel 2017, 'Beyond Formality and Informality: the informal modelrnisrn space, a place to investigate design principles and opprtunities', *Marginal Urbanisms. Informal and formal development in cities of Latin America*, 1, pp. 133-145
- Becerra-Santacruz, A 2009, *Architecture of Scarcity*, Ph.D. Thesis, University of Sheffield
- Beesley, P, Khan, O and Stacey, M 2014, 'Adaptive architecture', *Acadia 2013*, 1, pp. 133-145
- Ceteau, M 2011, *The Practice of the every day life*, University of California Press, United States of America
- Habraken, N.J 2007, *Palladio's Children: Essays on Everyday Environment and the Architect*, Taylor & Francis, London
- Hernandez, F, Kellet, P and Allen, L (eds) 2012, *Rethinking the Informal City: Critical Perspectives from Latin America*, Berghahn Books, New York- Oxford
- Huang, A. 2013 'Digital Craft', *Acadia 2013; Adaptive Architecture*, Cambridge Ontario, Canada, pp. 52-55
- Iriarte, P 2018 'Digital Craft in Semi-Peripheral Nations', *Acadia 2018: Recalibration on impresion and infidelity*, Mexico City, pp. 51-55
- Jones, J.C. 1990, *Design Methods*, David Fulton Publishers, London
- Leonard, JB 2002, 'Culture cash and housing: Community and tradition in low-income building', *Habitat International*, 17(1), pp. 152-153
- Livingstone, LP, Palich, LE and Carini, GR 2002, 'Promoting creativity through the logic of contradiction', *Journal of Organizational Behavior*, 23(3), pp. 321-326
- Du Preez, PH 1984, 'Basic Socio-Economic Elements of a Development Theory for Traditional Societies', *Development Southern Africa*, 1(1), pp. 36-55
- Ramirez-Lovering, D 2008, *Opportunistic urbanism*, RMIT Press, Melbourne
- Ravallion, M and Chen, S 2007, *Absolute Poverty Measures For The Developing World, 1981-2004*, The World Bank
- Ravallion, M, Chen, S and Sangraula, P 2007, 'New Evidence on the Urbanization of Global Poverty', *Population and Development Review*, 33(4), pp. 667-701
- Van Rooyen, CJ 2008, 'Basic socioeconomic elements for a development theory for traditional societies', *Development Southern Africa*, 2(1), pp. 146-150
- Saltmarsh, S 2015, 'Michel de Certeau, everyday life and policy cultures: the case of parent engagement in education policy', *Critical Studies in Education*, 56(1), pp. 38-54
- Till, J 2009, *Architecture Depends*, MIT press, Boston
- Wigglesworth, S 2005, 'Critical practice', *The Journal of Architecture*, 10(3), pp. 335-346
- Wisner, B., Stea, D. and Kruks, S. 1991, 'Participatory and Action Research Methods', in Moore, G. and Marans, R (eds) 1991, *Advances in Environment, Behavior and Design*, Plenum Press, New York, pp. 271-295