

# Dirt, Garbage, Water, and Steel: Architectural Entrepreneurship in South Africa

The profession of architecture (and its academic counterpart) has an exquisitely designed building for most problems—including those insufferably prefigured by climatologists. Few would consider such a fault—for the production of the built environment appears to occupy a center of gravity within our human ecosystem that gives it a coincidental relationship to nearly everything.

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And so, architecture is pertinent to most challenges like few other forms of production. This alone affords architects (along with architectural educators) heightened relevance within the cohort of agencies addressing climate change. As such, architects are dutifully educating themselves on the matters of ecology, sustainability, and climate change. However, the professional paradigm remains awkwardly burdened by its necessity to offer an architectural solution, no matter the problem. Architecture is no small part of climate change. But architects interested in addressing the broader complexity of environmental, social, and economic sustainability may find greater effectiveness by assimilating the entrepreneurial paradigm.

“Entrepreneurship is a process by which individuals...pursue opportunities without regard to the resources they currently control.”<sup>1</sup> This alone explains architecture’s sub-entrepreneurial approach to sustainability. Architects fully regard their “control” over the resources employed in building, and as such, leverage building resources when addressing climate change. Another commonly cited definition of entrepreneurship frames it as the process of creating value by bringing together a unique combination of resources to exploit an opportunity.<sup>2</sup> Architects are plenty adept at uniquely combining resources in creating value through opportunity—so long as the resources are bricks and mortar, the value architectural, and the opportunity a well-funded client. Certainly the opportunities offered by conventional design, practice, and pedagogy are relevant, if not critically important. But their associated limitations are no less so. In actively addressing the issues relevant to societies facing climate change, architects would do well to uncloak themselves from a professional mindset preoccupied with building resources and architectural value alone.

The coursework explored in this paper imposes the entrepreneurial mindset in an otherwise conventional architectural endeavor. *Entrepreneurship and*



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*Architecture* is structured as an interdisciplinary course in which students collaborate on projects of a post-architectural nature in a distinctly challenging context. Most recently, students of architecture, agriculture, construction management, journalism, and entrepreneurship proposed design interventions in the dynamic social, political, and environmental climate of subtropical South Africa. The student investigations of soil conditions, waste streams, water quality, climate change, and other contextual forces at work in the black townships of the Eastern Cape Province allude to a productive re-orientation of practice that befits the problematic future foreshadowed by recent trends. Rather than preparing students to find a problem for their architectural solution, future practitioners and their interdisciplinary teams are confronted with a dynamic and complex environmental context to which they must respond with a fitting intervention of some form—architectural or otherwise. Dirt, garbage, water, or steel—their proposals for soil management, waste stream harvesting, water filtration, and industrial up-cycling signal a promising future for an engaged and entrepreneurial profession.

#### **SOUTH AFRICA AND THE EASTERN CAPE PROVINCE**

South Africa was selected as the focus for the course in *Entrepreneurship and Architecture* for a number of reasons. First, the OSU School of Entrepreneurship has previously participated in academic initiatives within the country and is familiar with the context and many of its pressing needs. Second, South Africa and the Eastern Cape Province have a complex history with many residual conditions, not the least of which is poverty, segregation, and suboptimal development in many of its townships. Third, the horizon of opportunity within South Africa is bright, given its many recent advancements and willingness to address significant issues—education, health, and climate among them.

A brief review of the literature for South Africa reveals no shortage of challenges facing its people, many problems of which are likely to be compounded as the already looming changes in climate take effect. “South Africa’s weather records over the past six decades indicate the region’s climate is shifting... The pressures associated with climatic shifts are anticipated to exacerbate existing environmental, social, developmental and economic vulnerabilities...”<sup>3</sup> Conservative estimates of warming in South Africa anticipate an increase of one to two degrees Celsius on the coast by 2050 and three to four degrees by 2100, with inland increases in temperature of almost twice as much. Naturally, such a significant increase in temperatures doesn’t come without a host of vexing consequences.

With such temperature increases, life as [it is known] will change completely: parts of the country will be much drier and increased evaporation will ensure an overall decrease in water availability. This will significantly

Figure 1: The student research and proposals for the *Architecture and Entrepreneurship* course were presented in a student-led exhibition in the gallery at the Oklahoma State University School of Architecture.

affect human health, agriculture, other water-intensive economic sectors such as the mining and electricity-generation sectors as well as the environment in general. Increased occurrence and severity of [field] and forest fires; extreme weather events; and floods and droughts will also have significant impacts.<sup>4</sup>

Of particular note is the likelihood that the most severe burdens associated with climate change fall disproportionately on the young, rural, and poor.

In a slum environment, where many already economically vulnerable people live in un-insulated, makeshift shelters, the associated health risks are exacerbated. Similarly, in the case of flooding or fires, shack dwellers are more vulnerable than communities living in brick-and-mortar houses...<sup>5</sup>

While the concentrated poor in urban areas shoulder no small part of the impending challenges, the rural poor—suffering from already substandard living conditions and disconnected from essential services—are likely to be acutely affected. Many of the rural poor in South Africa live in the Eastern Cape Province. In a 2011 report by the Eastern Cape Socio Economic Consultative Council, the Eastern Cape is clearly established as the province most acutely dealing with the wide variety of suboptimal living conditions noted above. Among other problems, it was ranked highest in net migration, poor school facilities, paraffin and wood based cooking, unsafe drinking water, and inadequate sanitation.<sup>6</sup>

The most vulnerable segment of the rural poor in the Eastern Cape are the youngest. In a report detailing the causes of death among those five years and younger, the Medical Research Council of South Africa highlighted the consequences of substandard living conditions.

Most of the [causes of death besides HIV/AIDS] of infants and toddlers are associated with poor socio-economic conditions. The Eastern Cape Province has a relatively low percentage of homes with access to piped water at 62.4%...The Eastern Cape also had a very high proportion of households without any toilet facilities (30%)...Just over half the households have regular refuse removal services... Many of these deaths can be prevented. Reducing poverty, meeting basic needs and adopting a comprehensive primary health care approach with renewed [vigor] must be high on the agenda in the next few years.<sup>7</sup>

Often the health consequences associated with substandard living conditions are overshadowed by the equally significant deaths caused by HIV/AIDS. It is clear, as the report goes on to state, that these other diseases are significant and preventable.

Environment and development initiatives such as access to sufficient quantities of safe water, sanitation, reductions in exposure to indoor smoke, improved personal and domestic hygiene as well as comprehensive primary health care will go a long way to preventing these diseases.<sup>8</sup>

And so—in the Eastern Cape Province of South Africa—we have the nation's poorest and most vulnerable, living in rural settlements already suffering the health consequences of substandard living conditions, confronted with the likelihood that such conditions will only be exacerbated as climate change and its residual effects take hold. Such a context signals opportunities within the



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built environment for sure, but their needs extend well beyond a simple architectural solution. It is within this context and with an understanding of these issues that the *Architecture & Entrepreneurship* course was based.

### COURSE STRUCTURE

Outside of the specific focus on the Eastern Cape Province of South Africa, the *Entrepreneurship and Architecture* course was run as it has been before—with a balanced mix of lectures and case studies, coupled with the development of a final project. The lectures are introductory, the cases reinforce and expand on material covered in the lectures, and the final project is structured to support the student’s exploration and application of the lecture and case study material in a specific context. Among the most insightful lecture topics for the students are:

- Opportunity identification and evaluation
- The development of business concepts and models
- Types of ventures: for-profit, nonprofit, and social entrepreneurship
- Marketing and adoption strategy
- Financial and economic feasibility

Following these and other lectures in an alternating sequence, the class held a complementary series of case discussions exploring similar topics in specific, well-documented examples of entrepreneurship. Students were required to prepare and turn in notes prior to class, but were also evaluated on their contributions to class discussion. Among the more fruitful case discussions were:

- The Eames Office: Creativity and Ideation in Design, Architecture, and Entrepreneurship
- Public Architecture: Social Entrepreneurship in For-Profit, Nonprofit, and Other Entrepreneurial Ventures
- Droog: Marketing, Strategy, and Entrepreneurship in Design
- MK Designs in Prefab: The Rapid Rise and Dramatic Decline of MK Designs in Prefabricated Construction

Figure 2: Each interdisciplinary student team exhibited their specific proposal for improving the lives of people in the South African townships. Student Team: Hannah Grammon, K.T. King, and Amanda Siegersma.

- Jonathan Segal and JMan Development: Entrepreneurship in Project Delivery and Opportunity Recognition in the Cyclical Real Estate Market

### **COURSE STARTUP**

The *Entrepreneurship and Architecture* course was developed over a number of years, as a collaborative class between the OSU Schools of Architecture and Entrepreneurship. It is predominately supported through a program at OSU known as the Riata Fellowship, which supports entrepreneurial endeavors in departments throughout the University. During the first year, the collaboration was focused on a few select opportunities to teach entrepreneurship within existing architectural courses. First, a number of lectures in entrepreneurship were embedded within existing courses and in special sessions for all students and faculty. This allowed us the time and proximity to plan and promote the full course for the following year, which we started in the spring of 2012 (co-taught with Dr. Rubin Pillay). While the course structure remained the same during the spring semester of 2013 (co-taught with Dr. Craig Watters and Graduate Assistant Sohrab Soleimanof), we focused the course more specifically on the Eastern Cape Province of South Africa and required the students to prepare a final exhibition in addition to their final projects. This sequential development of the course over a three-year period has served both schools well and fostered the active participation of students from a range of degree programs. In the spring of 2013, the course included students with a background in architecture, agriculture, construction management, journalism, and entrepreneurship. Such an interdisciplinary group is essential in a course that aims to break down conventional limitations on the practice of architecture, but is even more important when addressing the broad range of issues inherent in a place such as South Africa—where a serious consideration of context doesn't necessarily dictate a purely architectural intervention developed from a purely architectural expertise. And as the South African Government noted in its white paper on the issue, climate change itself has “cross-disciplinary and cross-sectoral implications...Understanding the concept as well as the options to mitigate it and adapt to it is fundamental...Climate change education should be part of the broader framework of education for sustainable development, and should equip South African citizens to re-orient society towards social, economic and ecological sustainability.”<sup>9</sup>

### **STUDENT WORK, FINAL EXHIBITION, AND FUTURE OPPORTUNITIES**

The contextual research and project development was almost entirely student led. Students were given a few general introductions to South Africa, the Eastern Cape Province, and some of the poor townships in Mthatha and Sterkspruit. They were required to submit a number of interim projects such as context posters, project journals, audio discussions, and in-class presentations. Such interim assignments were critical to the development of their final projects. Likewise, the final project exhibition was planned, designed, and produced by the students through a committee of team representatives working on a limited basis with the course faculty and teaching assistants. The final exhibit included some general information about the course, a class reconstruction of a shack in a rural township, and each team's project—briefly described below.

#### *Upcycling Waste*

Suboptimal waste management and infrastructure is particularly evident in

the townships of Mthatha and Sterkspruit. Trash can be seen accumulating along the streets and outside of residences. Such conditions can harbor disease and adversely affect the lives of residents. This project explores the use of up-cycled waste in order to limit the accumulation of trash, provide jobs, and improve residents' health through building materials, lights, and other products.<sup>10</sup>

#### *Dirt, Sand, and Clay for Construction, Filtration, and Culture*

The townships of South Africa lack infrastructure, quality housing, sustainable food sources, stable employment, and potable water. This project explores the processing of excavated dirt and clay. The resources are reformulated to make building materials, support water filtration, and promote culture through artistic works such as pottery.<sup>11</sup>

#### *Ground to Earth (G2E)*

The soils located in Mthatha and Sterkspruit lack certain nutrients for supporting plants, fruits, vegetables, herbs, and other vegetation. This project explores the use of recycled coffee grounds and tea as a supplement for compost and fertilizer, reintroduced to the soil. These two products increase the levels of beneficial nutrients in the soil, better supporting many forms of beneficial plant life.<sup>12</sup>

#### *Prefabricated Construction and Shipping Containers*

Most building materials for homes in Mthatha and Sterkspruit consist of free and readily available materials adapted for use in construction. Many residential structures are ad-hoc, with suboptimal solutions for waterproofing, insulation, light, and other critical building functions. This project explores the use of recycled storage containers to create pre-fabricated housing units that are structurally sound and weatherproof.<sup>13</sup>

#### *Organic Waste Digester*

The management of organic waste in the townships of Mthatha and Sterkspruit is an important issue. Food scraps and other organic materials can accumulate outside homes and in streets. This can adversely affect residents' quality of life and create breeding grounds for bacteria and mold spores. This project explores the introduction of small scale anaerobic digesters to collect organic waste and convert it into a usable biogas.<sup>14</sup>

#### *Community Growth & Education*

The opportunities to improve the lives of people in South African townships are numerous. This project explores a diverse array of initiatives for entrepreneurship and education. Over time, these community lead activities could support growth and improvements in health, safety, and economic activities within Mthatha, Sterkspruit, and other similar townships.<sup>15</sup>

#### *Media Shack - A Glimpse into Township Life*

In the black townships of South Africa, housing is often informally assembled from trash and found materials. Though residents are resourceful, methods of construction are often unsuitable for stable, weatherproof, and comfortable living. Old newspapers are often used to provide minimal insulation. In this project, students recreated their interpretation of a small shack in South Africa.<sup>16</sup>

## **CONCLUSION**

The final exhibition, while challenging, formed an essential part of promoting the course and student work to each of the participating schools and others

## **ENDNOTES**

1. H.H. Stevenson and J.C. Jarillo, "A Paradigm for Entrepreneurship: Entrepreneurial Management," *Strategic Management Journal*, no. 11 (1990): 17-27.
2. H.H. Stevenson and David E. Gumpert. "The heart of entrepreneurship," *Harvard Business Review* 63, no. 2 (March 1985): 85-94.
3. Leonie Joubert, "South Africa's Changing Climate," *Current Allergy & Clinical Immunology*, 24, no. 2 (June 2011).
4. South Africa, *National Climate Change Response: White Paper*. <http://www.climatechange.co.za/>.
5. Leonie Joubert, "South Africa's Changing Climate," *Current Allergy & Clinical Immunology*, 24, no. 2 (June 2011).



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**Figure 3:** Among other elements of the exhibition, the Media Shack was an initiative led by the students to represent the living conditions of South Africa's poor by constructing an ad-hoc home out of found materials.

6. Eastern Cape Socio Economic Consultative Council, *Service Delivery and Conditions of Living in the Eastern Cape*. [www.ecsecc.org](http://www.ecsecc.org).
7. Debbie Bradshaw, Davide Bourne, and Nadine Nannan, *MRC Policy Brief: What are the leading causes of death among South African children?* <http://www.mrc.ac.za/bod/bod.htm>.
8. Debbie Bradshaw, Davide Bourne, and Nadine Nannan, *MRC Policy Brief: What are the leading causes of death among South African children?* <http://www.mrc.ac.za/bod/bod.htm>.
9. South Africa, *National Climate Change Response: White Paper*. <http://www.climatechange.co.za/>.
10. Student Team: Hannah Grammon, K.T. King, and Amanda Siegersma.
11. Student Team: Jerad Bell, Eric Dresser, Stephen Griffin, and Simon Manning.
12. Student Team: Craig Borkenhagen, Nestor Castaneda, Evan Neal, and Jordan Strother.
13. Student Team: Ben Clayton, Brandon Cummings, Nick Forthman, and Shaun Hull.
14. Student Team: Emiko Ishibashi, Sarah Ramey, and Melissa Smith.
15. Student Team: Katy Harlow, Derek Enloe, Anthony Johnson, Elizabeth Hinkle.
16. Student Team: Video assembled by K.T. King from multiple sources. Shack assembled by course students.

within the university. Many of the students and faculty from the Schools of Architecture and Entrepreneurship have a general understanding of each institution's focus (and their collaborative courses), but nothing that can be replaced by a tangible expression of collaboration such as the exhibition provided. Students, faculty, and staff from both schools commented on the positive impact of seeing the work exhibited by the students in the course. Additionally, visitors noted the meaningful experience of seeing the living conditions and requisite problems of South Africa's poorest, in addition to the potential value inherent in the student projects and their capacity for positive intervention. Such conversations have led to additional discussions about ways to seek positive change in the lives of people outside our typical sphere of influence. As each year's work has built on the next, so will this year's *Architecture and Entrepreneurship* course provide an important point of reference for future classes and initiatives. The base of knowledge established by students and faculty have already spurred additional opportunities for next year and beyond. Students and faculty have a growing interest in applying their expertise to a broad range of challenging issues that are on the periphery of architecture: poverty, water quality, sanitation, recreation, infrastructure, and conditions of living among them. One can see the field of vision—once limited by a conventional architectural paradigm—predictably opening up to new territory in the face of climate change and other challenges faced by the rural poor of South Africa—and millions elsewhere.