

# Digital fabrication technologies: sustainable development through community intervention

Kenfield Griffith

PhD Candidate

Digital Design and Fabrication Group

Department of Architecture

Massachusetts Institute of Technology

Phone: +1 (716)390.2357

E-mail: Kenfield@mit.edu

<http://ddf.mit.edu>

## Abstract

Production for sustainability has difficulty materializing in developing countries due to the lack of proper resources and repeatable systems. The current approaches to sustainability reduce the goal to the availability of material, the harnessing of energy, and the reapplication of natural resources. However, the fundamental challenge of creating sustainable economies through community development is ignored. The developing world looks towards innovative technologies to provide a higher standard of living that will in turn produce a thriving economy. However, it takes substantial capital for the implementation of western technologies to provide the infrastructure sought. In addition, the one-time investment can be challenged as an inefficient model for supporting sustainable communities. Despite the optimistic motivation for aiding the developing world, the current methods take an exogenous approach and have to be repeated many times with significant and possibly unfeasible capital for implementation. The one-time aid does not add sustainable value to developing communities due to the lack of methodology, and a distributable system for repeatable production. Based on the Global Fab Lab initiative (MIT) that offers tools and technology to developing countries and the United Nations Millennium Development (2004) goals for empowerment, this research will look at technology systems for building community infrastructures endogenously. The current research is twofold: it derives a systematic process that can be locally and globally repeated; and investigates the principle of sustainability through community empowerment. The goal is to produce a coherent system that can be applied globally, and is generic enough to incorporate the cultural influences and perspectives of each community as innovation.

## 1. Introduction

There is a substantial need for housing and sustainable infrastructures in developing countries. Currently, housing units in shanty towns in South Africa represent non-standard juxtaposition (Figure 1.0) of the use of materials for shelter that do not provide sustainable living conditions. The concern of

philanthropists and the western culture is to provide a higher standard of living and stable conditions for these communities. However, because of limited long term resources for maintenance, the approach is limited to investing large capital for building homes that are not guaranteed for longevity. The current approaches offer the end product to the community rather than a solution. There are limited examples that prove these methods as sustainable systems; therefore they fall in the category of aid and donations, ignoring the long term investment. There is a great need for an economic model that offers a system for building homes through technology and repeatable production. This will potentially lead to a cyclic economy that thrives from production and infrastructure construction, hence the sustainability feature. This research explores digital fabrication technologies to challenge this concern.



*Figure 01 Shanty Town, South Africa ; Source: [http://www.capetown.dj/people/CapeFlats/IMG\\_1226.JPG](http://www.capetown.dj/people/CapeFlats/IMG_1226.JPG)*