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## Preview of Award 1513395 - Final Project Report

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### Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1513395
Project Title:	Constructing Empirical Public Decision-Making: The Application of Situated Data to Development in Consolidated Informal Settlements
PD/PI Name:	Steven A Moore, Principal Investigator Kristine Stiphany, Co-Principal Investigator Peter M Ward, Co-Principal Investigator
Recipient Organization:	University of Texas at Austin
Project/Grant Period:	09/01/2015 - 08/31/2017
Reporting Period:	09/01/2016 - 08/31/2017
Submitting Official (if other than PD\PI):	Kristine Stiphany Co-Principal Investigator
Submission Date:	11/27/2017
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	Kristine Stiphany

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### Accomplishments

#### \* What are the major goals of the project?

The purpose of this study is to measure the impacts of redevelopment (*upgrading, regeneration, and housing "rehab"*) on established informal settlements in São Paulo, Brazil. Its long-term goal is to expand redevelopment's scope to encompass technologies that assimilate urban design, social mobility, and physical transformation within informal settlements across the globe. To these ends, the study is guided by the following major goals:

**1. Expand understanding about how historical patterns of redevelopment (*upgrading, regeneration, housing “rehab”*) impact future growth alternatives in established informal settlements.**

**2. Establish new methods for synthesizing data collection, analysis, and visualization of housing production processes into urban design strategies for adaptive reuse.**

**3. Promote planning that expands citizen participation in urban development, aligns policy goals with contemporary conditions of informality, and enhances the social experience and urban form of established informal settlements.**

**\* What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities:

**1. Expand understanding about how historical patterns of redevelopment (*upgrading, regeneration, housing “rehab”*) impact future growth alternatives in established informal settlements.**

*Creation of Indicators to Measure Redevelopment*

Focus groups and key informant interviews with informal settlement residents and local planners in order to understand and establish indicators of successful redevelopment;

*Quantitative and Qualitative Analysis of Redevelopment’s Impact on Physical Space and Social Welfare*

A multiscale analysis (n = 1,102 cases) of urbanization patterns, redevelopment trends, and building typologies in São Paulo was undertaken across two commensurate case studies of Heliópolis and Jardim São Francisco.

*Digital Inventory of Existing Conditions*

Construction of 2D and 3D base maps of both case studies using Computer Aided Design (CAD); Geospatial Information System (GIS); Rhinoceros (RHINO) and Google Earth files obtained from public sources and evolved in parallel with fieldwork.

**2. Establish new methods for synthesizing data collection, analysis, and visualization of housing production processes into urban design strategies for adaptive reuse.**

*Field-based Methodology*

Implementation of a field methodology whereby each household is subject to a full sociological survey; post-occupancy analysis; as-built architectural drawings in plan, axonometric, and section formats; and multi-media film and photography documentation.

*Extensive Mapping*

Development of 2D and 3D maps, drawings, and models illustrates the relationship between historical, contemporary and future conditions of informality.

*Digital Tools*

Construction of an Open-Source GIS tool (ComuniDADOS) permits the public to visualize development indicators.

*Design Parameters*

Data synthesis into design parameters to guide the urban form and social experience of alternative future scenarios.

**3. Promote planning that expands citizen participation in urban development, aligns policy goals with contemporary conditions of informality, and enhances the social experience and urban form of established informal settlements.**

*Citizen-Sourced Data*

Establish a suite of field-based and digital tools to enhance the diversity and precision of urban planning.

*Scenario Planning*

Advance interactive strategies for evaluating how historical processes of redevelopment inform future urban design alternatives for informally-constructed environments.

*The Future of Social Housing*

Utilize parametric tools to translate patterns among existing housing typologies into new housing typologies.

*Structuring Informality*

Expand the scope of redevelopment to encompass IT forms of urban infrastructure.

Specific Objectives:

**1. Expand understanding about how historical patterns of redevelopment (upgrading, regeneration, housing “rehab”) impact future growth alternatives in established informal settlements.**

*Urban Policy*

The first objective is to re-focus urban policy upon the improvement of established informal settlements that have been redeveloped yet still feature highly uneven conditions, with particular attention to strategies that reduce human displacement.

### *Citizen Decision-Making*

The second objective is to actively promote inclusive planning processes by empowering residents of informal settlements with tools that visualize redevelopment impacts and therefore enhance decision-making processes.

### *Global Awareness*

The third objective is to use visual representations to raise awareness among the global public of emergent forms of informality and the built environments they create.

## **2. Establish new methods for synthesizing data collection, analysis, and visualization of housing production processes into urban design strategies for adaptive reuse.**

### *Diversify participation*

The first objective is to diversify the actors involved in urban redevelopment, how they are involved, and when they are involved, through a transdisciplinary process that merges qualitative, quantitative, and mixed-media methods.

### *Identify Intervention Areas*

The second objective is to use data to create an equitable and systematic process for identifying redevelopment's uneven impacts, and selecting appropriate sites for scenario analysis and future intervention.

### *Design within Intervention Areas*

The third objective is to establish geometric and social parameters for guiding urban design and housing typologies within identified areas of intervention.

### *Disseminate Design Proposals*

The fourth objective is to disseminate proposals for intervention for public peer-review.

## **3. Promote planning that expands citizen participation in urban development, aligns policy goals with contemporary conditions of informality, and enhances the social experience and urban form of established informal settlements.**

### *Scaling Up*

The first objective is to use technology to translate design decisions undertaken at site scales to broader systems of urban impact.

### *Housing Diversity*

The second objective is to enhance access to quality low-income housing and its typological diversity in established informal settlements, with a particular focus upon social rental models.

### *Social Welfare and Urban Form*

The third objective is to protect and retain families in established settlements that experience relatively higher access to employment and urban infrastructural networks such as transportation, education, and health.

### *Collective Urban Management*

The fourth objective is to position partner communities to successfully maneuver urban development processes by equipping them with their own data and the tools for understanding its relevance for future development alternatives.

#### Significant Results:

**1. Expand understanding about how historical patterns of redevelopment (*upgrading, regeneration, housing “rehab”*) impact future growth alternatives in established informal settlements.**

### *Project Website*

Once created, project participants used the website to emphasize the unique condition of settlements that have been successively redeveloped, and their relevance as a model for conditions that are ubiquitous across the city of São Paulo, if not Brazil.

### *Project Film*

Project participants co-created a film that describes redevelopment's evolutionary trajectory, the methods through which it was studied, and the preliminary conclusions that the process revealed. This film was presented at the UN Habitat III conference in Quito, Ecuador, on October 22, 2016.

### *Assessment Standards*

The study resulted in an original and comprehensive dataset that will contribute to three areas of concern in established informal settlements: (1) social vulnerability and human displacement; (2) rental markets; (3) extreme diversity in physical housing conditions. These three areas have been addressed through peer-reviewed papers, conference papers and presentations, design proposals, and are currently in undergoing further development.

### *Preliminary Findings Workshops*

Between dates 11/20/16 and 08/12/17 six community presentations included the findings from key indicators established at the study's outset and that are influencing

emerging conditions in informal settlements, as well as recommendations and design proposals for improving access to housing while reducing displacement.

## **2. Establish new methods for synthesizing data collection, analysis, and visualization of housing production processes into urban design strategies for adaptive reuse.**

### *Digital and Physical Models for Urban Simulation and Public Pedagogy*

2D and 3D digital modeling tools were used to understand how redevelopment has changed the physical fabric of the case studies over time, and to develop, analyze, and simulate future development alternatives for these and peer areas. Currently, the study's key findings are also being explored through the digital fabrication of physical models, which will be exhibited in the spring of 2018 at Texas Tech University.

### *Housing Typologies for the Future*

2D and 3D digital tools were used to develop detailed 3D models of 800 sampled households, from which a series of common housing typologies was derived. These models demonstrate how social and political dynamics evolve urban built environments, and were used as a core building block for understanding the patterns of housing across settlements in São Paulo, and their import as models for scenario analyses of potential future conditions.

### *Research Across Planning and Architecture*

The study has contributed to an emergent body of work that cross cuts planning and architecture, and is distinguished for its focus upon participatory methods and the Global South. Together with Jennifer Minner (Cornell), NSF fellow Kristine Stiphany organized an interdisciplinary panel about planning support technologies at the 2016 American Collegiate Schools of Planning, within which she presented a paper about the participatory development of urban design indicators.

## **3. Promote planning that expands citizen participation in urban development, aligns policy goals with contemporary conditions of informality, and enhances the social experience and urban form of established informal settlements.**

### *Internship program*

The study established an internship program to support two young architects who live in informal settlements. These individuals were encountered through the household survey, after which they undertook a detailed block level analysis to identify broad morphological patterns, and expose them to the environments that they are likely to design for in their professional future. Both will be involved as research assistants to the Brazil Studio at Texas Tech (Spring 2018), described below.

### *Technology Sub-Committee*

A community sub-committee established functionality guidelines for ComuniDADOS, which were then incorporated into the construction of the tool. The guidelines included recommendations that the tool visualize data to resonate with community residents as much as global researchers, that it include a media feed for discourse about the visualized data, and that it permit residents to input data and make their own maps. This committee revealed that although the aforementioned methodology was intended to be participatory, it was still overly convoluted for most residents to undertake, and required reconfiguration to adequately equip them with implementable methods.

### *Community Assessment Toolbox*

In response to the technology committee findings, the methodology has been pared down to permit peer-to-peer evaluation of community change. An electronic guidebook that permits analysis at block and lot scales will be released and available for download in the summer of 2018.

### *Calibrating Digital Tools*

Although Envision Tomorrow is designed to simulate future alternatives based upon geometric and quantitative data, we have adapted its architecture to accommodate social variables. This process has been greatly facilitated by the office of Fregonese and Associates, the original developers of Envision Tomorrow, and the UT consultant Nathan Brigmon, who has undertaken 100% of the technical coding to adapt ET to the context of informal settlements.

Key outcomes or Other achievements:

### **Major Outcomes / Achievements**

#### *Employment of the Fellow*

Now that the PI (fellow) has been appointed to a tenure track assistant professorship in the College of Architecture at Texas Tech University the study will be expanded to include the launch of a major initiative at that will focus upon the intersection between technology, urbanism, and housing in Latin America. This effort has been greatly facilitated by a generous start-up package and the College of Architecture's commitment to establish a research presence about Latin America.

#### *Proposal to a Global Event*

Stiphany (Fellow) and Ward (Mentor) have written a proposal "Citizen-Sourced Data: Participatory Technologies for Redeveloping Informal Settlements," to launch the second version of ComuniDADOS at the United Nations World (biennial) Urban Forum in February of 2018. This event will follow up on a presentation of the project at the UN Habitat conference (2016) in Quito, Ecuador, and disseminate the study to a broader network of scholars and practitioners invested in technology for participatory urban development.

#### *Grant to replicate methodology at the US-Mexico Border*

Stiphany is now writing a grant to the Robert J. Wilson Foundation to translate this study's methodology to patterns of informality at the US-Mexico Border, which will include Peter M. Ward and colleagues from American and Brazilian institutions who also contributed to this study.

#### *Co-Constructed Knowledge*

Following the initial launch of the open source tool ComuniDADOS, community partners used findings to redirect community activism. Previously unaware of the extent to which the rental sub-market is providing low-income housing, community partners were accepting mortgage-backed housing models that few can actually afford. Since the study, one case study community has used the study as evidence for upgrading.

#### *New Contribution to an Established Network*

The study contributes new tools to the communities and researchers associated with the nine country Latin American Housing Network (LAHN) anchored at The University of Texas at Austin.

#### *ComuniDADOS re-release*

In response to community partner feedback, the next version of ComuniDADOS will include three functional revisions, including (1) the ability for users to construct their own maps; (2) the inclusion of a "feed" whereby contributors can discuss outcomes relative to community affairs; (3) capacity to cross-tabulate different variables. These three new functionalities will permit greater interactivity, clear communication about issues that are currently managed in rather ad hoc ways on social media, and a more nuanced understanding of not only what is happening in informal settlements generally, but also at precise locations.

#### *Pedagogical Application and Future Funding for Graduate Student Traveling Studios*

This study's 2D and 3D models will inform the urban focus and pedagogical framework of an urban design studio at Texas Tech University that will collaborate with international partners at Mackenzie University in São Paulo, Brazil. The 2018 studio will be supported by Dean James Williamson at the College of Architecture as a preliminary model for traveling pedagogical experiences, and used as a basis for future funding through the NSF IRES and PIRE grants.

#### *Exhibition*

The Texas Tech College of Architecture has also supported the construction of physical models representative of the study's housing typology analysis. These models will form part of a broader exhibition about housing, and support Stiphany's work on a manuscript that draws from this study's focus upon user-based forms of urbanism.

### **\* What opportunities for training and professional development has the project provided?**

The project aspired to empower researchers and community partners with training and professional development that directly impacts skill acquisition that broadly enhance the link between knowledge production and action in urban development. It specifically focused upon training and professional development as relates to the field-based data collection methods for mapping and documenting existing building stock, the management of multiple qualitative and quantitative data sources, and their visualization and translation into forms that will influence city making processes. To these ends, the study provided the following opportunities to research partners:

### *Community Partners*

Eight community partners were trained in Institutional Research Board (IRB) protocols, and digital survey-based fieldwork, including the use of Qualtrics, photography of dwellings, their materials, and construction sequences, and elaboration of verbal and written fieldnotes. Professional development opportunities include contribution to the development of a digital tool for their future use.

### *Research Assistant – Fieldwork*

Two research assistants expanded their expertise in digital modeling tools, and were also trained in household survey protocol, IRB, digital survey-based fieldwork, the production of detailed field notes that include axonometric and plan drawings of each dwelling, and the management of a multi-source and scalar dataset.

### *Research Assistant – Data Check*

One research assistant was trained in ensuring the completeness and quality of incoming data on a daily basis, and following up with fieldwork assistants in the event of necessary corrections. This study expanded this research assistant's background in historical preservation to include informally constructed environments.

### *Analyst – Construction of ComuniDADOS*

The analyst was also trained in IRB requirements, and expanded his scope of expertise to encompass the development and construction of ComuniDADOS, as well as the reconfiguration of Envision Tomorrow to accommodate informal land markets and informally constructed environments.

Expansion of Analyst's professional scope to encompass informally-constructed environments, field-based data analysis, and the reconstruction of Envision Tomorrow to accommodate the intersection of informal land markets and State-led redevelopment (upgrading).

### *Fellow*

The SBE fellow transformed her research agenda from one based on ethnography and qualitative methods to include quantitative analysis, extensive geospatial mapping, and parametric digital tools. Her training opportunities include (1) Land use analysis (Envision Tomorrow); (2) Geospatial Analysis (Advanced Work in GIS); (3) 3D Modeling and Rendering (Rhino and VRay); (4) Quantitative Methods and Analysis (SPSS); (5) Digital survey-based fieldwork (Qualtrics). The fellow's professional development was greatly enhanced by this research, permitting her time to complete several articles while developing and managing a large-scale research initiative, developing a website, administering two fieldwork teams, developing ComuniDADOS, and organizing and analyzing multiple data sources. Taken together, these skills and opportunities provided the fellow with a foundation from which to make significant contributions to the fields of architecture, urban planning, and public policy, in the areas of extensive urban mapping, housing systems, digital analysis, and scenario planning.

## Mentors

The study introduced mentors Peter M. Ward and Steven A. Moore to the existence and use of 3D modeling and rendering; expanded their skill set and familiarity with digital survey based fieldwork; & intensified their intellectual understanding of emerging theories and practice about co-production of housing and local community development.

These experiences will enhance Peter M. Ward's ongoing mentoring of doctoral students at UT-Austin; broaden his mixed methods techniques training; and facilitate his ongoing digital survey data collection as a part of the LAHN and in his *colonias* and informal housing research in the border region and in unincorporated settlements across the USA.

### \* How have the results been disseminated to communities of interest?

The study results have been disseminated among the following public audiences as well as scholars within the disciplines of urban planning, architecture, urban design, public policy, international development, and information and technology studies in the United States, Brazil, Ecuador, and Egypt.

- (1) Communities of interest through the project website.
- (2) Communities of interest and potential collaborators through business cards that include the project's website address.
- (3) Community partners through workshops and multi-media presentations of preliminary findings.
- (4) Community residents through public meetings at case study community centers.
- (5) São Paulo Municipal agencies through presentations to unit secretary offices.
- (6) Scholars through invited presentations at institutions of higher education.
- (7) Communities of interest through public international conferences (UN Habitat III; World Urban Forum, etc.)
- (8) Scholars through academic conferences.
- (9) Scholars through peer-reviewed journal articles.
- (10) Public audiences through invited exhibitions.
- (11) Communities of interest through a project film, created in collaboration with community partners.

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## Products

### Books

### Book Chapters

### Inventions

### Journals or Juried Conference Papers

Abigail Friendly and Kristine Stiphany (2017). Paradigm or Paradox? The 'Cumbersome Impasse' of the Participatory Turn in Brazilian Urban Planning. *Association of Collegiate Schools of Planning (ACSP) Annual Conference*. . Status = ACCEPTED; Acknowledgment of Federal Support = No ; Peer Reviewed = Yes

Abigail Friendly and Kristine Stiphany (). Paradigm or Paradox? The 'Cumbersome Impasse' of the Participatory Turn in Brazilian Urban Planning. *Urban Studies*. . Status = UNDER\_REVIEW; Acknowledgment of Federal Support = No ; Peer Reviewed = Yes

Kristine Stiphany (2016). Technofictions: Putting Smart City Thinking to Work in Brazilian Informal Settlements. *4S: Society for the Social Studies of Science*. . Status = ACCEPTED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Kristine Stiphany and Peter M. Ward (). Autogestão, Mutirão, and Autoconstrução in an Era of Mass Social Housing: The Case of Brazil's Minha Casa Minha Vida-Entidades Program. *International Journal of Housing Policy, Special Issue on 'Housing Policy in Latin America and the Caribbean: recent developments and perspectives'*. . Status = UNDER\_REVIEW; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Kristine Stiphany, Nathan Brigmon, Kirsten Larsen (). Citizen-Sourced Data, Technology, and the City: A Methodology for Assessing Development Impacts in Consolidated Informal Settlements. *Science as Culture. Special Issue about Science and Technology Studies (STS) and the City.*. . Status = UNDER\_REVIEW; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Kristine Stiphany, Nathan Brigmon, Kirsten Larson (2016). The Participatory Creation of Urban Design Metrics for Informal Settlement Redevelopment: Cases of Scenario Planning in São Paulo, Brazil. *Association of Collegiate Schools of Planning (ACSP) Annual Conference.*. . Status = ACCEPTED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

## Licenses

### Other Conference Presentations / Papers

Kristine Stiphany (2016). *Housing and Inclusive Production (Presentation for an Invited Panel)*. Seminário Economia e Cidade. The University of São Paulo. Status = ACCEPTED; Acknowledgment of Federal Support = Yes

Kristine Stiphany, Peter M. Ward, Steven A. Moore, Nathan Brigmon, Kirsten Larson, the Zeladoria Ambiental of São Francisco, UNAS of Heliópolis. (2016). *The Chapa Project: Citizen-Sourced Data for Equitable Urban Development. A Case Study from São Paulo, Brazil*. The United Nations Habitat III Conference. Quito, Ecuador. Status = ACCEPTED; Acknowledgment of Federal Support = Yes

### Other Products

#### Databases.

A database of 800 physical models of each surveyed household, constructed by the Fellow, will be shared with graduate level architecture students in the context of a collaborative studio to be undertaken in the Spring of 2018 between Texas Tech University and Mackenzie University, in São Paulo, and toward the development of future social housing typologies. Students will (1) learn the modeling software and (2) use the models to evolve new forms of social housing.

#### Audio or Video Products.

A film was produced in collaboration with community partners, and its primary objective was to create a graphically-rich, publicly-accessible venue for describing the research focus, methods, and preliminary findings. The film was first launched at the UN Habitat III conference in Quito, and it is available on the project website ([www.chapa.io](http://www.chapa.io)).

#### Models.

Hundreds of 2D and 3D digital models and maps were constructed in the context of this study, some expanding upon those made by the City of São Paulo, but the majority elaborated from scratch, given that informal settlements remain largely unmapped, unmodeled, and therefore unknown to planning and development processes.

#### Evaluation Instruments.

The study will generate a Community Housing Diversity Assessment Guidebook, mentioned in this report, for use by communities and/ or citizens without the skills or resources to undertake the study elaborated by this research grant. The guidebook will be released by August of 2018.

#### Survey Instruments.

An abbreviated version of the study methodology is shared on the project's website. Interested communities may request the fieldguide, which includes the survey instrument in .doc and PDF formats.

#### Poster Presentation.

A poster was presented at the 2017 Association of Collegiate Schools of Planning conference, and it graphically illustrates project maps and models, as well as a preliminary scenario analysis of redevelopment based upon housing types derived from this study's fieldwork.

## Other Publications

Kristine Stiphany (2018). *Emerging Urbanism: New Architectures of Informality*. This exhibition of physical models, maps, and drawings will illustrate this study's key findings related to informal rental markets. Although the data derives from this study's unique dataset, the fabrication of models is supported by the Exhibition and Events committee at the Texas Tech University College of Architecture.. Status = ACCEPTED; Acknowledgement of Federal Support = Yes

Kristine Stiphany, Peter M. Ward, Steven A. Moore (2017). *Housing, the City, and Technology in São Paulo, Brazil: A Graphic Report*. The graphic report expands upon the core goals, activities, and objectives of this NSF final report, yet emphasizes the study's highly graphic nature and the hundreds of models and drawings that were produced over the course of its two year trajectory. It will be completed by December 15, and distributed among relevant communities of interest within the disciplines of Urban Planning, Public Policy, International Development, and Architecture.. Status = OTHER; Acknowledgement of Federal Support = Yes

## Patents

## Technologies or Techniques

A data visualization tool, ComuniDADOS, was created to facilitate the communciation of data findings and the community development work of partners and their local governments.

## Thesis/Dissertations

## Websites

*The Chapa Project*

<http://www.chapa.io>

This website introduces the research scope, work, people, and progress.

## Participants/Organizations

### What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Moore, Steven	PD/PI	1
Stiphany, Kristine	Co PD/PI	12
Ward, Peter	Co PD/PI	2
Brigmon, Nathan	Other Professional	5
Figueiredo, Alessandra	Non-Student Research Assistant	3
Larson, Kirsten	Non-Student Research Assistant	3
Alves, Leonardo	Undergraduate Student	1
Nunes, Julia	Undergraduate Student	1
da Silva, Manoel	Consultant	1
Oliveira, Adalgisa	Consultant	1
Venderinho, Dayse	Consultant	1

**Full details of individuals who have worked on the project:**

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**Steven A Moore****Email:** samoore@austin.utexas.edu**Most Senior Project Role:** PD/PI**Nearest Person Month Worked:** 1**Contribution to the Project:** Advisor.**Funding Support:** Full Professor at the University of Texas at Austin**International Collaboration:** No**International Travel:** No

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**Kristine Stiphany****Email:** kstiphany@utexas.edu**Most Senior Project Role:** Co PD/PI**Nearest Person Month Worked:** 12**Contribution to the Project:** Research Lead. Developed and managed the majority of research activities.**Funding Support:** None.**International Collaboration:** No**International Travel:** Yes, Brazil - 1 years, 0 months, 0 days; Ecuador - 0 years, 0 months, 7 days; Spain - 0 years, 0 months, 14 days

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**Peter M Ward****Email:** peter.ward@mail.utexas.edu**Most Senior Project Role:** Co PD/PI**Nearest Person Month Worked:** 2**Contribution to the Project:** Advisor.**Funding Support:** Full Professor at the University of Texas at Austin**International Collaboration:** No**International Travel:** Yes, Ecuador - 0 years, 0 months, 7 days

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**Nathan Brigmon****Email:** nrbrigmon@gmail.com**Most Senior Project Role:** Other Professional**Nearest Person Month Worked:** 5**Contribution to the Project:** Information and Communication Technology Specialist**Funding Support:** None**International Collaboration:** No**International Travel:** Yes, Brazil - 0 years, 0 months, 7 days

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**Alessandra Figueiredo****Email:** figueiredo.le@gmail.com**Most Senior Project Role:** Non-Student Research Assistant**Nearest Person Month Worked:** 3

**Contribution to the Project:** Fieldwork lead - São Francisco Case. Alessandra lives in Brazil.

**Funding Support:** None

**International Collaboration:** Yes, Brazil

**International Travel:** No

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**Kirsten Mary Larson**

**Email:** kirsten.mary.larson@gmail.com

**Most Senior Project Role:** Non-Student Research Assistant

**Nearest Person Month Worked:** 3

**Contribution to the Project:** Fieldwork Research Assistant for Heliopolis Case Study. Kirsten Larson is an American with Brazilian citizenship.

**Funding Support:** None.

**International Collaboration:** Yes, Brazil

**International Travel:** Yes, Ecuador - 0 years, 0 months, 7 days

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**Leonardo Alves**

**Email:** leonardo.alves.sp95@gmail.com

**Most Senior Project Role:** Undergraduate Student

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Leonardo is an undergraduate architecture student who lives in the Heliopolis community, and after expressing interest in the project became a project intern. Together with Julia Nunes, Leonardo was responsible for undertaking block level analysis of housing conditions (observation and drawing), and had no contact with human subjects.

**Funding Support:** Kristine Stiphany - personal funds.

**International Collaboration:** Yes, Brazil

**International Travel:** No

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**Julia Nunes**

**Email:** juulianuns@gmail.com

**Most Senior Project Role:** Undergraduate Student

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Julia is an undergraduate architecture student who lives in the Heliopolis community, and after expressing interest in the project became a project intern. Together with Leonardo Alves, Julia was responsible for undertaking block level analysis of housing conditions (observation and drawing), and had no contact with human subjects.

**Funding Support:** Kristine Stiphany - personal funds

**International Collaboration:** Yes, Brazil

**International Travel:** No

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**Manoel Otaviano da Silva**

**Email:** manoel.bibliotecaunas@gmail.com

**Most Senior Project Role:** Consultant

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Manoel is a community guide for the co-PI when she is undertaking block-level analysis and for the all-female team working in Heliopolis. He is an original leader and associated with UNAS.

**Funding Support:** None.

**International Collaboration:** Yes, Brazil

**International Travel:** No

**Adalgisa Oliveira**

**Email:** g.isa.07@bol.com.br

**Most Senior Project Role:** Consultant

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Adalgisa is associated with ANESF and wrote the community partnership letter associated with this grant. She is a community guide and has assisted the PI in making contact with interviewees associated with housing movements. She has filled in on several occasions as a guide for Alessandra when Dayse V. has not been able to do so.

**Funding Support:** None.

**International Collaboration:** No

**International Travel:** No

**Dayse Venderinho**

**Email:** day.cvm@hotmail.com

**Most Senior Project Role:** Consultant

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Dayse is a community partner in São Francisco. She undertakes the survey with Alessandra. Dayse lives in Brazil.

**Funding Support:** None.

**International Collaboration:** Yes, Brazil

**International Travel:** No

**What other organizations have been involved as partners?**

Name	Type of Partner Organization	Location
ANESF (Association of Nucleos e Entidades of São Francisco)	Other Nonprofits	São Francisco favela, São Paulo, Brazil
Fregonese Associates	Industrial or Commercial Firms	Portland, Oregon
Latin American Housing Network	Other Organizations (foreign or domestic)	Austin, Texas
The University of Texas at Austin	Academic Institution	Austin, Texas
UNAS (União de Nucleos e Associações)	Other Nonprofits	Heliopolis Favela, São Paulo, Brazil
University of São Paulo - Polytechnic School	Academic Institution	São Paulo, Brazil

**Full details of organizations that have been involved as partners:**

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**ANESF (Association of Nucleos e Entidades of São Francisco)**

**Organization Type:** Other Nonprofits

**Organization Location:** São Francisco favela, São Paulo, Brazil

**Partner's Contribution to the Project:**

In-Kind Support

Collaborative Research

Other: Guide for complex community situations.

**More Detail on Partner and Contribution:** ANESF has provided local infrastructural and negotiating support to the fieldwork team in São Francisco.

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**Fregonese Associates**

**Organization Type:** Industrial or Commercial Firms

**Organization Location:** Portland, Oregon

**Partner's Contribution to the Project:**

In-Kind Support

Collaborative Research

**More Detail on Partner and Contribution:** John Fregonese, the creator of Envision Tomorrow, and his team provided initial technical support and a metric template for Envision Tomorrow. While we will likely distill ET to its basic code and reconstruct it for application in Brazil, Fregonese's involvement was helpful for considering how ET might translate to other contexts of the Global South.

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**Latin American Housing Network**

**Organization Type:** Other Organizations (foreign or domestic)

**Organization Location:** Austin, Texas

**Partner's Contribution to the Project:**

Collaborative Research

**More Detail on Partner and Contribution:** The research is inspired by the fieldwork methods established by the Latin American Housing Network (LAHN) at The University of Texas at Austin, an outcome of Peter M. Ward's extensive work on housing in Latin America.

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**The University of Texas at Austin**

**Organization Type:** Academic Institution

**Organization Location:** Austin, Texas

**Partner's Contribution to the Project:**

Financial support

Personnel Exchanges

**More Detail on Partner and Contribution:** Steven A. Moore has contributed \$10,000 to the technological tool development from his University of Texas at Austin professorship.

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**UNAS (União de Nucleos e Associações)**

**Organization Type:** Other Nonprofits

**Organization Location:** Heliopolis Favela, São Paulo, Brazil

**Partner's Contribution to the Project:**

In-Kind Support

Facilities

Collaborative Research

Other: Guide for complex community situations.

**More Detail on Partner and Contribution:** UNAS has provided local infrastructural and negotiating support to the fieldwork team in Heliopolis.

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**University of São Paulo - Polytechnic School**

**Organization Type:** Academic Institution

**Organization Location:** São Paulo, Brazil

**Partner's Contribution to the Project:**

Facilities

**More Detail on Partner and Contribution:** The Polytechnic school has developed some contacts in support of the project's activities, including a small symposium.

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**What other collaborators or contacts have been involved?**

This study has benefited from collaborations with colleagues at The University of Texas at Austin, including Noah J. Durst (digital survey design) and Carlos C. Olmedo (quantitative research design); Robert Paterson, Elizabeth Mueller, Thomas Hilde, and Michael Oden (Applying Envision Tomorrow to issues of social vulnerability). Leticia Palazzi Perez assisted with statistical analysis in GIS. John Fregonese and his team at Fregonese and Associates provided advice about configuring Envision Tomorrow to the context of informal settlements, and shared the metric version (open source). The PIs also maintained contact with the University of São Paulo's Polytechnic School, where colleagues in Civil Engineering provided some advice about fieldwork scope (Alex Abiko).

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## Impacts

**What is the impact on the development of the principal discipline(s) of the project?**

This study focused upon scholars within urban planning, architecture, and public policy who are completing connections between field-based and digital methods of urban mapping. It improved the co-construction of knowledge and exchange of methods and tools among participants within these fields, as well as their connection to community organizations and their governments in Brazil. Past support from UT-Austin and (now) future support by Texas Tech has enabled continuity to these connections, which are anticipated to become stronger and expand as the fellow uses the study as a model and comparative basis for peer regions and communities in Latin America and at the US-Mexico border region.

Specific to the fields of architecture and urban planning, the study contributed to how practitioners and academics use data visualization to investigate and communicate phenomena related to the urban built environment. Historically, architecture has tended toward either highly technical or speculative mappings that are beautiful but opaque, and planners toward information-laden graphics that are empirically correct yet lack, at times, public persuasiveness that architectural models and 3D renderings afford. This project sought to develop a new graphic language for representing informality between these poles, and through six scales (urban region, district, neighborhood, block, lot, and space) and eight modes (plan, axonometric, figure-ground, topographical, film and image, collage, cross-section, diagram, physical model). This graphic language is currently in development, and was first tested in the context of a poster presentation at the ACSP Conference (noted in products), and will form the basis of an exhibit at Texas Tech University in the spring of 2018.

Specific to international development, the project advanced a framework that considers the theoretical middle ground between political economic perspectives and the potential of individual agency. From this position, the work advances an alternative that uses empirical studies to critique the processes of urbanization, the environments it creates, and the struggles of living within them, yet also emphasize the opportunities that adaptable, user-based forms of housing have created, and the potential of technology to enable citizen-orchestration of neighborhood change. This framework advocates that urban change is best understood by the merger of multiple scales of data.

Challenging existing frameworks is not the only component of this project's achievement. It proposed, like all Participatory Action Research, that researchers become better at linking knowledge to action by becoming better at communicating. This study expanded upon this goal by contributing to an emergent movement within planning and public policy toward visualization tools that document how urban processes unfold, where policy might most effectively intervene, and, most uniquely, what future policy interventions –if shaped in part by citizens – might look like in urban space.

### **What is the impact on other disciplines?**

Nothing to report.

### **What is the impact on the development of human resources?**

The research has enhanced the fellow, mentor, and consultant's (Nathan Brigmon) knowledge and skill sets as relates to digital tools for urban analysis and participatory mapping and visualization. Participatory technologies are an emergent field within IT, and the creation of ComuniDADOS permitted these study participants initial entry into the collaborative work being undertaken within open-source and open data movements for equitable urban development.

### **What is the impact on physical resources that form infrastructure?**

This research results in three impacts upon the physical resources that form infrastructure. These impacts are anticipated to help communities and their governments improve the process and outcomes of informal settlement redevelopment, also referred to as *upgrading*, *rehabilitation*, and *regeneration*. The first is to provide a method through which NGOs, citizens, and researchers can measure the existing infrastructure (central to which is housing) that comprises contemporary informal settlements. The second is the maintenance of a digital tool, ComuniDADOS, which will permit the visualization of the data collected in the context of this study. The third impact depends upon municipal reception to the data produced by this research and its application to redevelopment projects that physically transform informal settlements.

Currently, redevelopment decision-making is informed by data. However, because these data derive from public sources, and redevelopment is funded with public finance, residents of settlements without their own data have very little leverage in directing the scope and pace of development in their own neighborhood. Further, data is used to identify "areas of risk" for removal, rather than areas that simply require improvements. Finally, municipal agencies are beginning to abandon upgrading altogether, citing the rising cost of land and complication of building within existing informal settlements, and instead constructing peripheral mass social housing estates to accommodate the low-income housing crisis. To counter the lack of citizen-sourced data, emphasis on removal of areas of risk, and divestment from informal settlement upgrading, the project continues to support community partners with tools and data they need to advance their claims for community improvements, and evidence existing conditions that may be upgraded, not simply removed. Currently, the fellow is advancing these goals through a Latin American Urban Lab at Texas Tech University, where development alternatives are being visualized and disseminated through the digital tool ComuniDADOS. Over the long term, this initiative aspires to transform redevelopment, but with citizen data sources, which in turn will legitimize community claims for physical outcomes - housing, infrastructure, and public space – more reflective of user needs.

### **What is the impact on institutional resources that form infrastructure?**

This study contributes to an emergent body of literature and practice focused upon technologies that enhance the synthesis of local data into policy resource streams and the distribution of public goods to and among marginalized communities, specifically as relates to housing and infrastructure. The project has contributed to the established Latin American Housing Network (LAHN) at The University of Texas at Austin, and forms the foundation of the Latin American Urban Lab at Texas

Tech University. It is anticipated that the Latin American Urban Lab will strengthen existing ties with the University of São Paulo's Polytechnic School, and form new collaborations with the TTU College of Agriculture (specifically landscape architecture) and College of Engineering in the coming years. That said, the project lacks financial support within the two case study communities – however not for lack of interest. Brazil's current political economic crisis has severely reduced third sector outlays, which in turn has placed partnering associations in the vulnerable position of having to provide social services yet without adequate resources.

### **What is the impact on information resources that form infrastructure?**

This research has resulted in two web-based information resources that will impact the design, simulation, implementation, and assessment of urban infrastructure: (1) the creation of a project website, [www.chapa.io](http://www.chapa.io), which introduces the study, its team, primary goals, and research methodology, as well as provides information as to the study's ongoing evolution, key events, and primary deliverables; (2) the construction of an interactive data visualization tool, ComuniDADOS.

### **What is the impact on technology transfer?**

This research results in three impacts to the role of technology in urban development and industries related to the production of social housing. First, it provides a new data resource to communities and their governments, which is the post-occupancy assessment of the outcomes stemming from four decades of informal settlement redevelopment. Second, the translation of the dataset into 3D models has the potential to expand the data sources used by architects, engineers, and urban planners to design housing typologies relative to what has and has not worked in the past. Third, the use of local data for scenario planning has guided an unprecedented use of local data as a basis for Envision Tomorrow analyses, thus permitting communities and the data they generate to be utilized in the creation and assessment of future alternatives.

### **What is the impact on society beyond science and technology?**

Through dissemination at public events (e.g. the UN Habitat III conference in Quito), the project website, and ComuniDADOS, the study has impacted public awareness of data's role in urban redevelopment for informal settlements, and the importance of tools that more effectively reveal, legitimize, and incorporate resident perspectives into urban design and constructed outcomes. This study finds that knowledge of redevelopment's impacts is likely to improve decision-making processes related to the location of urban development, type of housing produced, and the nature and extent of citizen participation in assessing and directing these processes.

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## **Changes/Problems**

### **Changes in approach and reason for change**

Nothing to report.

### **Actual or Anticipated problems or delays and actions or plans to resolve them**

It was anticipated that the household survey would require three months, however the increased sample frame and health and political economic turmoil in Brazil (the Zika Virus and the Presidential Impeachment) at the study's beginning extended this estimation to six months.

### **Changes that have a significant impact on expenditures**

Nothing to report.

### **Significant changes in use or care of human subjects**

Nothing to report.

### **Significant changes in use or care of vertebrate animals**

Nothing to report.

### **Significant changes in use or care of biohazards**

Nothing to report.

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## **Special Requirements**

**Responses to any special reporting requirements specified in the award terms and conditions, as well as any award specific reporting requirements.**