



**FIGURE 1. WIND DAMAGE
TO DWELLING IN
BARRANQUITAS, PUERTO RICO**

Hurricanes, similarly to other intense climate events, exacerbate the underlying social, economic and environmental issues of a place. Hurricane María has uncovered the fragile state of our Island. It has exposed years of lack of governance, maintenance and code enforcement issues that have left us with crippled infrastructure and developments that do not respect the geographic and topographic conditions of the place. Hurricane María not only exposed the wrongdoings of our physical development processes, it has also revealed the social and economic disparities that are at the root of these transgressions. Overall, last year's hurricane season highlighted the systemic issues of the current

disaster response, relief and recovery system, some of which we have already seen in United States.

The first concern is timeframe. Disaster recovery takes time and current policies difficult the process of expediting it. The separation of relief funds and recovery funds is one of the biggest reasons for delays in housing recovery. We need to think of these processes like buckets of money. The next one is not available until you spend the first ones available and this process can take between 12 to 18 months. The second issue is cost and quality. Due to the extended periods of relief activities, the federal government spends large amounts of funds in relief housing solutions that

HOW CAN DESIGN IMPACT IN DISASTER RECOVERY HOUSING?

¿CÓMO EL DISEÑO PUEDE INSTIGAR CAMBIOS EN EL
SISTEMA DE RECUPERACIÓN DE VIVIENDAS POSDESASTRE?

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MONOGRÁFICO PP.26-37

RESUMEN

El sistema de vivienda de recuperación posdesastre de Estados Unidos necesita un cambio sistémico. Actualmente, el proceso de recuperación posdesastre toma demasiado tiempo, cuesta mucho dinero y en algunos casos excluye a las comunidades que más necesitan asistencia. El Programa de Vivienda de Recuperación Rápida ante Desastres (RAPIDO, por sus siglas en inglés) es un ejemplo de cómo una estrategia de vivienda como parte de un sistema modelo puede instigar cambios a nivel federal, estatal y local, y a su vez crear un enfoque comunitario, impulsado localmente y centrado en las familias que pretende apoyar. Existen buenas prácticas y lecciones que aprender de experiencias pasadas y RAPIDO proporciona recomendaciones de políticas públicas y guías técnicas que permiten su adaptación e implementación a nivel local.

palabras clave: vivienda de emergencia, participación comunitaria, recuperación posdesastre, política pública, Rapid Disaster Recovery Housing (RAPIDO)

ABSTRACT

The American disaster recovery housing system is in need of systemic change. Currently, disaster recovery takes far too long, costs too much, and, in some cases, excludes the communities most in need of assistance. The Rapid Disaster Recovery Housing Program (RAPIDO) is one example of how designing a housing strategy as part of a system's model can impact change at the federal, state, and local levels while creating a bottom-up, locally-driven approach centered on the families and communities that it intends to support. There are lessons to be learned from past disaster experiences, and RAPIDO provides policy and technical recommendations that allow for local adaptation and implementation.

keywords: *emergency housing, community participation, disaster recovery, public policy, Rapid Disaster Recovery Housing (RAPIDO)*

do not meet the long-term housing needs of affected residents. Usually, the deployment and installation of these temporary solutions cost more than what a permanent home costs to build and stay much longer than expected. All the money that goes to temporary solutions is money that does not go to long-term ones but do have a lasting impact in the future reconstruction and recovery processes. And third, there is a generalized lack of planning for disaster recovery. It is evident the lack of planning, preparedness and coordination at both federal and state level for Puerto Rico. Yes, María was a catastrophic, unprecedented hurricane but the aftermath of a natural disaster is not the place to start assessing what the problems and barriers are while trying to react and respond. The lack of planning for recovery at the local level is at the root of extended delays in the disaster recovery process.

Puerto Rico may be a territory of the United States, but our political, geographic and cultural condition makes the Island a foreign territory. In spite of these differences, after intense climate events, we are governed by the United States federal disaster response, relief and recovery system. Is the national recovery framework a good fit for Puerto Rico? Are we going to witness the same barriers to recovery we have faced in United States mainland now exponentially aggravated by the political status and inequity conditions we face in Puerto Rico? Are the necessary human, economic

and knowledgeable resources on the ground to lead a locally driven recovery process? The reality is every disaster is unique, and much of the emergency response and even recovery, especially in Puerto Rico's context, may be improvised. Nevertheless, one thing is guaranteed, if the local jurisdiction is not prepared to respond to the disaster event a top-down approach will end up defining the recovery process: a top-down approach that might not be led by Puerto Ricans.

Now six months after Hurricane **María** our low-income families and rural communities, some of them still without electricity, are hurting and their informal conditions already exclude them from relief and recovery programs (Figure 1). There is a lot of change needed in disaster recovery systems and any work in the right direction should advocate for change and preparedness. As designers, planners, academics and residents of many affected communities we are at the juncture of recognizing our current state, what our vulnerabilities and strengths are, and use this opportunity to organize and define locally driven approaches for the recovery and reconstruction of a resilient Puerto Rico, one that is better prepared to respond and recover from the next María. This was the main idea when a group of colleagues and I founded the volunteer network retoñoPR, the idea that a resilient Puerto Rico was possible with collaborations that elevated the experiential knowledge of our communities and the technical expertise of practitioners and academia in and outside the Island.

2008



2014



Figure 2. Six Years after Hurricane Dolly hit the Rio Grande Valley, low income families were still living in homes affected by strong winds.

I have had the opportunity to see the impact of these types of collaboration in two different projects of disaster recovery housing through my work at *buildingcommunityWORKSHOP* (bc). Both of these projects faced similar challenges to other disaster response and recovery initiatives in the Gulf Coast, and through the lessons learned, bc and its partners created the *Rapid Disaster Recovery Housing Program* (RAPIDO). RAPIDO is a new holistic approach to disaster recovery housing that focuses on getting families back to quickly re-built homes after a natural disaster, and a system model that impacts policy change at the federal, state and local level.²

Our team saw first hand through the recovery efforts for Hurricane Dolly (2008) and Ike (2008) that, when executed poorly, housing recovery can take far too long, cost too much and in some cases exclude the communities most in need for assistance. Historically, low-income families struggle to access adequate and high-quality homes that not

only impact their standard of living but also our built environment. When homes already vulnerable due to the quality of the construction are affected by the passage of a hurricane they are also the ones that will struggle the most to recover. The informal nature of the majority of the construction in Puerto Rico, especially in rural areas, directly relates to the level of damage we are now left with. RAPIDO was reacting to the 85% of denied Federal Emergency Management Agency (FEMA) cases due to deferred maintenance in South Texas, where 5 years after the hurricane low-income families—the vast majority of them low-wage workers, the elderly and the disabled—were still leaving in homes affected by flooding and strong winds (Figure 2).³ The RAPIDO pilot program ought to create a new local approach to disaster recovery that was faster, invested resources efficiently, and was centered in the people that were impacted the most. This is a new approach that could be replicable across regions, while components

of the plan could allow for local adaptation and implementation as needed.

It all started with design, by asking: How could design have a role in systems' change? How can we design a house that showed how the gap between relief and recovery could be bridged, that displayed how resources could be leveraged towards long-term solutions that met families' needs and preferences, a house strategy that sparked pre-disaster planning to expedite the disaster recovery system? RAPIDO's housing strategy approaches recovery through a temporary-to-permanent approach, providing immediate housing and investing in the first step towards a permanent **home**.⁴ This temporary-to-permanent strategy is possible with RAPIDO's "core". The core is a temporary, modular incremental unit that is deployed to a family's property within weeks of the disaster, and then expanded into a permanent home through a system of semi-custom designed additions (Figure 3). Typically, manufactured temporary/emergency housing is disposed after the relief phase or when the family is ready to move on. RAPIDO's core on the contrary, is designed for durability and expansion reducing material and financial waste associated with temporary/emergency housing.

The *buildingcommunityWORKSHOP* conducted five community focus groups to gather input on this temporary-to-permanent housing concept (Figure 4). Diverse design exercises clarified how residents

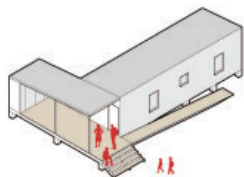


Figure 4. Focus group community engagement for RAPIDO's core design.

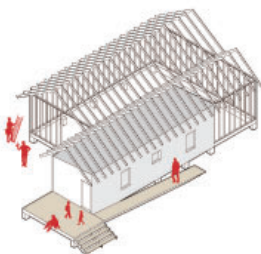
would use their living space and which activities were considered essential after a disaster. These focus groups validated the idea of expanding a temporary solution into a permanent one in a homeowner's site. For most residents, it was more important to be able to stay in their property, close to where their jobs and their kids' school were than meeting their long-term needs immediately. Based on the input of affected residents, bc designed a core unit that provided ease of construction, and ensured flexibility and choice in the final permanent form of the housing unit. RAPIDO's core unit is less than 500 square feet, comprised of a flexible living room, a kitchenette, an American with Disabilities Act (ADA) compliant bathroom and sleeping quarters (Figure 5).⁵

This modular home unit is easy to expand, is raised from the ground to avoid floodwaters and is windstorm certified becoming a safe box within the expanded home. RAPIDO's core is also easy to build and assemble. The unit is built in a local lumberyard out of prefab panels in three days and its flat pack design enables contractors

1 temporary unit



2 custom expansion



3 permanent home

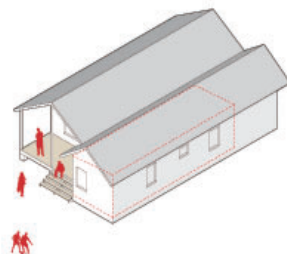


Figure 3. RAPIDO's temporary-to-permanent strategy: 1.) family lives in the CORE; 2.) CORE is expanded to fit family's needs; and 3.) family enjoys home.

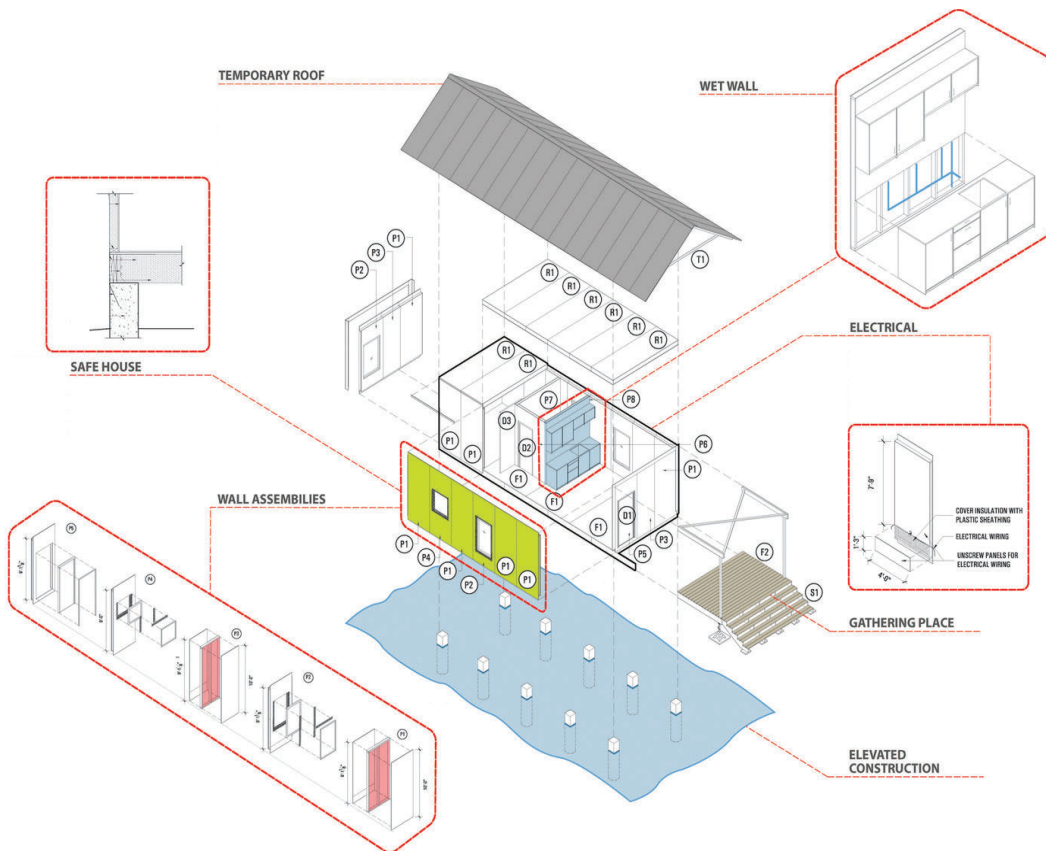


Figure 5. RAPIDO's CORE Unit.



Figure 6. RAPIDO construction process.

to deploy it using a standard flatbed trailer. The unit is assembled within four days on a homeowner's property using available labor and transportation, this differs to many manufactured units that require heavy machinery, and have to be placed on newly constructed group sites (Figure 6).

As designers and architects we tend to focus on the design of the product. In this case in which the design proposal is a pre-fabricated solution we would ask how is it going to be constructed and deployed, and what's the life cycle of that pre-fab unit that we are proposing? The RAPIDO program proposes that a percentage of the core units are in storage, ready to be deployed, but the ease of construction allows for local teams to start building cores right away to meet the post-disaster need, which also has an impact on the local economy. Designers would also think about the assembly and

construction phasing process at each family's home and property, and how and when their lot will be cleaned and the core placed and expanded. The pilot program gave bc the opportunity to test the expansion of the temporary unit. bc and its partners designed and built 20 prototype homes in South Texas as a way to test this scalable system, in which the best case scenario will get families back to a permanent home within months instead of years. However, the house strategy is just one side of the puzzle.

To be able to design a housing strategy that met all these time frame goals, the team needed to understand the source of the extended delays in disaster recovery, and the pilot program was the perfect setting to understand these delays and examine not only architectural issues but every level of the process, specifically the social, economic and political contexts that make up a disaster scenario. Along with the housing

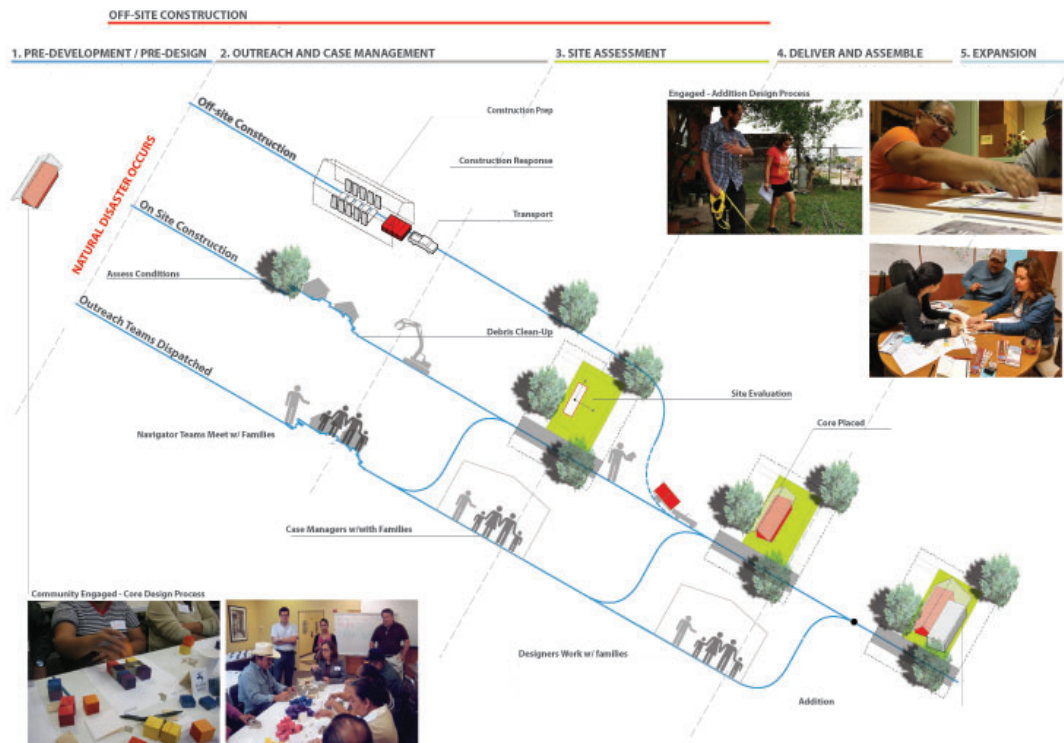


Figure 7. RAPIDO'S the deployment and engagement process.

strategy, the RAPIDO team designed a system's approach based on the family's path to recovery (Figure 7). The team evaluated the process of targeting families, application and eligibility procedures, and how the design and construction strategy could help expedite the timeframe from when an outreach worker delivers a family application to the moment the construction contract is signed. During a two-year period, bc and partners met monthly with experts, local stakeholders and community organizations to design a comprehensive system that empowers local jurisdictions to prepare, respond and recover from a natural disaster in all these key areas.

There were valuable lessons to be learned from the pilot program. The team learned that: (1) a successful disaster recovery system considers, not only design and construction, but also funding streams, community outreach, case management, eligibility and altogether policy, (2) community engagement in housing design is essential in any housing recovery effort and that there is no "one size fits all", and (3) a "navigator" role is essential for the disaster recovery housing process. Navigators can be community organizers, healthcare outreach workers, case managers or committed volunteers that work with the family from the beginning and serve to guide and connect them to needed resources along the entire recovery process.



Figure 8. Sandoval Family's home before RAPIDO.

The biggest lesson from the pilot program is that we cannot wait for a disaster to arrive to implement a new model to disaster recovery housing. In Puerto Rico's case, within six months from the worst hurricane in the past century, the urge to recover should not be an obstacle to build a resilient Puerto Rico that can bounce back from an intense climate event.⁶ We cannot miss the opportunity to rethink the Island's built environment and, while responding and recovering, build the local capacity to prepare for the next one. A model like RAPIDO can only be achieved by spending time and resources in planning for recovery, or what in the RAPIDO program is referred to as "precovery". Precovery means to envision and start recovery activities prior to a disaster, for example: (1) to pre-design and engage a diverse set of stakeholders including residents, community leaders, city officials, contractors, housing experts and local designers to produce ready available designs that reflect on our geographical and cultural contexts, (2) to pre-procure and coordinate the partnerships, communication, human and material procurement protocols and policies



Figure 9. Sandoval family RAPIDO home

we need in place to allow a just recovery to start at the earliest possible and (3) to prepare and train local teams as a collective to get to know all the actors that play a role in disaster recovery.

As architects and planners we cannot disconnect ourselves from other disciplines and experts that will allow our projects to have a bigger impact. It is our responsibility to bring our design thinking skills to explore solutions to systemic issues facing our communities. Imagine we had community-organizing structures across the Island to which architects and planners could connect to and provide the technical expertise our communities need to rebuild better. Imagine we had a comprehensive plan in place for local teams to feel empowered enough to drive the relief and recovery process. Imagine we were prepared to connect valuable resources from the federal government and the philanthropic community to the areas most in need. We cannot allow the government to forget all the barriers Puerto Rico have faced in the last six months because of lack of planning and

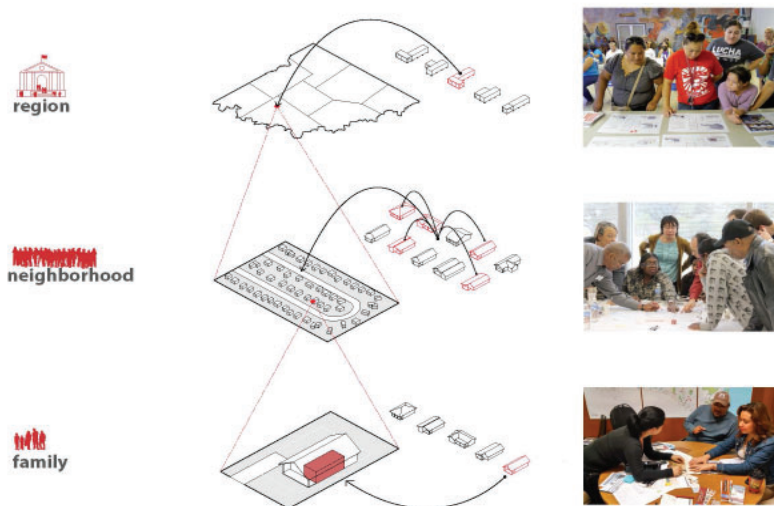


Figure 10. Increasing choice in disaster recovery.

preparedness. Even when many groups continue to react instead of being proactive, designers, planners and communities need to be advocate for a place at the table and avoid decision making processes that ignore the future impact of the temporary and long term solutions being implemented after hurricane María.

As a public interest designer working with a group of community developers, designers, planners, organizers, and policy makers I know that an empowered community connecting planning strategies and tools on time can have a system in place to bounce back from disaster situations. Investing in “precovery” activities is a comprehensive strategy that not only provides a path to prepare for a natural disaster but to achieve sustainable and resilient solutions. Planning for recovery will allow us to identify our current

capacity and start working towards projects that include multiple voices in the process, are built with the characteristics of the people and the place, and reduce our vulnerabilities towards future risk. As a result, we will have a system in place in which after a disaster, working teams are coordinated, families will have the opportunity to participate and have choices, and our social and economic networks instead of disrupted, by citizens fleeing from disaster, will be strengthened through bottom-up supported approaches.

RAPIDO delivered housing faster and cheaper than the housing built by bigger disaster recovery efforts in Texas (Figure 8 and 9). But the hallmark of the program was to provide choice in disaster recovery housing: choice to stay, choice to go, and design choice at different scales and levels (Figure 10). Is RAPIDO possible in Puerto Rico? Absolutely.

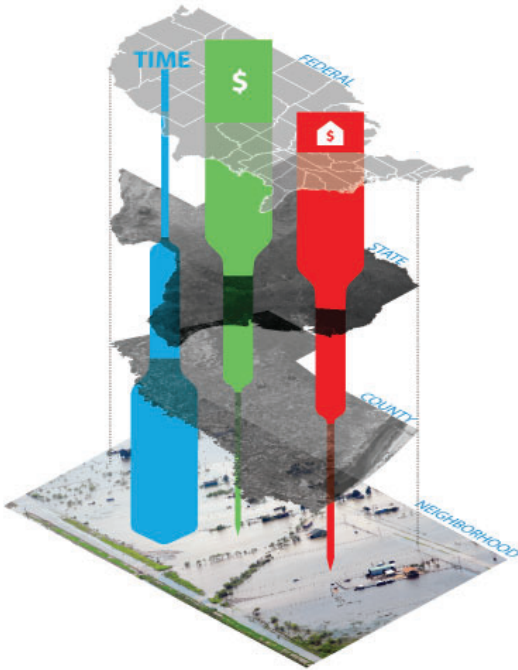


Figure 11. RAPIDO's system's approach (detail).

RAPIDO is a tool to empower local jurisdictions to define how they want to recover after an intense climate event. RAPIDO brings choice in disaster recovery housing and prioritizes a locally driven approach to disaster recovery housing. In the implementation the program's policy and technical recommendations what can guide a system's change process but the final design outcome of Puerto Rico's system and housing model is up to the team on the ground, working together through collaborations to develop design solutions that reflect on their geographic, socio-cultural context and local expertise. (Figure 11).

Puerto Rico's action plan should be built from the ground up, a plan and implementation that builds local

capacity for any other María, and that ensures Puerto Ricans are listened to in the next months and years to come. A resilient Puerto Rico will consider holistic strategies that react to the new normal, with housing that is self-sustainable and incorporates renewal energy and water management strategies, with retrofitted buildings and infrastructure that mitigate future risk. A resilient Puerto Rico will be achieved when we stop working in silos, when we move from designing projects to designing systems that take into consideration our social, economic and environmental characteristics.

NOTAS

¹ This article was written 6 months after Hurricane Maria.

² The Rapid Disaster Recovery Housing Program (RAPIDO) was created through a rapid-rehousing pilot program funded through HUD CDBG-DR funds, granted by the local COG in 2013 to the Community Development Corporation of Brownsville and buildingcommunityWORKSHOP. The program was tasked with testing a new strategy for producing and delivering replacement housing for victims of federally declared natural disasters at a large scale.

³ Sloan, 2015.

⁴ RAPIDO's housing strategy started its development after the Texas GrownHome competition, where 83 designs were considered. RAPIDO took this housing strategy and pair it with a more comprehensive disaster recovery system

⁵ You can find the technical details of RAPIDO in: rapidorecovery.org/technical-guides/.

⁶ Disaster recovery is a very long process and after a year of the event our focus should be placed in resiliency and disaster preparedness. Any other focus could be wasteful.

La autora es una de las fundadoras de retoñoPR, una red de voluntarios de profesionales puertorriqueños de la industria del diseño y la construcción que abogan por la reconstrucción resiliente de Puerto Rico. Es gerente de diseño de **buildingcommunityWORKSHOP** (bc) donde dirige el **Rapid Disaster Recovery Housing Program (RAPIDO)** y los trabajos de planificación ante desastres. Se especializa en el desarrollo comunitario en contextos posdesastre y posconflicto. Obtuvo su Bachillerato en Diseño Ambiental y Maestría en Arquitectura de la Universidad de Puerto Rico, y una Maestría en Cooperación Internacional y Arquitectura Sostenible de Emergencia de la Universidad Internacional de Catalunya, en Barcelona, España.

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