

As people in Houston and the region begin to transition from rescue and recovery to damage assessment and rebuilding, a word has begun to creep into more common usage as people look to put their lives back together: resilience.

With more articles describing Harvey as a new normal and discussing how to rebuild with the idea of resilience in mind and with various experts making recommendations for revising public policies, it is an appropriate moment to understand what the idea of resilience really means in the context of rebuilding after such a devastating event as Harvey. There are no shortages of professionals, researchers, policy experts, civil servants, and politicians with ideas for how we should significantly change infrastructure planning, development patterns, construction techniques, etc. in the Houston region to increase the resilience of our city. However, the average family whose home just flooded for the first time might not immediately understand why someone would tell them to hold off making that trip to Home Depot to replace the soaked sheetrock they just cut out of their just submerged house. Therefore, it is important to clearly articulate how we should approach making the region more resilient to prepare for the next catastrophic storm that we all know is coming.

As a concept, resilience is as broad and open to interpretation as other terms like sustainability, affordability, urban, or even

natural. A frequently cited definition of resilience from researchers at Columbia University and the University of Rochester describes it as “a dynamic process encompassing positive adaptation within the context of significant adversity.” An adviser to the World Bank interprets it to mean “the ability of people, communities, governments and systems to withstand the impacts of negative events and to continue to grow despite them.” The United Nations defines resilience as “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.” However, in the context of Harvey, how do Houstonians approach creating a more resilient Houston, especially as the region decides how and where we want to rebuild?

#### **A Forensic Approach**

One approach to rebuilding a more resilient Houston is to look at what happened in a forensic manner. The process would identify the relevant interconnected systems that were in place before Harvey, analyze how those systems interacted with one another, and pinpoint which ones were incapable of withstanding such a massive shock and which ones were able to adapt and recover. Once the strengths and weaknesses of the systems and their interactions are understood, it would be possible to determine what steps need to

be taken to ensure future outcomes are significantly improved. By understanding both the larger context and finer details of what happened, experts from across the region can work to devise strategies that help better adapt Houston to future catastrophes.

The systems that led to Harvey’s outcome exist in various forms and span multiple scales. Physical systems range from the region’s vast networks of flood control infrastructure down to the gypsum board used for walls across the city. Regulatory systems encompass everything from regional development policies (or lack thereof) to how many parking spaces are required for each bedroom in a residential dwelling. Energy systems link the vast windfarms of West and North Texas to the electric plug placed a few inches above the floor. Technological systems can be as complex as the most advanced supercomputers used by sophisticated weather forecasting software or as basic as the two-cycle outboard motors powering the flat-bottomed fishing-cum-rescue boats. Political systems include not only politician and civil servants that exist across all levels of governments, but also the citizens, lobbyists, and special interest groups that influence the decisions those public officials make. Social systems create the vast networks of personal connections that link all of these other systems together. Though the Houston region depends on these and many other systems, such as food, water, communication, and financial systems for its standard of living and economic performance, without careful planning, any and all of these

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# A More “Resilient” Houston: What Does That Mean and How Do We Get There?

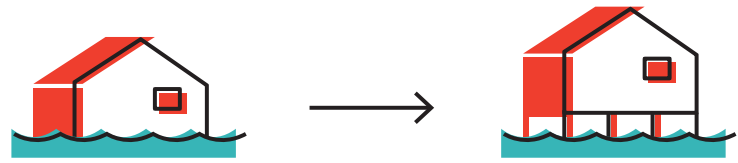
systems are vulnerable to the types of shocks Harvey represents. While the unprecedented amount of rainfall during Harvey created an almost inconceivable shock that would overwhelm the most robust system, how these systems jointly responded to that shock led to disastrous conditions so many across the region endured.

Numerous experts who worked within and studied these systems in the Houston region before Harvey had already identified many of their strengths and weaknesses and had clear ideas about how to make the city more resilient before the storm itself. That knowledge is why many of the recommendations that followed the storm were so specific, and so quick. Many of the underlying causes of the disaster were identified before it even happened. Yet, as with any complex system, not all of the reactions and outcomes of the disaster could be fully anticipated.

For example, technology and communication systems played a significant role in allowing for a much more resilient rescue and recovery response. Social media platforms and apps expanded communication networks far beyond overwhelmed 911 channels to allow first responders to identify more stranded victims faster. Groups like Sketch City created numerous digital tools for volunteers throughout Houston to remotely and very quickly organize relief efforts and compile essential

information for storm victims. Political systems adapted when public officials invited the community to assist with rescue efforts including the “Cajun Navy,” guided by a slew of volunteers, to significantly buttress overwhelmed official search and rescue resources. And social systems reacted as the close personal ties within the food and beverage industry allowed a dedicated group of volunteers to create an impromptu commissary that fed hundreds of thousands displaced people across the region. Ultimately, as the city begins to understand exactly what happened before, during, and after the storm, countless more examples of unexpected reactions will emerge.

A thorough forensic understanding of how all of these systems positively and negatively reacted then becomes the basis for devising the strategies necessary to create a more resilient Houston. Experts, public officials, business and community leaders, and residents can use that understanding to determine and agree upon the most efficient and effective solutions to “resist, absorb, accommodate to and recover from the effects of a hazard.” Each future shock—whether cataclysmic or not—leads to additional insight and continual refinement of these systems. These iterative improvements then contribute to more robust systems that create a more resilient Houston.



### An Outcomes Approach

An alternative approach to creating a more resilient Houston is based on a similar comprehensive understanding of these same systems, but looks to the future rather than the past for solutions. Rather than devising solutions based on the flaws and strengths of individual systems, the alternative approach would begin by identifying an ideal yet achievable outcome of such a catastrophic event and work backwards to devise what solutions would achieve that goal. Both methodologies begin with a very basic question but differ slightly but profoundly on exactly what that question is. While the first methodology begins with “What happened?”, the second starts with “What do we want to happen?”

The second question can be applied to each system to identify intended goals. Do we want to minimize or eliminate the threat of rising waters or have structures that can withstand floodwaters with little to no physical damage? Do we want to protect the open prairies across the region that can absorb

water before it reaches the city or require every individual property owner to have the flood protection measures in place to protect their own property? Do we want to pay for large-scale buyouts of properties before they flood again or pay for improved construction techniques that harden structures against rising floodwaters? Questions like these can help people across Houston imagine an optimal outcome of a storm like Harvey that experts would use to devise strategies for protecting the region.

This second approach can also begin with a broader perspective. A more basic answer to the question “What do we want to happen?” could look past answers for each individual system and start with a single answer of “No loss of life and minimal damage to property.” In other words, Houstonians would have hunkered down for Harvey and then gone back to their normal lives with little to no recovery or rebuilding. While “no loss of life” would be an unquestionable goal, “no loss of property” is open to a broad spectrum of interpretations from removing structures from the most flood-prone areas to using construction techniques that allow waters to enter and recede from structures with little to no damage or any other number of combined solutions. Reaching a common consensus on the interpretation of “loss of property” would require not only experts that understand the complexities of all of the systems, but also engagement of people that live in the region. Not only can a broader base of creative solutions be explored by allowing all Houstonians to participate in conversations on how to rebuild, but the residents of Houston would be more likely to support solutions that they were engaged in developing.

Each of these approaches present a practical framework for how to achieve a more resilient Houston. Both require a thorough understanding of the numerous complex systems that protect the city. One approach then looks at how to refine, reshape, or completely restructure those systems to re-engineer a more resilient city. The other reimagines how residents expect those systems to perform to redesign a more resilient city. Either approach would require significant efforts from a broad constituency, but one allows for more fundamental engagement by the people who will ultimately be impacted by the changes required to create a more resilient Houston. Therefore, Houstonians should decide which approach they want to pursue. That decision represents the first step in creating a more resilient Houston. ■

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