

A Fresh Look at Emergency and Rapid Shelter Solutions: Key Takeaways from The Rapid Shelter Innovation Showcase

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Abstract

When The Housing Innovation Collaborative (“HICo”)—the housing-focused research and development platform based in Los Angeles—launched The Rapid Shelter Innovation Showcase (Showcase) in mid-2020 in response to the COVID-19 pandemic, the response from the housing industry was unprecedented. In a short few months, the Showcase quickly became the largest, most diverse open-sourced collection of rapidly deployable shelter solutions in the world. In one interactive online interface showcasing 68 shelter solutions from more than 50 vendors representing 14 countries, it acts as not only a continually growing global conference of the latest technology and trends in rapid shelter housing, but is also a resource to help accelerate the discovery and selection process in deploying rapid shelters during crisis situations, ranging from rising homelessness to devastating natural disasters.

The Showcase launched with national media attention, which has renewed focus on the often-overlooked rapid shelter sector within the housing industry. The Showcase highlights many of the most frequently used shelter units for refugee, disaster, and homelessness crises worldwide, alongside the next generation prototypes and conceptual-stage solutions. With this new level of perspective, we have been able to review and categorize the rapid shelter landscape in entirely new ways. This article outlines a five-step roadmap for decisionmakers to find “the best” rapid shelter solution for any given situation.

Abstract (continued)

Three main takeaways from the Showcase include (1) there is no silver bullet answer for the “best shelter” given the variety of sheltering circumstances, so understanding the landscape is critical; (2) the whole lifecycle of using the shelter must be considered when comparing costs, as you often get what you pay for; and (3) good design—whether it is in the shelter’s layout, the manufacturing process, or how it is deployed—goes a long way in determining the overall success of any rapid shelter solution. The Showcase highlights a range of innovative design features that can help elevate the standards of every shelter on display. Ultimately, the Showcase has formed the much-needed platform for everyone to come together to share best practices, improve shelter response, and accelerate the rapid shelter sector forward into a new age.

Introduction

Imagine you are suddenly tasked to shelter 1,000 people in the next 90 days—could you do it? Where would you begin?

It is not as farfetched as it may seem. In addition to a growing global pandemic pushing the capacity of our medical facilities, there are tens of thousands of people left homeless each year in the United States when natural disasters (forest fires, floods, and hurricanes) destroy communities and tens of thousands more are living in precarious, unsheltered situations in major American cities. Faced with these emerging and recurring challenges, the need for better rapid shelter solutions has never been greater.

When disaster strikes, one basic human necessity is always in short supply: a safe place to sleep. To address this shortage in rapidly deployable shelter in times of need, the housing-focused nonprofit research and development platform known as “HICo” (short for The Housing Innovation Collaborative) launched an international call to action to the building and design community to present the world’s best and brightest solutions for rapidly deployable shelter. Hosted on the HICo website, housinginnovation.co/rapidshelter, The Rapid Shelter Innovation Showcase (Showcase) is an international exhibition displaying over 60 of the world’s best shelter solutions in one simple, sortable database. The Showcase has been frequented by thousands from around the world, has convened hundreds of thought leaders to share best practices in design and implementation via HICo’s ongoing programming efforts, and has garnered national media attention—elevating this timely topic to new heights.

As the lead organizer of this initiative, the question I am most frequently asked by decisionmakers exploring the Showcase is, “What is the best shelter solution out there?” The question is difficult to answer, as it is similar to answering the question of “What is the best car?” To find the answer, it is imperative to know the basics of the drivers, their needs, their budgets, and where they are trying to go. The specific circumstances, realities on the ground, and the population served determine

which shelter is ultimately the “best” fit. Building that foundational knowledge and knowing how to critically assess the options is where the Showcase provides the most value.

This article outlines the five stages of due diligence to help decisionmakers find “the best” rapid shelter solution for any given situation. It also highlights common themes, trends, and lessons that anyone from local government officials to developers and manufacturers can take away to help drastically improve this type of housing in the future.

Selection Criteria Roadmap

The online Showcase is designed as a sortable catalog, making it easy to explore the 68 solutions from a variety of perspectives—including the stage of readiness (from early-stage concepts to solutions in inventory, ready for immediate deployment), on-site assembly and set-up difficulty, portability, durability, along with the ability to rank the universe of solutions by cost-per-bed and speed. For the purposes of reviewing the landscape of the rapid shelter solutions and finding the “best” of those solutions, we will cover the five stages of due-diligence.

1. **Organizational Capacity:** Can the shelter provider deliver what you need within a given timeframe and geographic area?
2. **Cost:** Given your budget, what is the most cost-effective solution for your needs taking all costs into account?
3. **Speed:** Can the shelter meet your unique definition of “rapid”?
4. **Portability:** Where can the shelter be deployed and how can it be moved?
5. **Site Specifics:** What sites work best for which shelters and can the shelter access and fit the site?

Organizational Capacity Factors

The most important factor to consider in selecting a rapid shelter provider is assessing the provider’s organizational capacity. In other words, does the vendor (or the assembled team) have the breadth and depth of skillsets (in financing, sales, production, delivery), the experience, and the productive capacity to meet your particular order needs? Some of the best shelter solutions are undermined by insufficient organizational capacity—from incomplete teams, limited experience in the housing market, or lack of production, delivery, or on-going servicing capacity.

Key Questions

Some key questions to consider when assessing organizational capacity are categorized as follows.

- **Talent Capacity**—Are multiple outside vendors or parties required for shelter deployment, or are all of the necessary tasks (from design, manufacturing, delivery, and servicing) included in-house?

- Experience Capacity—How many units has the team delivered to date, how many years have they been in business, do they have relevant experience in scaling production and deployment of shelter units?
- Production Capacity and Scope—How many shelter units can be produced, within what timeline, and to what region? What is the geographic reach of each production facility, and are the units produced in-house or by third party manufacturers? Are there multiple factories and/or suppliers of the primary components of the shelter? What building codes and manufacturing certifications have been obtained? Does the facility have any specific certifications from relevant approval or auditor agencies?
- Capacity to Grow/Scale—How does the provided shelter unit fit within the vendor’s overall business scope and product lineup? Is the team focused on building and improving the unit over the long term? It is important to keep in mind that while several of the shelter providers presented in the Showcase may be in the prototype stage or amidst their first production run, their talent, experience, and production capacity can grow. With a high-capacity team, unit deployment can scale quickly from the prototype to tens of thousands of units worldwide in a few years, as exemplified by Better Shelter’s Refugee Housing Unit 1.2 (see the Better Shelter’s RHU 1.2 illustration). While the Showcase currently presents relatively limited information on the provider’s production capacity and execution experience, further information gathering is on-going, especially in finding which solutions should be scaled far beyond their current capacity.
- Responsibility/Warranty—Is the shelter provider the designer, the manufacturer, and/or the retailer? When you buy the shelter unit, who provides which types of warranties?
- Customizability—Some shelter solutions have numerous customizable features, which is important for fitting into a locale with various facades and finishes, while others achieve economies of scale in production with one standard global design. Also, can the unit be used in other ways on-site beyond shelter uses? For example, Better Shelter’s RHU 1.2 units are used as classrooms in Sub-Saharan Africa, and The Maidan Tents are used as shaded community gathering spaces in refugee camps in Greece.
- Social Impact—Beyond an organization’s experience, competence, or geographic reach, it is worth noting that many organizations involved in this space are social benefit organizations that pursue social impact metrics beyond profit.

Highlight in Scale:

Better Shelter’s RHU 1.2 –

From a prototype showcased to the United Nations High Commission for Refugees (UNHCR) in 2012 to now over 60,000 units deployed to more than 66 countries.



*RHU = refugee housing unit.
Source: Better Shelter*

Additional Industry Support Needed

Although organizational capacity is the most fundamental factor in successful rapid shelter delivery, the environment and the process for how shelter units are produced is underappreciated by many government partners. For example, the Federal Emergency Management Agency (FEMA) Alternative Housing Pilot Program (aka the Katrina Cottage Demonstration Program) produced over 2,800 new units in 17 months starting in 2007 after Hurricane Katrina (FEMA, 2009)—a great feat in scaled production and regional coordination, but the FEMA program lacked the longer-term follow through needed to expand operations and building operational capacity. The NYC Urban Post-Disaster Housing Prototype Program produced a three-story prototype project in Brooklyn (City of New York, 2020) after Hurricane Sandy in 2014. It was an innovative new high-density type of rapid shelter, but the NYC program failed to increase overall production capacity or simplify design and approval processes outside of the pilot's limited timelines and geographic scope. The California Governor's Office of Emergency Services (Cal OES, 2017) solicited input with a Request for Information (RFI) Innovative Housing Solutions in response to October 2017 wildfires, but only got 17 submissions from the entire housing industry (Cal OES, 2017), and those innovative submissions have not been shared outside of their offices. It is unclear if there was any real impact to shelter deployment or improved housing design given their closed-door approach.

Using the analogy of a fruit tree, we often obsess over the end product's shape, color, and cost—always seeking the “next best thing”—but pay little attention to the preparation of the soil and the irrigation and growth of the plant that bears the fruit. To reap the best harvest, we must create a productive and supportive environment that nurtures the growth of promising new ideas even before the seeds are planted.

To create an environment of increased productivity, government partners, from the local to the federal level, should use pilot projects as opportunities to simplify regulation (code compliance, organization requirements), increase coordination across jurisdictions by pulling in all relevant parties that have worked on similar initiatives before, and make longer-term commitments to supporting organizations in building capacity and knowledge sharing via new funding sources and programming efforts. Also, they should provide for less closed-off competitions and more open-sourced collaborations.

To nurture the growth of promising new ideas, government partners need to accept the risks associated with working with new partner organizations, trying new technologies, and adapting to new processes. We do not need to reinvent the whole eco-system all at once, but we do need to improve every single part of it, one step at a time, all of the time, as a continuous process of improvement. Expect to fail, expect to have budget overruns, expect to have pushbacks—and then learn from those failures and share them publicly. This is all part of the process of open collaborative innovation. We can afford to make mistakes, but we cannot afford to keep making the same ones repeatedly, so building upon past efforts is critical. Pilot programs should not be viewed as extravagant, one-off experiments in radical thinking, but rather, they should be viewed as the necessary first stage of the path we are all taking collectively toward scaling the most successful designs and processes to the rest of the country.

Government parties are in the unique position to act as cross-industry conveners and capacity builders. They can validate new cost-saving designs and technologies, connect vendors and capital providers, help scale production of promising new ideas, standardize designs between regions, and close the widening chasm between established incumbent manufacturers who are innovating the least and the early-stage innovators stuck in the prototype stage. Breaking down geographic and regulatory barriers and increasing industry collaboration among the various niches within rapid shelter (emergency response, refugee, homelessness, festival) can spur unprecedented creativity both in design and business operations and will create larger markets that can financially justify more risk-taking ventures in pursuit of promising new solutions for the benefit of the industry as a whole.

Cost Comparison Factors

Once it is determined that a provider can deliver the shelter(s) you require—whether it is one unit or 1,000—the most important selection consideration is finding the solution that fits within one’s budget. The value of shelter depends on the type of crisis and where it occurs.¹ Cost is a nuanced and complex category, as there is much more to the overall cost than the listed price tag of, say, a \$10,000 unit. Not every quote is created equally. It is important to reconcile the cost of each shelter using a methodical apples-to-apples approach. There are three primary steps in price reconciliation: (1) lining up the “upfront costs” of the unit and any needed auxiliary items, (2) adding the “near-term deployment costs” of delivering and setting up the unit on-site, and (3) accounting for the “long-term costs” over the unit’s operational lifespan. The three steps are outlined in a table format in exhibit 1.

Exhibit 1

Price Reconciliation in Three Steps (1 of 2)	
Step 1: Upfront Costs	
Starting Price Quoted (\$/unit)	
Bathroom Included?	(If not, plus cost of an on-site shared facility)
Kitchen Included?	(If not, plus cost of an on-site shared facility)
+Extras (Available or Not Included in Quote)	(If not initially quoted, plus these costs)
+Customizable Features Needed (Extra Windows, Doors, Color, Materials)	
Subtotal Upfront Costs	\$

¹ For example, when the United Nations High Commissioner for Refugees (UNHCR) is serving in the most impoverished or remote locations, \$800 per shelter unit for refugee housing can be on the higher end of the budget. American city governments’ have spent \$10,000–\$20,000/bed for low barrier, transitional shelter solutions to more immediately address homelessness, whereas private parties, such as moderate-income families, will pay upwards of \$150,000 for a temporary home after a natural disaster. Sources:

- Ranges based on the host and sponsor country, per HICo’s conversations with UNHCR staff and Better Shelter staff. UNHCR provides first-line emergency shelter as needed, while funding the construction and maintenance of emergency locations and providing temporary cash-assistance to help refugees pay their rent and avoid homelessness. Further discussion found in this UNHCR report: (UNHCR, 2020)
- Per HICo’s research as part of “Project Spotlight”—see transitional housing project examples in Seattle, Oakland, and Riverside (HICo, 2020).
- Per HICo’s conversations with homeowners in Los Angeles County recovering from the 2018 Woolsey Fire and discussions with LA-based modular housing manufacturers.

Exhibit 1

Price Reconciliation in Three Steps (2 of 2)

Step 2: Near-Term Deployment Costs

- +Delivery costs (with last mile included)
- +On-site labor and materials (low to high skill)
- +Site preparations required (grading, utility connections, etc.)?

Subtotal Near-Term Costs \$

Step 3: Long-Term Costs

- Anticipated deployment timeline
- Expected frequency of replacement (durability)
- Expected risk of replacement (resiliency)
- Servicing costs
- Other Costs (relocation, storage, customization over time)

Subtotal Long-Term Costs \$

Fully Reconciled Cost \$

Unit's Intended Occupancy

Reconciled Per Person Cost (based on unit capacity)

Upfront Costs

The first step in reconciling price is adjusting each unit for comparable features, including adding the cost of any on-site shared bathroom facilities and kitchen facilities (if not included in the shelters themselves). In addition, the reconciled price should account for any premiums from customizing desired in-unit features (windows or material upgrades can vary greatly between vendors).

- **Low Cost**—While many options would not constitute a permanent home, these lower-cost, basic shelters certainly have their time and place when the alternative is having no shelter at all. The lower-cost options range from temporary wall dividers and sleeping pod units used in congregate shelter settings to non-congregate stand-alone units without bathrooms or kitchens with utilitarian finishes and minimal insulation.
- **Mid-Priced**—There are several mid-priced, quickly deployable housing units that meet permanent building codes for U.S. cities (across California and elsewhere) that come with many of the comforts of a longer-term residence—including full bathrooms, private sleeping quarters, full or partial kitchens, climate control, large windows, and lockable doors. Many of these options

Highlight in Cost:

Connect Shelter 3 –

Off-grid ready, customizable layout and colors, LEED-certified at \$30,000/bed-bath



LEED = Leadership in Energy and Environmental Design.

Source: Connect Shelter

range between \$15,000 to \$30,000 per one-bedroom/one-bathroom unit (see example in the Connect Shelter 3 image).

- Higher-End—Modular units built to the permanent building codes with sustainable features such as a green certification or more sustainably-sourced finishes, full kitchens, Americans with Disabilities Act compliance, or greater structural integrity and durability are available. They are good fits for a wide range of uses beyond emergency shelter, including student dormitories, senior housing, and VIP accommodations at temporary events.

Near-Term Deployment Costs

The second step in deriving a comparable price is adding the delivery and on-site setup costs. Some shelters may have very cheap delivery and little low-skill assembly needed on-site (such as unfolding homes). Others are fully assembled on-site (such as Better Shelter's RHU 1.2, delivered as two flat-pack boxes containing all of the panel components and tools). In addition, the required skill level of on-site labor can range from large, low-skill volunteer workforces to small, but highly specialized crane operators and other technicians.

Long Term Costs

The third step of price reconciliation is perhaps the least understood and underrepresented cost category—calculating the unit's long-term cumulative operational expenses. How much does it cost to maintain for the intended use? How long will it last before needing to be replaced? Long-term costs take into consideration the durability, serviceability, and sustainability of a unit.

- Durability—The longer the unit can last, the cheaper the unit becomes over time. For example, over a 10-year period, a \$10,000 unit replaced every 2 years due to wear and tear or susceptibility to damage ends up being the same cost as a more durable \$50,000 unit that can last 10+ years. For shelter post-disaster, it is important that the new shelter can withstand a variety of natural disasters and be durable enough to be deployed for the expected time frame. Many shelters are built for high wind speeds, have built-in elevated foundations for flood areas, have mold resistant or fire-retardant materials, and are insulated for freezing cold and hot climates. Many of the shelters can also be customized to address many resiliency factors—such as changing out thicker foam wall boards for more insulation or adding an elevated or floating foundation system for placing on wet or uneven surfaces.
- Serviceability—How easily can the shelter be turned over to new tenants? Is it easy to clean inside? Some shelters can be fully cleaned for quick and low-cost tenant turnover, with waterproof, graffiti-proof, antimicrobial interior walls and built-in floor drains for hosing down the interiors. What capacity does the shelter provider have in servicing broken parts, guiding the proper set-up or maintenance of the unit? Does the unit have off-grid capability (septic system on-board, etc.)?
- Sustainability—Using more sustainable and green building materials can be the more cost-effective choice (such as using recycled materials, retrofitted shipping containers, or rapidly renewable materials such as bamboo). Beyond quantitative factors, there are qualitative

benefits from using sustainable materials, including increased health and satisfaction of the occupant and reduced impact on the environment. There are a number of rapid shelters built to green codes such as those defined by the U.S. Green Building Council Leadership in Energy and Environmental Design (USGBC LEED), CalGreen, or Energy Star.

Speed

The term “rapid” is relative to the situation and is distinct for each use case. The speed of shelter deployment determines if the rapid shelter can be used in the timeframe needed and which sites are available. To understand speed and more precisely define “rapid,” we use three scales of measurement—minutes, hours, and days—along the three distinct stages of deployment—the building process, the delivery process, and the setup process.

Scales of Measurement

How fast is “rapid”? While a 90-day building time is fast compared to traditional building construction, it is not fast enough for shelters needed at a moment’s notice the day after a natural disaster. The nuanced differences between minutes, hours, and days depends on the situation. In the building process, some shelters can be built on-site in hours using locally available materials. In the delivery stage, some shelters are held in warehouses on a tarmac, ready to be deployed within minutes on the next flight. In the setup process, some shelters take several days of skilled labor to assemble on-site (Sprung Structures), some take four to five people over a few hours (Better Shelter), and some tents and hard-shell structures can be popped up or unfolded in a minute by one person (such as the Shelter Pod or the AMC Box).

Stages of Speed

While all three stages’ cumulative result is important, speed can be further prioritized within each stage of deployment: the building process, the delivery process, and the setup process. Some structures take months to build; however, they can be deployed and hooked up to a new site in days, whereas others are quick to manufacture and deploy but can take additional labor and time to set up on-site. For example, the floating 18-bedroom Urban Rigger requires 1 month just to cast

Highlight in Speed:

Pallet Shelters –

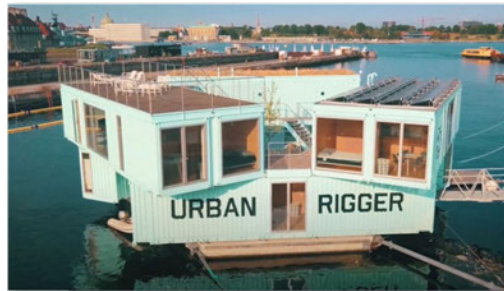
Four people can assemble the unit in minutes.



Photo credit: Pallet Shelters

Urban Rigger –

Although it has a relatively long production time, it can provide waterborne shelter in days.



Source: Urban Rigger

and cure the floating concrete foundation (in addition to building the superstructure on top), but once fully built and assembled, the delivery and setup time is fast: a three-story, 18-unit Urban Rigger can be tugged up and docked to a new portside location within days.

- Building Time = Design Time + Back Log or Supply Wait Time + Production Time. While the building time of the deployment timeline can be skipped if there is a substantial inventory on hand, that is often not the case for many manufacturers building units on demand. The building time should account for not just the actual building time but any current backlog on the production line and delays in supplies of necessary materials.
- Delivery Time = Cheapest Option vs. Fastest Option Available
- Set-Up Time = Site Prep Needed + On-site Assembly + Hook Up

Portability Factors

Portability is one of the key advantages of most rapid shelter solutions over traditional site-built construction. Portability enables expedited deployment and relocation of shelter units. A shelter unit's portability can be assessed by its deployment range and its relocation cost.

Deployment Range

Deployment range is measured by two primary dimensions—the number of ways it can be delivered and the number of sites on which it can be set up (the range of sites is covered in more detail in the next section). To illustrate delivery range, most flat pack and foldable structures have a wide range of ways they can be delivered, including being airlifted and flown long distances, whereas volumetric modular and/or floating structures can be prohibitively expensive for long-distance delivery and are limited to sites accessed by trailers. Further, the most portable structures on paved surfaces (such as RVs or recreational vehicles) may not be able to access a more remote location, which is where foldable or flat-pack-delivered structures requiring little or simple on-site tooling can come in handy for last-mile delivery.

Most shelters are somewhere in between, with a range of volumetric modular designs requiring minimal on-site labor that can be dropped off from the back of a trailer bed and are fully functional off-grid or can easily hook up to utilities.

Relocation Costs

Suppose the intention for the shelter is to be moved several times over its useful life or within a specific time frame. In that case, it is important that the cost of disassembling, transporting, and then re-assembling the shelter (cumulatively known as a unit's "relocation costs") is minimal. It is important to know what type of on-site machinery (cranes), labor (crane operators, welders, a large low-skill labor force, etc.), and infrastructure (electrical or plumbing connections) is needed for deployment and redeployment.

The lower the relocation costs, the less investment is needed for shelter deployment on any given site, opening up many more possible sites for interim use. For example, any city park, open field, or parking lot, regardless of the short- or long-term plans of the site, could theoretically act as an interim shelter site for a few days or weeks if the need were great enough.

To fairly compare relocation costs between various shelters, the “relocation surcharge” can be calculated by representing what percentage the relocation costs are to the unit’s overall budget—the higher the relocation costs, the higher the relocation surcharge percentage. Similarly, the inverse of the relocation surcharge is the “relocation multiple”—how many times can the shelter be relocated before the cumulative relocation costs amount to the cost of a new shelter unit. Some shelters can be moved relatively cheaply and therefore can be relocated hundreds of times before the cumulative relocation costs surpass the cost of a new unit, whereas others may only get one move before being prohibitively expensive. For example, a \$90,000 unit with \$30,000 relocation costs has a relocation surcharge of 30 percent and a relocation multiple of three; In other words, it can be moved to three locations before it is more cost-effective to buy an additional unit for the intended use.

Low relocation costs can be less of a priority if the shelter is intended to replace a permanent home. Given the often-duplicative costs of shelter and housing costs (for example, FEMA paying for rapid shelter after a disaster and then the U.S. Department of Housing and Urban Development (HUD) paying for a more permanent housing solution), there is a growing desire among government officials for solutions that can serve two purposes: rapidly deployable housing units that meet permanent building codes with a design that can adapt to a resident’s needs over time. In designing and marketing shelters, shelter providers should advertise the unit’s intended occupancy duration (1 month, 1 year, or several years).

Highlight in Portability:

AMC Box’s Model –

Light-enough to carry piecemeal; unfolds by hand in a minute.



Source: AMC Box

NRB Modular Solutions –

Stackable to three stories on a modular foundation with low site impact and dissembled in days.



Source: NRB Modular Solutions

Site Factors

To determine if a shelter fits a particular site, it is important to assess sites for two primary factors: (1) size, including available buildable dimensions and desired on-site occupancy; and (2) accessibility, in terms of overall site attributes, flexibility of delivery methods, and scheduled availability.

Size

- **Dimensions**—If a site is too narrow, some shelters simply cannot fit, but there are a number of stackable or small footprint shelter solutions that can make the most of narrower sites. One-story shelters have been built underneath freeway overpasses. In contrast, multi-story shelters of various widths and depths can make the most of an area with limited available open space in high-density cities.
- **Density**—While there are many multi-story rapid shelter options (such as NRB Modular Solutions' portable three-story, 50-unit design), many of the one-story options provide relatively good site density for accelerated timelines. For example, Sprung Structures can shelter 150–300 people in an 8,000-square-foot congregate shelter. The 64-square-foot Pallet Shelter can allow for dense clustering of non-congregate private spaces with a fast, simple, low-cost construction method. A variety of sleeping pods and temporary wall divider systems can provide a higher level of privacy and personal storage options in congregate shelter settings.

Accessibility

- **Site Attributes**—If dependent on utility connections, the distance and accessibility of available connections nearby are critical. When finding sites, almost any type of site can work if matched with the right type of shelter, as there are shelters that can self-level for sloped surfaces, elevate several feet over boggy land, or float in water. If a more stable, secure foundation is needed, there are high-strength, low-site-impact solutions with which most shelters can be paired. One example is the modular foundation systems by Triodetic Multipoint Structures, which is used throughout Canada for multistory permanent supportive housing developments on interim urban infill sites.
- **Delivery Methods**—It is important to consider the distance between the site of shelter deployment and the vendor's factory. Volumetric modular shelters are limited to slower and less flexible shipment options and are more expensive per unit than flat-packed shelter units, which can be more easily delivered by plane, boat, truck, or even in the back of a car, if needed.
- **Scheduled Availability**—If a site is only available for a limited time (a week, a month, or 1 or 2 years), the shelter's set-up and disassembly costs should be proportional to the expected time period of site availability—with the most portable options (outlined in the preceding section) selected for the sites with the shortest windows of availability. Also, as previously noted, shelters and their associated foundation systems can have minimal site impact, which can greatly increase property owners' willingness to provide a site for temporary use.

Top Three Lessons Learned

“Size matters, but good design matters more.”

There is an over-emphasis on a rapid shelter's square footage. While it is important to consider if a shelter meets the minimum 70 square feet in local building code or 120 square feet bedroom size guidance for HUD (HUD, 2020), a small space can feel spacious if designed well. A variety of design features can make the most of a small space, such as high or vaulted ceilings, appropriately proportioned room dimensions (square, rather than long and narrow), built-in folding furniture, tuck-under storage, multi-use wet room bathroom/shower designs, and natural light from skylights and floor-to-ceiling windows. The dignity of a space comes from not just the metrics on paper, but how it makes one feel inside.

“You get what you pay for.”

Comparing each unit's overall reconciled costs at the outset is crucial in ensuring that you get the biggest bang for your buck. While paying for a higher level of design (bigger windows, full bathrooms, durable materials), a higher level of simplicity (in assembly, portability, and operations), or a higher level of sustainability (more green, durable materials) may come at a higher price upfront, savings over the expected service life of the shelter can make the investment worthwhile.

“There is no silver bullet.”

Housing, including rapid shelter, is so specific to the particular site, the residents served, and the situation that there is not one “best” option that serves everyone everywhere equally—it all depends on what your definition of “best” is. Almost every shelter solution excels in at least one factor, whether it is the cheapest, most durable, most sustainable, most portable, or has the most experienced team in design, manufacturing, or deployment. More broadly, it helps to think of these shelters as tools in a toolkit where a site can benefit from an assortment of shelter options, using a blended approach for effective shelter deployment.

Conclusion

The Rapid Shelter Showcase highlights the most diverse selection of rapid shelter typologies in the world; however, we are only at the beginning of this rapid shelter exploration process. As the demand for rapid shelter grows, the work of improving shelter options continues. Every shelter delivers a unique attribute or perspective that contributes meaningfully to our collective knowledge. Therefore, we must continue to learn from each other and build on our achievements for future iterations.

Beyond the shelter design and manufacturing community, the decisionmakers tasked with responding to shelter-related crises need to be informed of the wide variety of solutions available and the nuances involved when considering which rapid shelter is best in each situation. Too often, we see how unawareness of the diverse range of solutions available has resulted in inadequate response—or worse, inaction—leaving far too many of our fellow neighbors unsheltered and vulnerable in times of crisis.

The need for rapid shelter will only become greater as natural disasters, geopolitical conflict, and social and economic trends continue to displace millions of people in our communities. Now is the time for a fresh look at rapid shelter. The Rapid Shelter Innovation Showcase starts us on this path forward by providing the much-needed platform for everyone to come together to share best practices, improve shelter response, and accelerate the rapid shelter sector forward into a new age.

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Further Reading

This article is based on rapid shelter solutions that have been submitted by innovators to the Housing Innovation Collaborative’s Rapid Shelter Innovation Showcase (found at housinginnovation.co/rapidshelter/). At the bottom of the Showcase webpage, further reading and relevant resources are categorized by funding sources, legislation, design guidelines, operation guidance, and prior government requests for ideas (RFIs) for rapid shelter proposals. Additional details about how various cities have deployed and/or developed rapid shelter projects are summarized in HICo’s “Project Spotlight” webpage (found at housinginnovation.co/deals/).