Hello welcome. We’re going to give everyone a few minutes to join us here today to talk about resilient retrofits in our existing buildings and physical climate risk. My name is Clay Haynes, I am the founder of public square and adaptive reuse real estate development company based in Nashville, TN. It's my honor to be your moderator today.

So why are we here? The built environment that we see today will represent 2/3 of the building stock in 2040. Extreme weather events are becoming increasingly common and most buildings are not prepared for the risks that they face here in Nashville. We've had multiple flood events, tornadoes, and each summer we deal with rising extreme heat. A number of challenges exist for retrofitting buildings for climate change, including design complexity cost. Policy and social equity.

A resilient retrofits report was published earlier this month to help us begin to address the necessary climate upgrades for existing buildings. This in-depth 55 page report draws upon work of the UI resilient land use cohort and technical assistance panels in New York, Nashville, and Houston. It communicates the design, financing and policy strategies that we can use to prepare buildings for the physical climate risks we face.

So thanks for joining us. I'm honored to introduce our All Star panel. Starting with Danielle Horton, founder and CEO of Verdina Partners,
she is an architect, LEED Fellow and has two decades of experience in corporate sustainability.

Next is Ibi Amonti. He's a structural engineer and leads the risk and resilience team which has offices in more than 30 countries around the world and then finally Mary Witucki is a regional outreach and program lead for FEMA where she facilitates mitigation and community engagement planning.

A few housekeeping items before we get started, we've allotted about 1/2 hour for the panelists presentations and then the remainder of the program for panel discussion. If you have any questions for the panelists, please use the chat Q&A function to send those our way. We'd love to have those. Also, a link to this report, as well as a recording of today's presentation will be emailed to everyone who's registered for today's event.

Thank you, Danielle.

Thank you so much, glaze, an honor to be here today. So I think as we saw from some of the placemarks you know climate risks and extreme weather events are here. You know this is not a future thing, this is something that's affecting us right now. You know a lot of this information about climate risks are going to become more and more transparent and it's going to continue.

You know it's going to. It's already having an increasing pact on building values. It's going to become a competitive advantage, and so it's really important that as we understand those risks that we take.

Steps right to mitigate those risks and retrofit our our properties to be more resilient so at the same time that we need to focus on, you know, climate change mitigation in terms of like working on efforts to reduce emissions that cause climate change, we need to take action to manage the risks of climate, the climate changing paths from an adaptation perspective. You know, climate risks are investment risks and it's really important that we take steps to
to address them. We can go to the next slide.

When you think about a resiliency program road map, we Verdani Partners implement residency programs for large real estate portfolios where working on like over 5000 properties nationally and internationally. And when you think about the steps that have to happen before you actually start implementing those resiliency strategies, typically on year one, you're looking at your goals strategies, who is responsible and budgeting to actually perform those risk assessments. Then year two. You typically will perform. Those settlements you understand risks and then you identify a high risk properties. Those are the ones where you might do a deeper level of assessment on site where you're going to like really identify those risks, and then you budget like evaluate those things and then you are going to budget to be able to invest in those certification strategies, right? So when you look at like by the you know to even get to the retrofit process like in my take like three or four years so not that this can't happen faster, but typically this is what we're seeing in the real estate sector. And so after that you know like to actually implement those strategies and then do public private partnerships. Because it's not just about protecting your property, you have to look at the entire region protecting the entire region next. So when you think about some of the key categories for, you know addressing resiliency risks you know according to grasp and the task force for climate related filing financial disclosures. CFD, there's some of the key categories include physical social transition risk. So physical risk when you're looking at reducing disruptions to building operations right from other events. But then you have to think about not only protecting property, but protecting people. So the social risks you know, like
we have to think about protecting buildings.

An occupant health and then transition risks. So when you think about like our efforts to decarbonize right to food, transition away from fossil fuels. If your buildings are heavily reliant on natural gas, that's a transition risks. So it's really important to understand the physical, social and transition risks

next.

And so when we think about a strategic approach to implementing every single program, when you're thinking about assessing risk and vulnerability, you have to do that at the entire lifecycle, including your existing assets. You know from new acquisitions, new developments and lower Asian nation. So the equity and the debt side you know budgeting should perform those assessments.

Making a plan so like we implement resiliency plans that has goals and targets. And what are these different mitigation strategies for different types of risks, right?

Incorporating those that process into the annual budgets, updating your emergency level plans, checking that you have proper insurance coverage,

and then you know implementing those strategies, educating stakeholders and emergency preparedness, reporting on your progress is going to be more and more requirements for transparency. Once you understand those risks that you also like disclosed them, and then you know once you implement those, hopefully negotiating lower insurance rates, it can go next.

So when you're looking at that the planning side, you know you'll have to look at, you know, protecting building sites, structure systems, operations, and people like flood proofing your building and enhancing structural elements. I mean, when is actually when we we calculate like OK, where are the most climate risks coming from and when is actually where we get the most damages. When you think about you, know your backup systems like before, you're thinking about 24
but now you have to be thinking about two weeks, right? If there's a major event that like. Would be great, goes down and then obviously like enhancing operational friends, emergency planning and locating your vulnerable populations to make sure that they are also protected. You can go to the next.

So there's a lot of like top resiliency level solutions, right? These are some of the things that you would when you're looking at doing a resiliency retrofit that you would do to kind of implement those strategies so from likewise you mentioned flood proofing your building, like where do you have temporary flood barriers? Or like by elevating your equipment to high ground, enhancing your structural elements because the events are getting more stronger, like integrating. Hazard resilient landscape design. So there's a lot of different strategies you can go to the next one.

So when you think about public private partnerships, right? Because if you even if you protect your building or elevated mechanical systems, if the entire region gets flooded, you're still. That's still gonna be a problem. So I think we need to see a lot more cities that are in coastal areas doing these initiatives, but it's great to see places like New York with the Dryline project or Boston that has Boston ready program Hoboken. You can see, like you know on the map like before and after they implement some of the original.

Kind of some of the regional strategies to protect the whole region, so it's really important that you do, and you're going to have to work together. Private and public sector. You can go to the next one, so this is just an example, right even after you do implement those strategies like elevating your mechanical systems and protecting, you know at the property level you also need to work on public private partnerships to protect the entire region as well.
You can go to the next one.

So just an example of like seeing this in action as a case study. So for one of our clients we have. You know we have done their risk assessments and we identify that some of their properties, for example in Houston, were, you know, a high risk for flood. So we did install like flood barriers we had dewatering pumps on site. So when Hurricane Harvey hit, the region suffered $125 billion in damages and because we had staked we had taken steps to be prepared.

To implement those risks, we had zero insurance claims, so I think you know it makes a lot of sense.

Can you imagine how much money right to deal with the hassles of like dealing with mold and all the issues that come with like flood or these risks? So it's really important to take steps and you should be able to negotiate lower insurance claims when you save. My building is high resilience and it's ready. You can go to the next one.

So another sample. This is like one of our one of our clients buildings in Boston. As you can see they had their surrounded by water and three sides, so they're high risk for flooding, so they obviously identify that was a risk. One of the things that they did that as a mitigation strategy for flood was they installed as like aquafest a flood wall, and these systems can be quickly deployed so they train the building staff to be able like they can deploy the rapid deployment.

They can deploy this and like. Within 8 hours of a pending flooding event so they trained the entire staff to do that and it blocks not only water but the breeze, so they're very effective, so like you do a emergency training and these can go up to 9 feet. Or in our case we just needed a four feet one, but you can see there's there's solutions that can be easily deployed and we can go to the next slide.

So you know these are solutions for the commercial sector, but when you think about like you know, you're ohh our own homes as well. There are systems like 45 homes, 45 rooms. Is that nationally recognized residency building methods?
So they basically you know it's a different strategies or certifications to ensure like for home safety. So like they basically have there's different things that you can do to kind of fortify and reinforce their home against wind damage and tornadoes. And so like, they're. Their standards range from zero to 3% of a hard cost, and retrofit generally costs 18 to $0.24 per square foot. So for example, like in Mississippi cost like 3 square feet home to to build to 45 gold and they and also like The thing is they they see an increase in resale value and in and they can actually qualify for lower insurance rates. So hopefully we'll see those. Kinds of things happen on the commercial sector as well, where if you implement those strategies, you should see value and lower insurance premiums as well. You can go to the next slide. So like to wrap up, I think I sing as we saw from those case studies and those examples you know for every dollar invested in climate resiliency infrastructure, $6 or saved. This is for the. And also the estimated cost of meeting the toughest 1.5 degrees climate target is about point $5 trillion over the next 30 years. But it will save the world $30 trillion in damages. So like it makes a lot of sense that we understand those risks and we take steps to address them because the cost of inaction is going to be a lot higher. So it's really important that we actually take action investing strategies to, you know, to prepare and be resilient. Against those climate risks, I thank you now. I'll pass it on to Evie. Thank you Danielle so much and that's a great segue to what I'm gonna be talking about in the next 10 minutes. Just really, the the focus will be on the business case for resilience and that cost benefit that Danielle just mentioned. So when organizations approach us, they're typically asking a number of questions. Here's a select few
that we get. Which hazards should I be concerned with and how do we measure their impacts on my assets, people and business? Which physical and operational innovation should my organization and prioritize, and how do I make a business case?

We're investing in resilience. So we typically go through a road map to resilience with these organizations, not dissimilar to what Danielle just described. We start with evaluation of the baseline risk and this could be a qualitative assessment for screening purposes all the way to deep dives and detailed modeling, which I'll describe in a few slides from that. Those insights we can develop resilience strategies. These might be physical interventions or operational measures, and really looking at a holistic approach to resilience, including.

Organizational resilience actions. The next step on the road map is to develop priorities and areas for investments and this is where the benefit costs analysis comes in that I'll describe in detail in the remaining slides and finally we can help with implementation, which includes retrofit design, resilience based design for new buildings as well as development of real estate frameworks that guide decision making.

So what is risk? I'm just going to drill down a bit more here, so risk is really the likelihood or probability of something bad happening and they can be described in terms of things like downtime and loss revenues.

It could be described in terms of damage and repair costs to health and Wellness and well being as well. There are the way to calculate risk is looking at these three different components. An integration of hazard exposure and vulnerability where the hazard is how likely is the hazard event to occur. Could be a hurricane for example. And what is the intensity? So the intensity for a hurricane would be measured in terms of wind speed, or it could be measured in terms of precipitation as well that
causes flooding. Exposure is what are the quantities, locations and values of exposed.

Assets and people and then finally vulnerability is how damageable are those exposed assets and how vulnerable are the people.

And so integrating all those together gets you to risk.

And I should say that in some cases some of the climate vendors and data providers that are in the market right now are really only looking at hazard and maybe exposure, but not really blending in the vulnerability piece and the vulnerability piece is key if you want to understand how to retrofit these buildings to reduce their risks.

So I'm gonna kind of share with you a way that we look at risk assessment. There's different levels as I mentioned before, all the way from high level screening assessment on the left side, which is what we're calling a class one risk assessment. This is something that Arabs developed to help our clients understand what they're getting from the different levels of risk assessment all the way to class 3/4 on the right side, which is fairly sophisticated simulations, probabilistic simulations that are virtually simulating how a natural hazard event may impact not only a building but the components within or outside of a building and the the class three and four risk assessment are really key in understanding and providing insights on what are the specific components that might need to be mitigated in a retrofit. So when we get into which buildings do you need to retrofit and how it's really getting into the detailed modeling that unlocks a lot of those insights.

Next slide. OK, so I'm going to describe how we use the insights from a A class three and four risk model in a cost benefit analysis to help answer that business case. And this is really the monetary part of a business case. It doesn't bring in things like marketability or reputation or anything like that, but this is really the dollars and cents part of it. Next slide. OK, so I'm
going to walk through a framework, so for let's say 
you have an existing building and you've decided that you 
want to understand if there's a business case to make 
a retrofit.

For that particular building, so you're collecting data on the 
hazard, the exposure, and the current vulnerability of that 
building,
you're building a risk model. You're running some 
calculations. Next 
slide, and these probabilistic simulations provide insight into 
what are 

the specific vulnerabilities in a particular building and the 
deficiencies,
and then what are the probabilistic losses. So, for example,
what is the likelihood and duration of downtime in this 
building? What is the damage looking like in this building
for this particular?
Existing case next slide.

So that's going to inform your retrofit designs so we 
can understand from this type of analysis that it's the 
facade system that's getting damaged by the wind or it's 
components on the roof that are getting damaged by wind
or for flooding. Maybe it's the equipment and the external
yards that are getting damaged so we can use that

to inform various levels of retrofit next slide.

And so you might actually have different options that you're 
investigating for those retrofits, something like a light touch,
an
a building, because it's not just you might not be 
just retrofitting a building to address the the risk from 
physical hazards. It might be there's deferred maintenance 
that's building
up over time, so we're looking at a number of

different options. All of those have different levels of scope,
including increasing amount of investment for each one of 
those,

and schedule implications as well.

Next, slide, so each of those retrofit options actually change 
the vulnerability I've mentioned before, the vulnerability is key
here. It actually improves the vulnerability or decreases the 
vulnerability
because we're making retrofits to address the concerns that
we had identified. So now you're bringing that information into the risk model again. Now you've got a risk model for the retrofitted building for each of those options, and you're running through the calculations again, and now you have a new probabilistic risk assessment, so this should show decrease.

About time, for example, or decreased losses for each of those options. Next slide. And so when we reassess those risks, like I said, we get the reduced risk the retrofit designs themselves also provide an asset life extension. Again, the different options might give you different life extensions, so a full renewal would extend the building life much longer than maybe a single targeted retrofit, and each of those also have different impacts as far as phasing and scheduling. So now we have both the retrofit impacts for each one of those options we have the retrofit scope, the dollars and cents, and the scheduling, and we can put that into a cost benefit engine, which is the next slide. And that cost benefit analysis Engine lets us run probabilistic calculations that provide us benefit cost ratios and payback periods for each of those options and gives us the residual risk. So each of those retrofit options result in a lower risk than the current building has, and then weighing all that information. We can use that to develop a prioritization strategy for each building. Among the options and then across the portfolio, you can be running this across multiple buildings at once, and typically we would start to invest in the ones that come out with the highest benefit cost ratios and lowest payback periods. Next slide. And so we've developed something called a retrofit or resilience payback calculator that does these calculations and kind of demonstrates what these payback periods look like. And when we turn the knobs on, the different factors that go into it
kind of gives organizations an understanding of what.
You know what they can tweak to help understand the
benefit cost.
And if I have time, I'll show you the live
demo. If not, I can do it. Maybe during the
Q&A and then finally this is my last slide we've
developed using the information from cost benefit analysis
and other
risk metrics, we've developed decision making guidelines for
real estate,
so this is an example from the University of British
Columbia in Vancouver where we've developed a real estate
framework
that guides their decision making on new buildings and
triggers
for building.
Retrofit, which is informed by those cost benefit factors and
other risk metrics. And then we've also developed resilience
based
design guidelines for new construction and retrofits and
renewals that
engineers, designers and the owner can implement to
achieve the
criteria and the levels of resilience that they're looking for
in their buildings.
OK so I'm I think I can do the.
The live demo real quick let me share screen.
I'll do this really quickly and hopefully everyone can see
my screen.
And so I'm just going to go through this really
quickly. So basically this is this is an example for
a building that has earthquake hazard, but we can swap
in any type of hazard that we're interested in, so
the hazard changes across different locations. What you're
seeing here
on the right is the resilience payback calculation. So this
is the number of years that the asset is in
service on the bottom. This is the investment in dollars,
so the.
The the Gray line right here is a standard or
existing building and then the pink line is representative of
the building that's been retrofitted, so the difference here in
year one, this investment of $4 million is how much
you're investing in the retrofit. OK, and then the the
basically the curve of the line is showing the annualized
losses over time, and so for the existing building that
is more vulnerable.
Over time it is.
It is basically getting more and more losses and the
reason it's bent over and not just adding like an
linear line is that there's basically a net present
value of the dollar. So a dollar you know in
the future is not worth as much as a dollar
today.
And the way the reason the pink line is more
shallow is because it is avoiding the losses that the
standard building is seeing. And when those two lines cross,
that is the payback. So in this case it's six
years for that investment of $4 million, and the benefit
cost ratio is this value divided by this value at
the end of the asset life. And so the way
these things change over time is I can change things
like what's the cost of downtime. So for my building.
If it's really significant, than you know might have a
lab building or something like that. Then the payback.
Actually
goes down to three years. And then here's the asset
life. So as I go to higher asset life, so
if that retrofit really extends the asset life, you can
see the benefit cost ratio goes up quite a bit.
Here's the resilience premium. This is the retrofit cost, so
if I spend, let's say, too much of my retrofit,
and my asset life is only extended by.
You know a certain amount and my discount rate. This
is a financial measure is.
High.
So I can get whoops, I can get.
More money from investing in something else than the
payback.
Goes down, and at some point you might not even
have a a positive benefit cost ratio. So this is
just showing all the knobs you can turn and kind
of shows what goes into these types of assessments. So
I'll stop sharing my screen and I'm gonna hand it
off to Mary.
Hi thank you Abby. My name is Mary Witucki and
I'm the community education and outreach program lead for
FEMA Region 9 mitigation Division I helped create Fema's natural
Hazard retrofit program toolkit, which is a guide for local
jurisdictions on designing disaster resilient building retrofit programs in order
to develop the toolkit, we spoke with practitioners from across
the United States to.
Glean best practices and strategies that they have used to
design and implement retrofit programs. Today, we'll cover common challenges
and look at some of the strategies that communities have
used to overcome those challenges and develop successful programs and
policies. Next, slide.
Some of the main challenges we heard about had to
do with funding, especially how to manage funds for programs
versus single projects and how to do this with limited staff and capacity. Another was understanding community perspectives, understanding what the community members had the capacity to take on, and what they were interested in doing to mitigate their risk.
Designing a program simply figuring out where to start and
what aspects to consider.
Communities also struggled with building and maintaining necessary partnerships with the various stakeholders that are so important to making programs and policies sustainable.
And we heard about the challenge of communicating and gaining support, not only politically, but also from community members and the private sector partners. Next slide.
Managing funds was one of the most common challenges we heard about from communities and the main piece of advice we heard was that it gets easier with experience. Experienced practitioners said that those just starting out should reach out to those who have done programs for advice and suggestions.
Talk to other communities and find out how they found
and managed funding. Communities need to consider the cost and time required to complete projects. What the funding source requirements are, including environmental reviews or benefit cost analysis, and how much the team can successfully manage. Jurisdictions should build relationships with funding source contacts and communicate often. That way they can keep informed and get support when needed. Next slide.

Experienced practitioners stress the importance of considering the context in which a program or policy is being implemented and using that information to inform policy decisions. Program and policymakers should identify potential barriers communities may face as they seek to participate in the program, and what constraints have inhibited community retrofitting in the past. To help identify potential barriers, policymakers can ask themselves what do people have the capacity to participate? Will they need assistance? Are they motivated? What is their degree of desire for something like this, and do they have the means? Is this something they can afford? Do they have the time and on the other side, the East framework applies for principles of behavior that can encourage action easy, attractive? Social timely people have a preference for tasks that are easy to achieve. There should be some benefit or something that makes the behavior attractive. Showing the behavior of others influences people to act in a similar way, and the timing of information can be critical to responsiveness. It's important to understand the variety of factors and how they overlap and intersect to affect an individual's position, access and resources. Next slide. Not knowing where to start was a challenge that several
communities we interviewed had to overcome. Their advice was to reach out to other communities that had completed retrofit programs and talked to those who have been there. Programs with streamlined focus and singular goals tend to be more successful. A single goal alleviates complications for both program administrators and participants. Often programs that want to meet multiple goals. Require longer timelines or more resources. Multiple goals should be kept streamlined and simple. It's important to remember that the design of retrofit programs and policies have real implications for marginalized groups and communities. Programs centered on ensuring equity will help avoid unintentionally creating additional barriers that exclude or marginalized those who already have fewer resources and assistance available to them. Next slide. Retrofit programs are often administered by small teams in low capacity departments. They survive by building strong partnerships with other city departments, community organizations, and private sector businesses. A successful retrofit program depends on having a local pool of construction businesses and material suppliers in the private sector to perform retrofits. Even the best designed programs will fail if the private sector. Does not have an incentive to perform retrofit projects. It's crucial to establish how contractors and inspectors will be eligible to participate in the program and to communicate the benefits of participation. Some program implementation teams consist of only a few staff. A small team may partner with a mapping expert in the planning department to identify vulnerable properties or a building inspector in the permitting department to verify construction standards. Retrofit
programs are truly a team effort, and the more diversified
the personnel available to contribute, the more successful the program
will be. Next slide.
Practitioners found that successful community engagement was critical to the success and sustainability of their programs. Starting small allows programs to go through a round of pilot projects that will inevitably highlight barriers or program components that need adjustment. It can also give communities time to get used to the program and administrators time to adjust to growing pains. Administrators need to work to gain trust in their communities. Particularly as they start a new program using trusted sources can help, such as the City Council and community organizations like Rotary Club. Many communities with successful retrofit programs receive public interest in their program with minimal advertising, sometimes relying only on word of mouth to recruit participants.
High quality customer service helps bring building owners, general contractors and the public through the program. The most successful programs are those that have created user-friendly avenues for accessing program information and staff.
Next slide.
As some keys to successful policies and programs start with humanizing the process and meeting people where they are building relationships and understanding with people from where they're at. Secondly, programs that set clear expectations not only for themselves and their staff, but also for the program, the contractors and the participants are more successful. And developing partnerships, such as with contractors and community organizations and working with other departments or agencies to gain
and support, leads to more sustainable programs. Clear, consistent communication helps build trust among program participants and gain support from decision makers. Thank you everyone for your attention and I'll hand it back over to Clay.

Very wonderful, thank you so much. I wanna I really like to take a moment to thank Debbie Mary in Danielle. I will let all of our participants know around the country here and actually a few international that you can use the chat function if there are any specific questions that you would like to ask and I'll just start it off here. IBL is really interested in the model that you created in so I'm going to give this one. To you, you know first the the the kind of virtuous cycle that it seems like you've created there. I'm curious to know if there are any kind of top line results that you could share in that baseline and enhance retrofit that you've seen within that model that you could share. So let's say a building owner can't afford to go through, or just doesn't have the capacity to go through an entire building model like. That here.

Your perspective on that and any of our other panels as well. Yeah, I mean I think it's a good good question clay. And and there's some things like the cost benefit workflow and assessment is not necessarily the right approach for every single case. In some cases it's kind of a no brainer. You know that there's some targeted retrofits, for example, moving equipment up because you know you're in a high floodplain that just makes sense. They're cheap, you just do it. You don't need to go through this whole modeling process, but there's some retrofits that get quite expensive.

Right, you're talking about hundreds of thousands or millions of
dollars where it's not obvious, and in those cases the cost benefit calculator really helps us understand if it makes sense or not. And especially when an owner's weighing a whole different host of options for a particular building, or if they've got a big portfolio and they only have the funds obviously to invest in a handful of buildings, then this really does help that in terms of top line results.

I've seen the payback calculator show really high payback for some of the things I just mentioned. For high hazard areas that are gonna cause a lot of damage and downtime, and you've got low investment in targeted retrofits, it's kind of obvious, right? You'll get the high benefit costs on the very other end for seismic retrofits, which we do a lot of when you're looking at those a lot of times it doesn't pay off. Unfortunately, as what we're finding, unless you're in a very very hazardous zone. And your risk of collapse is really high, so I've seen other other ends where the financial perspective, at least when you're looking at from a purely financial and monetary perspective. The benefit cost analysis doesn't always make the case, and that's why I mentioned in my presentation that this is just looking at the monetary case. There's a number of other factors that you have to take into account when you're making a resilient retrofit, which includes things like marketability, reputation, other clients that we have to look at other planning factors.

Not typically making a decision on retrofit just because of climate change risk for example. Can I just add something? I think at this important point too, in terms of the cost, because when we're looking at doing a portfolio, I assessment for resiliency risks. I mean there are certain assets when we get the cost of, like you know, because it's going to cost millions of dollars to retrofit where some of those assets might be like slated for this position where it might be too risky assets. But it's also on the other side. It's really important to incorporate those risk assessments during
Because, right, you might also not want to acquire an asset. That's a very high risk, and that's why it's really important to like. Even like it's gonna as more information becomes more transparent, it might be even harder to sell high risk building if they haven't gone through the process of doing those kind of retrofits.

It's really helpful. I'd like to kind of keep that thought going, and you know, one of the things that stood out to me in the presentation is just the multitude of risks that you know exist and you know I'd like to hear you know, maybe Mary if you want to start this off and but from all of our panelists about how, how, if there are strategies that building owners can use and adaptive reuse developers. Been used to address multiple risks right simultaneously and whether that's wind and fire and seismic, and it's a really challenging thing to do, but it seems like you know right now. Most parts of our country and our world are facing multiple threats and so would love to kind of talk about that. Those not just in isolation, but. Yeah, and just as you said it, it is kind of difficult. There are definitely some retrofitting methods that can be used together and put together. The kind of what we were just talking about that then goes into the cost. It's like.

You know the the challenge is finding an affordable solution to be able to cover the multiple hazards because there are very few buildings that exist within a location that literally is only affected by one hazard, so it is something that communities look at, and for example there's a community up in Washington state who. As they do their flood retrofits, they take into account their seismic risk as well, and if they're doing a more structural retrofitting process than they also take that time to do the seismic retrofit as well, because the safer you can make. Building our home the better.
Hey can I add something on that so when we do like for for a large portfolio when we do our initial like desktop risk assessments, at least for Donnie, we do we look at 50 different types of risks including regional level risks and building level risks because we need to understand not only those kind of regional risk like like fire, heat, stress, flood, right sea level rise, but also building level risks and storms. Some of those buildings may already have taken some steps to protect their assets.

So we look at that multitude of risks to then identify the buildings that need to take an extra step to actually implement. You know, go through a residency retrofit, but it's really important to look at all of these, and there's a lot of like open source tools available for free as well. From FEMA, there's a lot of a lot of tools that at least you can start to have a better understanding of some of these types of risks.

And I'll just add Clay as well that and we'll give you an example. We're looking at a building a couple of buildings right now in Tennessee that are subject to lots of different houses, including tornado and seismic. So a question is well, should we just mitigate for seismic alone? Should we just mitigate for tornado alone? The nice thing is that actually the retrofit some of them overlap, so we'll get a benefit from trying to address with the same retrofit. Both of those things. So I showed the cost benefit calculator.

You could do that for one hazard, but obviously if the same retrofit addresses multiple hazards and you're reducing the risk for multiple hazards, then the benefit costs just goes up. So the more hazards you can address with the same retrofit, the better. The other piece of this that I didn't really get into is, and I think someone in the chat asked this is around retrofits for other purposes like decarbonization and energy efficiency, so that could definitely be part of the process as well to identify which buildings are at.
Risk you know for carbon risk, for example, and investment in those to get more out of the life cycle in in those types of buildings would increase your benefit costs as well. It's all really helpful. I'd like to kind of take this and bring it to, you know, maybe a specific building level and I'm thinking about kind of uptake of resilient retrofits within different asset classes, and so just love to hear our any of our panelists kind of expand upon some of the points that have already been made about the value proposition specifically. And if you're seeing a specific I said type that is responding more favorably to. 2 presenting retrofits. So maybe, maybe why don't you? Why don't you start a call? Yeah, yeah, yeah. So interestingly, the so the approach that I showed before, which is again not dissimilar to Danielle's approach, which is like starting with maybe a pre screening assessment of all the hazards that a portfolio could face and then kind of drilling down into asset hazard pairs that might need more of a deep dive and then moving that into like. Well, what should we do about this? And so on and so forth. That is pretty standard across any type of organization. I will say that. The organizations that we do the most work for are kind of mission critical organizations like data center operators that can't afford any downtime all the way to campuses. So like university campuses, is a big one where you can imagine one single event could knock out the entire campus right? And so basically it's an existential threat to their entire mission, and so we've got other corporate organizations that have similar concerns. They have a downtown campus or an urban campus where literally one Event could knock out their headquarters, so we were working with a number of big clients like that also working for real estate developers who have scattered assets to try and help them understand. OK, out of all the assets
I've got in My Portfolio, which ones do I need to drill down on and really understand how to make our entire portfolio more resilient so I would say generally the same approach works for everyone. It's just that some are more incentivized to. Go through and be proactive and kind of our leading

on the resilience part.

Yeah, and if I can sort of follow on to that.

In what we saw in our interviews as we were conducting our interviews for the toolkit was.

Like the the community members.

More more often than some local officials think, have a greater desire to do something to mitigate their risk. They might not be sure exactly what their specific risk is. They might not be sure about how to do it, but once the community officials kind of got down to the community member level and started talking to people, they found that people are willing to do something. They're quite a few.

Projects in California where they were looking at doing building retrofits so like apartment buildings. You know multi unit buildings and the building owners were not as reticent as officials thought they would be because you're asking someone to put money into something and. So they thought that they would be hesitant to do that, but there were actually many more homeowners and building owners willing to do something for their safety than they

they.

Then the only thing to add there.

I think there's so many factors from like an investor perspective that would affect the buildings that would be more willing to do a retrofit. But like I'd say.

I think for office buildings where.

You know, if there's like, for example, like we have some office properties that have like 5000 tenants, and like you know those would be very high risk if they didn't take action.
Where they might have if, depending on the location, they might have more casual to be able to invest in those capital improvement projects, but when you think about like an industrial asset that's like you know triple net property with where like full tenant control, there's more like I'd say.

Umm?

There's it's hard in terms of like who makes a retrofit who benefits from it. I think would be harder, like I, I feel like we're probably going to see some asset types kind of lead. I think we're seeing more. We're seeing more progress on that. Like you know, for high rise office spaces then we are maybe like for like for example in certain industrial facilities. Because of that I think so. The investment structure, like who is responsible? I think it will. It will be a factor in terms of like who do we see leading the efforts in terms of like.

Making those retrofits a reality.

Fantastic, well we have a lot of questions from our audience today so I'm gonna try to get through as many of these as I can. Thank you for everyone who submitted questions. Please keep those coming one that is specific for you. Mary that says curious if you spoke to property owners of historic buildings which must retain historic elements of the building while adapting their buildings for future natural disasters.

Yes we did, and that was definitely a challenge that we heard of, especially since one community in particular was working with FEMA and FEMA requires an environmental and historic preservation review. So with historic buildings, you can't change anything about the look of the outside of the building.

And so these communities that were work that you know had some historic buildings in their building stock had to go through a process of, you know, taking pictures of what a retrofit you know, like a seismic retrofit on a building would look like, proving that it wouldn't be
seen from the outside of the building. Things like that. So it's definitely a challenge. But there there is a process there. There were communities who figured out sort of a roundabout way of doing it. It takes a long time, but they were able to do it. So it's definitely a challenge. But there there is a process there. There were communities who figured out sort of a roundabout way of doing it. It takes a long time, but they were able to do it. Wonderful, I do want to make sure that you know we acknowledge the equity in this process and so I've got a question just relative to that. I mean, you know, we know the properties that serve people of color and low income households. They are higher exposure to climate risk. That's just a fact. And these communities also face higher barriers to access in capital. And so how do we ensure that the equity is baked into this process. And I'll open it up to you. Maybe Mary goes first, like I can fall on. Yeah yeah, I can hop in real quick. Something that we saw is definitely taking that like even even having it in your mind as you start these processes from the very beginning helps because just by being aware you start to look for how to take all of that into account. There were communities who before they jumped into their retrofit program. I did. You know, assessments on their community. To find out exactly what their community demographics were and what sort of barriers the community members might have in retrofitting. Umm? And. So like taking those steps early on helps to include it throughout the process. Maybe did you have anything else that you wanted to add relative to equity in the process? Yeah, again, going back to the cost benefit, the traditional cost benefit analysis is looking at value at risk. So the example that we use and this disproportionately impacts low income populations, the example that we use is. Let's say you've got two communities at risk of like sea level
rise and you're looking to build a seawall to protect them. The cost benefit. Analysis would actually favor the richer community because the value at risk is higher and so your benefit cost goes up. That's we can't do it that way, so we're actually there's a lot of literature about this, and Eric has been developing some stuff looking at how you can integrate social equity into the traditional cost benefit analysis by looking at things like median incomes in a population that waits the certain benefit costs, and so that kind of makes it more on a level playing field and really kind of gives an apples to apples comparison, so I think it's really important. The note that the dollar, let's say, goes a lot farther in a low income population than a richer population that needs to be integrated into our traditional workflows. Danielle, I would love to hear you. There's a lot of questions in the chat and I would love to hear you talk about the role of insurance in this process. And you know, pretend you're pitching one of pitching a client that just says, well, gosh, isn't that what insurance is for and they've already calculated this risk? I'm sure you've heard that I would like to just hear how you respond to a skeptic that's profitable. One tells you, like that's what's insurance. Yeah, I mean there's a lot of there's a lot of regions where insurance companies will not touch those types, like there's places in high fire risk or high flood risks. There's no insurance companies. I mean, they'll say female will cover me that nobody wants to ensure those properties. So like and I think for us when we're developing our risk assessment, we actually met with several major insurance companies to understand. OK, if eventually as we implement those risks, this property will become like a. High resilience, would we consider negotiating a lower insurance rate so we actually talked to them OK? What kinds of
questions should be incorporating to our risk assessment and some of the things they said you know, like compliance with buildings, latest structural codes or like some of the even fire codes would help. So like we, we did talk to them about that. I feel like. Also they you know when I met with them and see what kind of process do you use. Even evaluate the risks now to come up with your insurance rates. And I I think it's gotten better now. But a lot of insurance companies are not even prepared. I mean, they're just using old models, and they're not really understanding the the latest risks, so I feel like they have. I mean, there's obviously things that are happening, but I don't think that the insurance companies are really, truly prepared to understand these risks and include that into their models. But I do think that as we make progress to, you know, if we're making this major investments, we make the property more resilient that should affect your insurance rates. So we need to. All get more like. I'd say advanced on that and you know I saw there was a question about also in terms of like how the retrofit process when you think about decarbonization all those together. So one of the things we're doing when we are even during the due diligence for new acquisitions process we are, we created something called the Green PCA. It's a green property condition assessment and we're including resiliency risk assessment. We're including decarbonization efforts and looking at energy audits and doing like a really. More encompassing assessment of that property. So then we can then incorporate into our underwriting models what it would take to retrofit that property and do it all at once, right? If you're retrofitting, maybe you include, you know, fully electrifying that property by incorporating maybe solar panels, doing the
I think it's really important to take that holistic approach when you're doing retrofits right? Usually the best time is just feel like we need to really understand all these risks and and take that approach to to really make our buildings right more sustainable, more resilient decarbonized. So I think that's a really important part of the process. Like I add on the insurance piece. I agree with Danielle. I mean I basically you have to realize or recognize with insurers. They're looking at large portfolios of buildings. They care about the averages. They don't really care about individual buildings. So unless you've got like A and I've seen it cause we've done like a $500 million asset, they won't really which we call facultative risk. They don't really understand the intricacies of individual buildings, and they certainly won't typically give you a resilience. Sorry insurance premium reduction because you've made certain measures. That is the Holy Grail. Connecting resilience with insurance so you get the payback directly. I don't think we're anywhere near that, unfortunately. And like Danielle said, they're definitely not looking at risk at the individual asset level like they should be. So if you want to protect yourself, you really need to maybe investing in those resilient retrofits. I would also say the insurance coverage that you're typically looking at might cover you for a certain percentage of damage there. Not gonna really protect you for losses, indirect losses like downtime and business interruption and those types of things. So that's something that you need to be aware of. Ohh, they agree. If I can follow on that as well. Some of the programs that we interviewed started because of this. Just like Danielle said, some areas of the country insurance companies won't even go there because of how high
their risk is. So like South Carolina and Alabama, the
safe Alabama homes programs were both developed.
Because of this

lack of insurance access, so they were retrofitting homes so
that those communities could be safer.

And get some more access to potential insurance.

Alright, I think we have time for maybe one more
quick round of questions here, and so there's a couple
of questions relative to tools that individuals can use that
are maybe online. Whether it's a payback calculator or other
risk assessment calculators. So what's could I'd like to do?

Kind of a quick run through of each of you
if you're looking at a piece of property. There are
a couple of tools that you would just go to
immediately online.
Start to look at risk.
And payback.

There's.
There there's really not. I mean, I think that's the
issue. Well, look if you wanna get into like if
if you wanna look up tools online for resilience, index
indices, for example for particular counties or municipalities
or things
like that. Then certainly they're like FEMA has a resilience.
I think I don't know what they call it. Resilience
index, but if you're looking at specific buildings like there's
tools like flood factor now online, that first St Foundation
is put out there so you can go to your
individual property and understand your flood risk. For
example, there's
other hazards.
It works, but like when you for other hazards. And
really, if you're trying to get an understanding of specifically
at your property, there's not really much out there,
unfortunately.
I don't know if Danielle and Mary.
If you agree with that or not.
Yeah, just like you said, FEMA has the National Risk
index and you can get to sort of like a
county, maybe community level, but getting like drilling down
more
specifically to a specific property then there isn't so much
sometimes States and counties have their own programs like
00:59:06 --> 00:59:07: has a my hazards.
00:59:09 --> 00:59:12: And that's that's kind of like a high level. You
can search your address basically and see what different
hazards
00:59:17 --> 00:59:21: layer on top of your area, like your block and.
00:59:23 --> 00:59:24: Yeah.
00:59:25 --> 00:59:29: It's difficult to find very specific local information.
00:59:32 --> 00:59:35: Well, I want to be respectful of everyone's time and
00:59:35 --> 00:59:39: I wanna thank first and foremost the resilience land use
cohort at ULI for all of the amazing work that
00:59:43 --> 00:59:46: has been done for the report that will be sent
00:59:46 --> 00:59:50: out. And for assembling this panel and for everyone that
00:59:50 --> 00:59:53: has joined us today, I know that this is an
00:59:53 --> 00:59:58: extremely complicated issue that it's very difficult to to wrap
00:59:58 --> 01:00:01: our hands around and just a one hour presentation.
01:00:02 --> 01:00:05: And I'm deeply grateful that everyone is committed an hour
01:00:05 --> 01:00:08: of their day to addressing this. So thank you on
01:00:08 --> 01:00:09: behalf of you a lot.

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