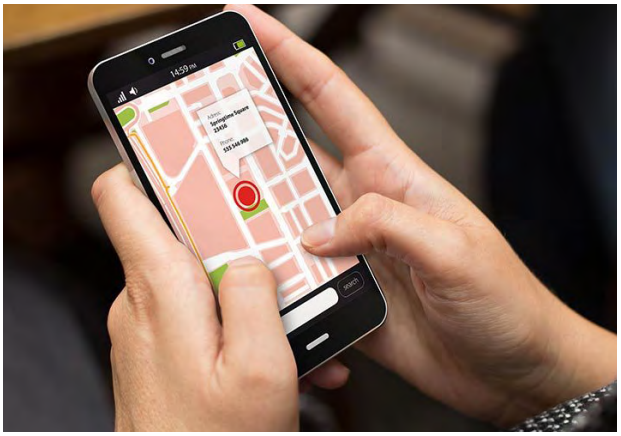
Testing Resilience Solutions:
A RISE Case Study on the Urban Mobility Challenge

About RISE Urban Mobility Resilience Challenge

The RISE Urban Mobility Resilience Challenge seeks solutions that bring automated, real-time flood-avoidance information to drivers of private, commercial, and emergency vehicles, as well as public transportation. Through this Challenge, RISE has selected four promising innovators who are working to create a traffic app that guides drivers in real-time to avoid flooded roads in Hampton Roads. RISE has provided up to $30,000 to each team, as well as the opportunity to participate in RISE's Resilience Innovation Accelerator program. The final stage of the Challenge, slated to begin in January 2021, will provide at least one winner the opportunity to implement and run a real-world demonstration pilot in Hampton Roads in close coordination with cities and industry experts.



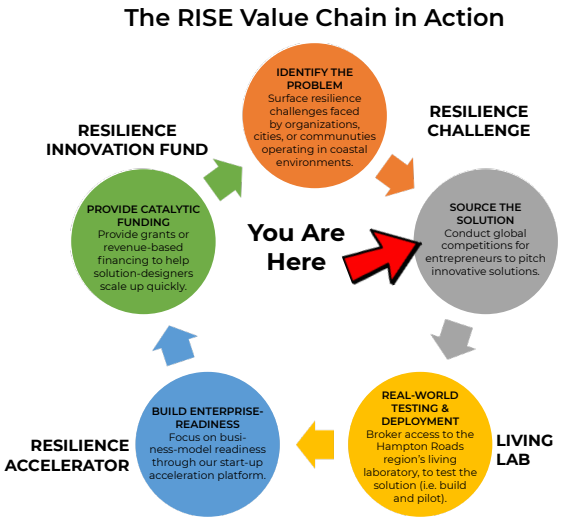
Problem We're Trying to Solve

RISE is no stranger to the hazards brought on by sea level rise and its effects on surrounding communities. Flooding events – including rapid rainfall, river floods, and storm surges – have become more intense and frequent as a result of climate change, leading to significant transportation disruptions. Such disruptions affect all modes of road transportation. This, in turn, adversely impacts the economic viability of local businesses, disrupting the quality of life of residents, and upending city-wide transportation infrastructure. With recognition that sea level rise will continue to be a reality in the Hampton Roads region where RISE operates – and runs its Living Laboratory – **designing scalable and cost-effective solutions to navigate these hazards will be critical in helping coastal communities proactively adapt to – and build resilience against – future climate-related hazards.**

Smartphone-based routing platforms (like Waze, Google Maps, and others) often provide general guidance around hazards, but providing real-time guidance for rapidly changing flood hazards is highly technical and expensive. Moreover, current navigation platforms often rely on crowdsourced information provided by

users, which can vary based on whether impacted areas are in densely populated cities or in more rural locations. To truly solve this problem, a product is needed that not only addresses flooding as it happens, but can also forecast and proactively adapt to variable floods. And the solution that is developed needs to be both cost-effective and replicable across different coastal areas. **Identifying the "right" urban mobility solution to chronic flooding that is fit-for-purpose and scalable serves as the crux of RISE's latest Resilience Innovation Challenge.**

Resilience Challenge: How RISE and its Partners Worked Together to Create the Urban Mobility Resilience Challenge



Like RISE's other Challenges, the Urban Mobility Resilience Challenge was made possible through collaboration with key stakeholders, including city officials, companies, customers, and other industry leaders struggling with the challenges faced by flood-based hazards.

With insights from key conversations with partners – like why current solutions do not work and what is really needed – RISE turned to the City of Norfolk. The City of Norfolk has been a long-time partner and funder of RISE's work. Along with the City of Virginia Beach, the stakeholders started brainstorming how they could design a challenge that would source the most effective, long-term solutions. They quickly realized that answering this question required access to flooding information and data sources. Kyle Spencer, who serves as Deputy Resilience Officer for the City of Norfolk, also spearheads the City's membership with Waze for Cities – a data-sharing partnership program that promotes real-time analytics and facilitated mobility in cities. Leveraging data and analytics from Waze and other resources, RISE and its partners envisioned a guidance solution that would be optimized for flood-related scenarios – essentially using the existing infrastructure of a guidance app like Waze and overlaying it with new features that could be responsive to unique flooding conditions, replicable across other coastal cities, commercialized, and user-friendly. RISE and its partners determined that the right solution would be able to consolidate various information sources – such as road networks, storm surge models, topographic information, and other sensors – into existing navigation applications, and help improve forecasting models across different cities.

Once they had the vision of a promising solution in mind, RISE reached out to a diverse set of stakeholders in the Hampton Roads region to ensure that needs of a variety of stakeholders in the community were part of the design process. For example, RISE interviewed officials at Sentara Norfolk General Hospital to solicit feedback on what design features should be considered to ensure that an app-based, real-time flooding information and navigation product would be beneficial to their patients, employees, and the general public. For Rusty Bradfield, Director of Sentara's Emergency Department, and Shannon Murphy, Director of Sentara's Support Services, the lack of reliable and publicly available information on road closures as a result of flooding was a concern of public safety. While computer-aided dispatch (CAD) systems can facilitate navigation for emergency vehicles to reach the hospital, Bradfield emphasized that such information is not open to the general public, "making it difficult for our staff – most of whom rely on public transportation – to reach our facilities." And while navigation applications like Waze can crowdsource data points, they do not always convey the most accurate and up-to-date information on road closures, construction, and hazards occurring in real-time as a result of immediate flooding. **For Bradfield and her colleagues, the ideal solution would combine the look and feel of a product like Waze, with transparent data that could adapt to current hazards and better predict and build resilience against future flooding events.**

While RISE and its partners saw significant alignment around what a solution could look like, determining what components or features would need to be built into a successful final product required the innovative minds of solution-builders themselves. To source that innovation directly, the Challenge launched in November 2019, and was designed in three stages, guiding qualifying teams through a structured process that allowed them to leverage datasets provided by RISE and its Challenge partners to build, test, and eventually operationalize a pilot in Hampton Roads.

Executing a Challenge

Stage 1: The Build

November 2019 - June 2020

Stage 2: Business Plan Refinement

July - December 2020

Stage 3: Piloting & Demonstration

January 2021 - March 2022

Let's Dig In: The Build

In this stage, six teams conducted technical analyses around flooding, elevation, and roadmap data from datasets provided by RISE and its partners. Throughout this first stage, the City of Norfolk and City of Virginia Beach served as technical experts to field teams' questions and provide clarity on data specifications. Mark Cave, who serves as GIS Specialist for the City of Virginia Beach, played a particularly critical role in encouraging teams to also consider external factors beyond the data itself. "In addition to data, teams also had to consider the 'messaging' and underlying criteria that go into communicating weather hazards to the public." To Cave, it was important for teams to consider how various flooding conditions trigger certain types of closures (e.g. impassable barricades closed to all vehicles, those closed for the general public, etc.). Particularly from the standpoint of the cities of Norfolk and Virginia Beach, building a product that only considers the data itself, but is otherwise not adaptive to the surrounding environment and other public safety considerations, would not offer a practical solution. Teams in the first stage also benefited from RISE's partnership with the cities of Houston and Miami, offering perspectives on how to eventually replicate their proposed solutions in other coastal communities.

Let's Dig In: Business Plan Refinement

Based on the submissions from the first stage, RISE further refined the pool to four finalists, selecting the solutions that showed the greatest potential for on-the-ground applicability. As part of the second stage, finalists also had the opportunity to participate in RISE's Resilience Innovation Accelerator program, which took place over the course of three months starting in August 2020. The Accelerator pushed finalists to consider the underlying business strategy for commercializing and scaling their solution. Led by Bob Smith, Director of the I-Corps technology start-up accelerator program at George Washington University, the Resilience Innovation Accelerator paired teams with a dedicated mentor to evaluate, validate, and strengthen their business models. Together, the teams and their advisors developed a product roadmap and created a long-term strategy for scalability. Over the course of the accelerator, Smith encouraged teams to shift their thinking from a "product-driven mindset" to a "business-oriented approach." During the second stage, RISE's Hampton Roads-based partners also served as additional resources to refine teams' value propositions and business plans.

Let's Dig In: Piloting & Demonstration

At the time of writing, the Challenge has not entered the third stage, where the finalists will not only be judged on the technical specifications of their proposed solutions, but will also be evaluated based on the viability of their business models. This will include whether their product is fit-for-purpose for a diverse set of stakeholders and geographic environments. RISE partners – including the cities of Houston, Miami, Norfolk, Virginia Beach, in

addition to Sentara Norfolk General Hospital, the Children's Hospital of the King's Daughters, and the Port of Virginia– will judge finalists on their ability to create a product that is sufficiently responsive to their unique needs and circumstances. Most importantly, RISE and its partners are interested in seeing evolution. For RISE Executive Director Paul Robinson, "if teams' solutions and business models at the end of Stage 2 do not support growth and scalability, there is no value in that." When underway, Stage 3 will serve as a crucial inflection point in the trajectory of the Challenge: *selecting at least one winner to implement their product concept and business model through a real-time demonstration in Hampton Roads*. With up to $300,000 in funding to further implement and optimize their solutions, winning teams will have the opportunity to leverage resources and test space from RISE's Resilience Innovation Hub and translate their concept into reality. The demonstration, slated to take place during 2021, will be overseen by RISE partners, as well as other industry experts.

Results

Though currently underway, the Urban Mobility Resilience Challenge is already producing inspiring results. Through its close collaboration with resilience leaders like Kyle Spencer at the City of Norfolk and Mark Cave at the City of Virginia Beach, RISE was able to access critically needed data to help design a Challenge that could be truly catalytic. Spencer – through Norfolk's membership with the Waze for Cities program – not only provided backend access to databases, but also cleaned the data to make it easier for teams to integrate the guidance information into their solutions. Both partners have also provided deeply needed perspectives on what key resilience issues and gaps they are solving for, and what considerations matter most in the development of a viable urban mobility solution. As the Challenge's third stage continues, RISE's city partners will also serve as "living labs" themselves, providing access to infrastructure and space for winners to pilot their products.

The Urban Mobility Resilience Challenge has provided an infusion of much needed innovation for the Hampton Roads region in identifying and sourcing sustainable resilience solutions – in this case, to adapt to the effects of flood-based hazards. RISE's ability to offer a holistic approach in designing and executing a viable resilience solution – coupled with the catalytic partnerships with city officials, research universities, and representatives from key local stakeholders – have all worked together to shape the Urban Mobility Resilience Challenge. As a result, the Challenge is highly responsive to localized resilience issues while also being able to sufficiently adapt to the needs of other coastal communities – in Hampton Roads and beyond.

Ready to Get Involved?

When we stay in our silos, we miss the most compelling resilience solutions of our time. RISE can mobilize resources and work with its partners to run a Challenge that will source diverse, proven, and innovation solutions to the resilience challenges in which you're investing. Submit an idea for a new Challenges, and view RISE's list of current Coastal Community Resilience Challenges.