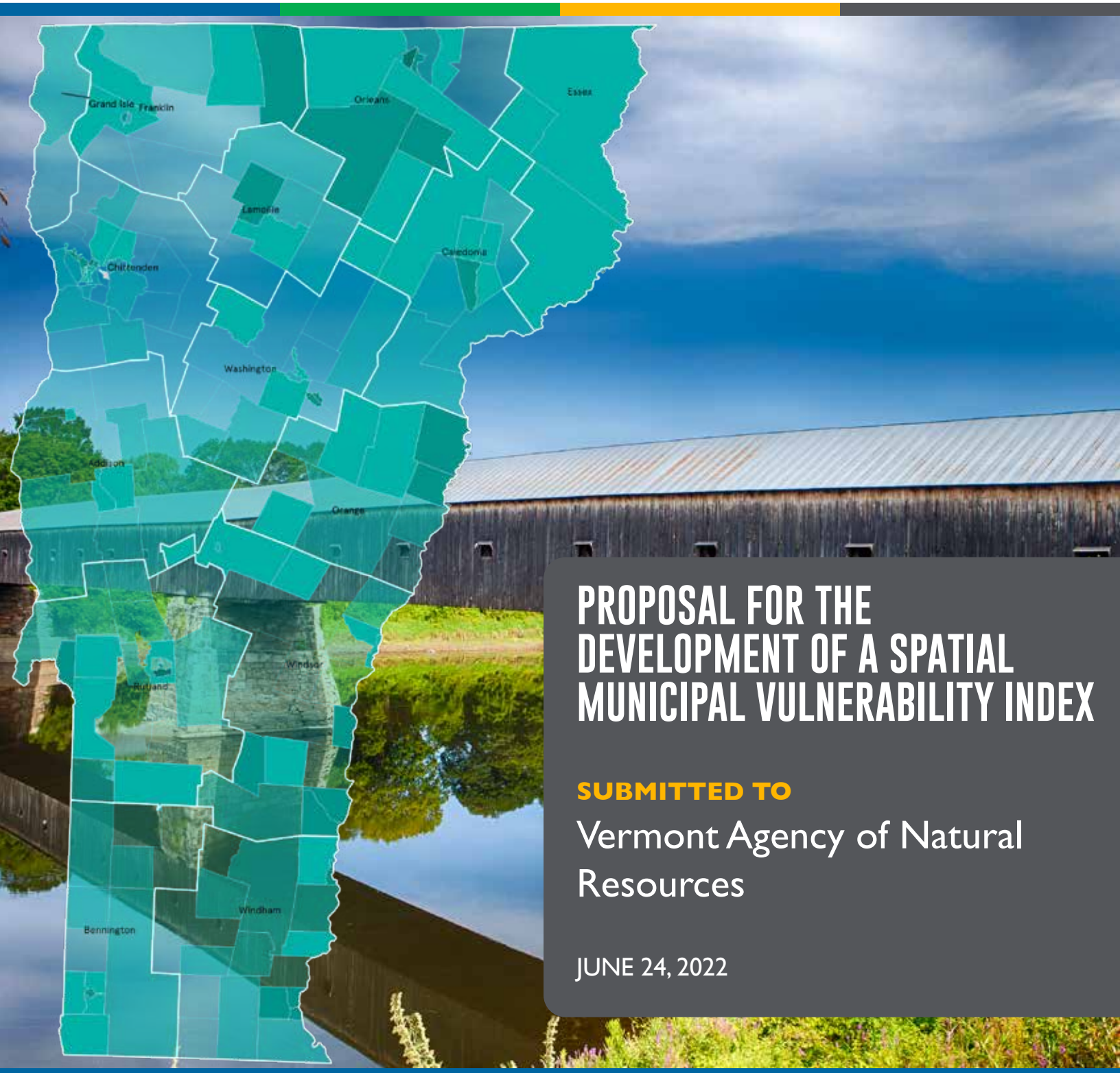
iParametrics



PROPOSAL FOR THE DEVELOPMENT OF A SPATIAL MUNICIPAL VULNERABILITY INDEX

SUBMITTED TO

Vermont Agency of Natural Resources

JUNE 24, 2022

Innovating Solutions for a Changing World

iParametrics

GUIDING PRINCIPLES

iParametrics' Guiding Principles are the backbone of our business. We are a customer-focused, employee-driven firm dedicated to integrity, quality, and the highest standards of our industry. We enter each engagement committed to delivering the best products and services and exceeding our clients' expectations.

This commitment to excellence is made possible by the expertise and professionalism of our employees.

DELIVER RESULTS

Customer loyalty is the key to our future. Loyalty is built on trust - when we make a promise, we deliver.

SUPPORT COMMUNITIES

Our work is never "just projects"—people and communities are depending on our success.

INNOVATE

Seek opportunities to develop innovative solutions.

BE PASSIONATE

Demonstrate passion for what you do.

EMPOWER OUR EMPLOYEES

Our most valuable asset is our employees; with them nothing is impossible.

Overall, we bring our customers a diverse group of creative, technical, and entrepreneurial talents, all focused on providing a memorable customer experience and a safer community.



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EXECUTIVE SUMMARY

WHY IPARAMETRICS?

iParametrics is pleased to present the following proposal to support the State of Vermont's Agency of National Resources (ANR) in the development of a Spatial Municipal Vulnerability Index (MVI). The enclosed proposal details our experience, qualifications, and approach to completing this work. We look forward to the opportunity to serve the state of Vermont in this exciting project.

Knowledge & Experience

We have worked on over 70 presidentially declared disasters. Our team has provided emergency planning, disaster recovery, hazard mitigation, analytics, and software development for public agencies throughout the United States, including a critical infrastructure project for the State of Vermont.

Skill

Our credentialed technical staff have proven methods. Our analytics and digital solutions team has created a variety of cloud-based tools to help clients with decision-making related to risk and vulnerabilities.



Trusted

We perform work on some of the nation's most critical and protected infrastructure. Our team is made up of experts in the field such as Data Analytics and Emergency Management experts, and the majority of our staff hold federal security clearances.

Quality

We rank in the top 10% of U.S. firms, based on independent evaluation. We hold a Dun & Bradstreet Open Ratings score of 94, the top 10th percentile of firms.

WHY IPARAMETRICS? CONTINUED

iParametrics is pleased to submit this proposal and is excited about the potential to work with the State of Vermont on this very critical project. Based on the following, we believe we are uniquely qualified to deliver the best solution at the lowest risk to the State.

Why iParametrics?

- iParametrics has considerable experience working with the State of Vermont. We have participated in post-disaster recovery operations, performed planning and geospatial tasks, cataloged the state's critical infrastructure, and performed vulnerability assessments for natural and man-made hazards for a subset of those assets.
- iParametrics has extensive experience working with natural hazard and climate change data, including hazard mitigation planning and analysis for public clients, and developing decision support and visualization tools to make this data actionable.
- iParametrics has extensive experience with the categories of data, and in some cases the actual data sets, to be used in this project.
- iParametrics has extensive experience in building highly interactive geospatial tools relevant to the requirements of this proposal.
- iParametrics with be solely responsible for this project without sub-contractors and has the capacity in-house to deliver. Further, iParametrics will dedicate specific, qualified personnel to this project for the duration of the project.
- iParametrics can complete the project within the desired timeframe.

SECTION 1

QUALIFICATIONS OF THE TEAM

WHAT WE DO



WHO WE ARE



HOW WE WORK

- DELIVER RESULTS
- BE PASSIONATE
- SUPPORT COMMUNITIES
- EMPOWER OUR EMPLOYEES
- INNOVATE

Company Profile

Founded in 2003, iParametrics provides emergency management and resilience consulting services to clients in all 50 states and 24 countries. For the past 18 years, we have provided guidance and subject matter expertise to help our clients plan for and navigate some of the most challenging issues relating to the security and resilience of their people, economy, critical infrastructure, and natural spaces.

Our experience includes all-hazard pre-event planning and mitigation geared towards putting in place proactive measures and controls to help our clients reduce risk, increase preparedness and system resilience.

Our goal is to stop the bad things that happen in the world from happening and to reduce the depth and duration of impact when they do.

We also provide post-event response and recovery through the entire lifecycle of a crisis event, including manning emergency operation centers during an event and providing technical guidance and program management during the response and recovery cycles.

Data Analytics Competency

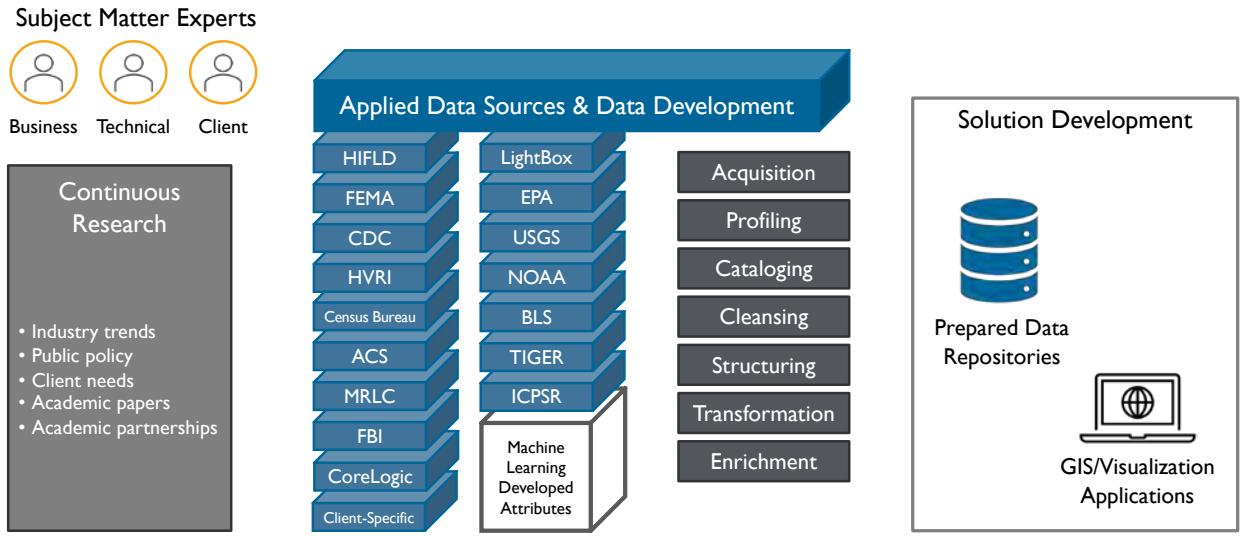
Over the past two decades in our role as planners and responders, iParametrics has gained firsthand experience with the increasing severity of storms and other effects of climate change. We have been directly involved in over 70 presidentially declared disasters and emergency and resilience planning for the Federal Emergency Management Agency (FEMA) and numerous state and local clients.

This work has included supporting the State of Vermont during the recovery phase of Hurricane Irene and enhancing the state's understanding and accounting of its critical infrastructure.

In 2017, iParametrics stood up an advanced analytics competency to help our clients better understand their data and to make that data operational and actionable. The technical subject matter experts of the

analytics team are complemented with the hands-on, client-driven experience of our professional services staff who understand the unique challenges faced by state and local clients in matters of disaster preparation, hazard mitigation, and building resilient communities.

The key components of our Data Analytics Competency are **Subject Matter Experts, Continuous Research**, **Applied Data Sources & Data Development**, and **Solution Development**.





SUBJECT MATTER EXPERTS

The successful delivery of every technical solution, including tools such as the Vermont Municipal Vulnerability Index (MVI), starts with a well-defined problem statement to ensure the technical team has a clear and defined objective with the appropriate end-user in mind. This is achieved via collaboration between leadership and the technical and client subject matter experts.



RESEARCH

iParametrics' subject matter experts perform continuous research to stay abreast of industry trends and public sector policies, as well as to identify and qualify new sources of data that should be added to our data sources catalog because they have an impact on our clients and the types of services we deliver to them.

As a firm, we allocate on average of 15% percent of our staff's time to ongoing and continuous research and professional development.

QUALIFICATIONS OF THE TEAM CONTINUED

As related specifically to hazard mitigation, climate change, state, and local community vulnerability, some of the research and resources we have referenced in the past include:

Global/Federal/National Level

- FEMA Risk Mapping, Assessment and Planning (Risk MAP)
- FEMA State and Local Mitigation Planning Policy Guides
- FEMA Disaster Data Delivery Platform
- FEMA National Resilience Index
- DHS Interagency Security Council Risk Management Process
- DHS National foundation-level data
- FEMA HAZUS
- USACE Building Resilience Program
- United Nations Offices for Disaster Risk Reduction.
- United Nations International Strategy for Disaster Risk Reduction (UNISDR) for Making Cities Resilient
- USDA Wildfire Risk to Communities
- United States Climate Reduction Toolkit
- U.S. Census Bureau Publication
- National Institute for Standards and Technology (NIST) Resilience Studies
- National Weather Service Climate Prediction Center
- NOAA National Centers for Environmental information
- National Science Foundation publications on Risk and Resilience
- Presidential Policy Directive 21 (PPD-21) on Critical Infrastructure Security and Resilience *(a diverse array of critical infrastructure sectors, touching on some of the key threats and hazards concerning the sectors, and highlighting the common, first-order dependencies and interdependencies between sectors)*.
- Sector specific guidance, such as NERC-CIP (Electrical), AWIA (Water), and PTASP (Transportation) for the assessment and protection of critical infrastructure vulnerability

State and Local Level

Partnerships and engagement with:

- State Emergency Management Agencies, such as Florida, Texas, California, and Massachusetts
- The Commonwealth of Massachusetts Municipal Vulnerability Preparedness Program
- Southeast Regional Partnership for Planning and Sustainability
- Florida Coastal Resiliency Portal
- New York Climate Change Science Clearinghouse
- Hazards and disaster research centers in the Americas
- Academic publications from universities throughout the country

Commercial/Private Sector

- Research from independent, nonprofit research organizations:
  - » Headwater Economics
  - » Multi-Resolution Land Characteristics Consortium
  - » First Street Foundation
  - » The Northeast Regional Climate Center's Applied Climate Information System
- The Nature Conservancy Community Resilience Building Methodology
- Kresge Foundation Urban Adaption Initiative
- The Lincoln Institute of Land Policy
- Baseline Resilience Indicators for Communities (BRIC)
- Methodologies, tools, and publications by the insurance industry to model risk such as Swiss Re CatNet, Munich Re, Natural Hazard Edition, Lexus Nexus, and CoreLogic

In addition to the information above, iParametrics supports academic and foundational climate change research with organizations such as Rebuild by Design and the Georgia Institute of Technology School of Civil Engineering.

DATA SOURCES & DATA DEVELOPMENT

The Vermont MVI, like many of our projects, will consume data from many types of data sources. For example, weather information may be drawn from the NOAA and other sources. Demographics like population, age, and socio-economic data, may

come from Census and American Community Survey data. Historic disaster data, like hurricane frequency and severity, may come from FEMA data, including non-public databases.

Since its inception, the iParametrics analytics and digital solutions team has invested thousands of hours in researching, acquiring, and ingesting public, commercial, and private data most appropriate to the challenge at hand.

Appendix A:
iParametrics maintains a catalog of over 700 datasets. A representative excerpt from that catalog is presented in Appendix A.

The result of that ongoing effort is a library consisting of over 700 individual datasets from over 100 individual data sources. We have extended these datasets via the application of machine-learning techniques to create new attributes and features.

A representative listing of some of the iParametrics Data Analytics Foundational Competency data sources can be found in Appendix A.

SOLUTION DEVELOPMENT

Since its inception, the iParametrics analytics and digital solutions team has been charged with delivering web-based solutions used by clients, the public, and our practitioners. These solutions typically consume data from the prepared repositories within an end-user application, all developed and maintained by the analytics and digital solutions team. We follow a development methodology that ensures solutions are delivered on time, on budget, and on scope and can be easily maintained over their lifecycle. Several of the systems that we have deployed that are relevant to the Vermont MVI are described in Section 3, Experience.

Section 3:
iParametrics has developed and deployed a variety of online tools. Section 3, Experience provides details on 10 relevant tools to the Vermont MVI project.

In addition to the systems identified in Section 3, iParametrics has developed and deployed a public-facing grants management system for clients such as:

- Providence, Rhode Island
- Chatham County, Georgia
- Fayetteville, North Carolina
- The Unified Government of Wyandotte County and Kansas City

These systems are available to thousands of citizen users to submit grant applications.

Qualifications of the Project Team

iParametrics team members have extensive experience in supporting communities as they recover from a variety of disaster and emergency situations.

QUALIFICATIONS OF THE TEAM CONTINUED



Mark Homrich, Project Manager



John Lorimer, Subject Matter Expert, Data Analytics



Ariel Mallett, Data Analytics Team Lead



Payton Duran, Data Analytics Team Member



Jeff Stevens, CEM, MEP, Subject Matter Expert, Resilience

The team will be lead by **Mark Homrich,** Vice President of Data Analytics and Digital Solutions for iParametrics.

As Project Manager, Mark will be the primary point of contact for the state and will be responsible for the services provided on this contract. **Mark** has over 30 years of experience in project management, consulting, product development, and product management across of a variety of functional domains and industries, including over 11 years of experience managing programs and products for a variety of technical disciplines for Siemens Digital Industries Software. Mark combines deep management experience with an entrepreneurial mindset to address client challenges in new ways.

Supporting Mark will be **John Lorimer, Ariel Mallett, and Payton Duran,** iParametrics' team of data analytics and Geospatial Information System (GIS) experts. **John** is iParametrics' Advanced Analytics Subject Matter Expert with over four decades of experience in analytics and digital solutions. John advises the analytics team on the application of advanced analytics and machine-learning techniques.

Ariel currently serves as a Geospatial Engineer and Solutions Development Leader for our team. Ariel graduated with a master's degree in civil engineering from the Georgia Institute of Technology, focusing on the intersection of geotechnical engineering and disaster response. Ariel has a deep knowledge of engineering and GIS and is experienced in researching and analyzing data, utilizing engineering, GIS, and BI software such as LPile, FB-Deep, ArcGIS, QGIS, and Qlik, scripting in programming languages, such as R and Python, and creating visualizations to communicate data and analyses.

Payton currently serves as a researcher, developer, and geospatial engineer. Payton has extensive knowledge and experience in developing geospatial visualizations to show data by its various dimensions and multiple measures through dashboards and geospatial visualizations. Payton has extensive experience with ESRI ArcGIS, Quantum GIS, Tableau, Python, and R to automate geospatial data acquisition and processing and create visualizations to transform complex data into easy-to-understand graphics.

Serving as Subject Matter Experts on this project are **Jeff Stevens, CEM, MEP,** and **Royce Woodruff, D.Sc.,** both Emergency Management and Community Resilience experts with iParametrics. **Jeff** works closely with our clients to improve their resilience and enhance their recovery efforts. He is known for his advocacy on behalf of the communities we serve. He constantly identifies opportunities to ensure that our clients are leveraging all possible avenues to enhance their preparedness

QUALIFICATIONS OF THE TEAM CONTINUED

for and recovery efforts after a disaster event. Jeff is a Certified Emergency Manager and FEMA Master Exercise Practitioner and led our Vermont Critical Infrastructure project.



Royce Woodruff, D.Sc. Subject Matter Expert, Recovery

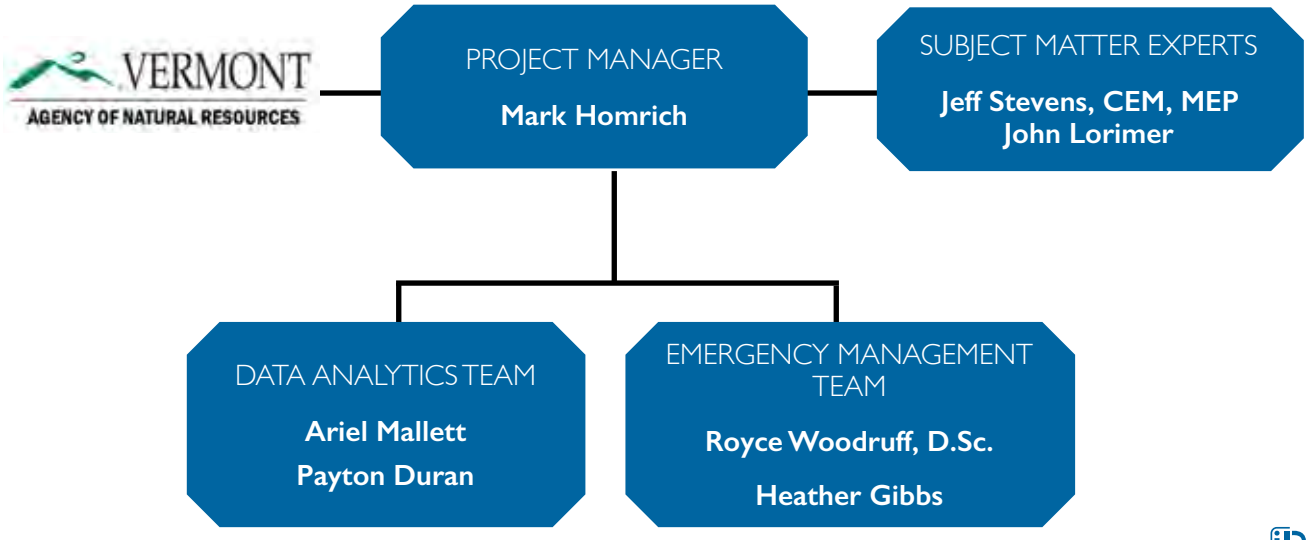
Royce is a seasoned emergency management professional with over 20 years of experience. He has responded to a variety of different natural disasters throughout his career. Royce is a former Hazard Mitigation Grant Program Specialist for FEMA. In this role, he deployed to several disasters throughout the Southeast. Royce holds a Doctorate in Emergency Management and serves as subject matter expert on hazard mitigation and resilience programming.



Heather Gibbs. Emergency Management and Training Coordinator

Lastly, Heather Gibbs will serve as our Emergency Management and Training Coordinator for this project. Heather's role includes research of various training topics to aid in the design and development of training courses to support the company's Emergency Management and Security and Risk Management divisions. She was a key team member of our Vermont Critical Infrastructure project, and as a resident of Vermont, will be critical to the success of our team through her knowledge of the state and her previous experience with the data we will be using for this project. She has been engaged with Vermont's Homeland Security Unit for over a decade and has a strong understanding of local built infrastructure in the State.

This comprehensive team will approach this project from numerous aspects ensuring the most complete work product. Trust and relationships are foundational to our success. **We are committed to providing our top team of professionals for this job, people who love the work that they do.** Full resumes for these individuals are found on the following pages.





MARK HOMRICH

VICE PRESIDENT, ANALYTICS & DIGITAL SOLUTIONS

As Vice President of Analytics and Digital Solutions for iParametrics, Mark Homrich oversees the application of advanced analytics, machine learning techniques, and business process automation to Public Assistance projects to shorten response times, improve performance, and achieve greater cost efficiency. Mark has over 30 years of experience in project management, consulting, product development, and product management across of a variety of functional domains and industries, including, recently, over 11 years of experience managing programs and products for a variety of technical disciplines for Siemens Digital Industries Software. Mark combines deep management experience with an entrepreneurial mindset to address client challenges in new ways.

PROJECT ROLE

Project Manager

EDUCATION

- BS, Industrial Engineering, Georgia Institute of Technology

EXPERIENCE

- **State Mitigation Assessment Reports (Florida et al).** Data Analytics Project Executive. Oversaw the design and development of a nationwide mitigation assessment analysis and reporting solution that was applied for the State of Florida and other states. Mark oversaw the team that summarized the information into a report using graphics, maps, and tables to easily communicate the findings and for disbursement to various stakeholders within the state.
- **US IBWC Critical Infrastructure Threat and Vulnerability Assessments.** Data Analytics Project Executive. Oversaw data-driven site assessments and analysis of disparate data, including insurance-backed risk data, infrastructure data, and national crime data. Worked with team to create reports to visualize and communicate results.
- **Rebuild by Design.** Data Analytics Project Executive. iParametrics was tasked with analyzing historical disaster data to support Rebuild by Design's initiatives. Mark managed the efforts to define the problem statement and business requirements, survey stakeholders, assess data sources, develop the model, and design the user-facing components.
- **Grants Management System.** Data Analytics Project Executive and Product Manager. Responsible for the management, design, development, and staffing of the iParametrics Grant Management System which is used by clients to process grant applications submitted by citizen users. Mark developed the procedures and best practices to ensure high system reliability and availability at minimal cost of maintenance and support.
- **PAMS.** Data Analytics Project Executive and Product Manager. Responsible for the management, design, development, and staffing of the iParametrics Public Assistance Management System Management System which is used to expedite and improve management of large-scale disaster recovery projects.



JOHN M. LORIMER

ADVANCED ANALYTICS SUBJECT MATTER EXPERT

As Advanced Analytics Subject Matter Expert for iParametrics, John advises the analytics team on the application of advanced analytics and machine learning techniques. These projects include tools to assist Public Assistance projects to shorten response times, improve performance, and achieve greater cost efficiency. John has over 40 years of experience in product management, project management, marketing, and analytics in a wide variety of industries, including over 13 years of experience managing marketing, product development, and project management for advanced analytics / machine learning products for LexisNexis Risk Management.

While at LexisNexis, in his role as VP of Analytics Product Management, John led the development of a unique initiative to develop a cross-industry data- and machine-learning-based product set for addressing and combatting financial fraud, that encompassed banking, insurance, retail, telecommunication and national, state, and local governments. John combines deep management experience with an entrepreneurial mindset to address old challenges in new ways.

PROJECT ROLE

Data Analytics Subject Matter Expert

EDUCATION

- MA, Communications, Southern Illinois University
- BA, Physics, Wheaton College

EXPERIENCE

- **FEMA Public Assistance Program, Southeastern/Eastern US.** Analytics Subject Matter Expert. Developed and directed an advanced analytics capability to augment iParametrics' capabilities in emergency management and disaster recovery. Participated in strategic planning with company principals for an advanced analytics group.
- **Rapid Hurricane Response Management System (RHRMS)** Analytics Subject Matter Expert and Analytics Group VP. Oversaw the development of a robust operational tool that used machine learning and other analytic tools to project counties that would be eligible for Federal disaster funding. The model identifies target counties within one day of hurricane landfall and then provides corresponding detailed operational information to appropriate action can be planned for.
- **Disaster Response Planning and Management Suite.** Analytics Subject Matter Expert and Analytics Group VP. Oversaw the development of a suite of applications targeted at reducing the cost burden and expediting the timeline of multiple phases on the disaster management process. Oversaw the team that collected and processed data in a variety of programs, including Qlik, QGIS, and others, to automate the process so that the timeliness of the data was maintained. Developed Qlik Sense applications to allow users to visualize and interact with the data and machine learning model results. This suite of applications included the Site Suitability Analyzer, the Critical Infrastructure Analyzer and other applications.
- **Grant Management System** Analytics Subject Matter Expert, Analytics Group Management. Contributed to the conceptual design, development and testing of a Grant Management System to facilitate the application for and issuance of COVID 19 relief grants utilizing cloud technology and rapid development business process development tools.



ARIEL MALLETT

DATA ANALYTICS & DIGITAL SOLUTIONS TEAM LEAD

Ariel Mallett currently serves on iParametrics' Data Analytics team as a Geospatial Engineer and Solutions Development Leader. Ariel graduated with a master's degree in civil engineering from the Georgia Institute of Technology. Her coursework throughout the completion of her undergraduate and graduate degrees focused heavily on geotechnical engineering. During her graduate career, she further her focused by concentrating on the intersection of geotechnical engineering and disaster response. Understanding its applicability on the engineering and emergency management fields, Ariel took several classes on GIS during her master's program, earning a Certificate in GIS from the school. Through her diverse coursework and work as a research assistant during her graduate and undergraduate studies, Ariel gained a broad, yet deep knowledge of engineering and GIS and honed her skills as a researcher and analyst. Ariel is experienced in researching and analyzing data, utilizing engineering, GIS, and BI software such as LPile, FB-Deep, ArcGIS, QGIS, and Qlik, scripting in programming languages, such as R and Python, and creating visualizations to communicate data and analyses.

PROJECT ROLES

Data Analytics Lead
Research

EDUCATION

- MS, Civil Engineering, Georgia Institute of Technology
- BS, Civil Engineering, University of California, Los Angeles

CERTIFICATIONS

- GIS Certified
- Qlik Sense Business Analyst Certification

EXPERIENCE

- **Weld Hazard Mitigation Plan, Weld, Colorado.** Geospatial Engineer. Developed a suitability model on Esri ArcGIS Pro to identify areas of highest risk to Weld County. Ingested and processed data from over 10 different state and federal agencies into continuous, hazard-specific raster layers. Transformed the hazard-specific layers to a common hazard scale and weighted the hazard types relative to one another based on population likely affected to generate a composite risk layer.
- **Disaster Response Planning and Management Suite.** Geospatial Engineer/Developer. Developed a suite of applications targeted at reducing the cost burden and expediting the timeline of multiple phases on the disaster management process. Created scripts in R to automate the scraping of data from website pages. Created data load scripts in Qlik Sense to request data from Assessments. Analyzed and joined disparate data, including insurance-backed risk data, infrastructure data, and national crime data. Created professional reports to visualize and communicate results.
- **State of Vermont Critical Infrastructure List Program.** Led the data analytics to create a comprehensive critical infrastructure list for the state of Vermont that summarized infrastructure from across multiple owners and stakeholders. Drove the development of mapping and tools to help the state understand their data.
- **USIBWC Critical Infrastructure Threat and Vulnerability Assessments.**
  Geospatial Engineer. Performed data-driven site assessments to supplement traditional Threat and Vulnerability
- **Rebuild by Design.** Geospatial Engineer. Analyzed over two decades of historical disaster data to help Rebuild by Design communicate the need for resilient infrastructure funding, Mapped declaration, obligation and social vulnerability data on the county-level for each state nationwide and provided tables of the underlying data broken down by county, assistance type, and disaster.



PAYTON DURAN

DATA ANALYTICS & DIGITAL SOLUTIONS TEAM MEMBER

Payton currently serves on iParametrics' Analytics team as a researcher, developer, and geospatial engineer. He delivers the valuable insights our government clients need to efficiently improve services and deliver on their mission. Payton has extensive knowledge and experience in developing Geospatial Visualizations to show data by its various dimensions and multiple measures through dashboards and geospatial visualizations. He joined the firm in July 2021 and has worked on analytics modeling and visualizations for the Federal Emergency Management Agency (FEMA). Payton has extensive experience with ESRI ArcGIS, Quantum GIS, Tableau, Python, and R to automate geospatial data acquisition and processing and create visualizations to transform complex data into easy-to-understand graphics. He also has notable publications in the fields of remote sensing, machine learning, and GIS.

PROJECT ROLES

Research
Data Analytics Engineer

EDUCATION

- MS, Geography, University of Georgia
- BS, Environmental Spatial Analysis, University of North Georgia

CERTIFICATIONS

- Fundamentals of Geo-spatial Technology Certificate
- Geographic Information Science (GIS) Certificate
- Cartography certificate (ESRI)

EXPERIENCE

- **Grants Management System.** Led the Software testing QA, dashboard development of reporting and geospatial elements for the iParametrics Grant Management System which is used by clients to process grant applications submitted by citizen users.
- **PAMS.** Lead in dashboard development of critical insights and reporting elements of the iParametrics Public Assistance Management System which is used to expedite and improve management of large-scale disaster recovery projects.
- **Threat and Vulnerability Assessment Projects**. Utilized variety of scripting and automated GIS processes to produce facility reports on threat analysis for several projects including:
  - ATL Xpress
  - Orange County Transportation Authority (CA)
  - Orange County School Systems (FL)
  - Stafford County (VA)
  - USIBWC (the US section of the International Boundary and Water Commission)
- **Disaster Risk and Recovery.** Created Public Assistance and Hazard Mitigation reports for cities in the United States which gives insight to number of disasters in the last 20 years, Public Assistance funds, and Hazard Mitigation funds spent for the city, COVID-19 Public Assistance Obligations and their rank within the state, as well as critical infrastructures inventory that could be impacted in high-risk areas.



JEFF STEVENS, CEM, MEP

VICE PRESIDENT, EMERGENCY MANAGEMENT & COMMUNITY RESILIENCE

Jeff serves as iParametrics' Vice President of Emergency Management. In this role, he works closely with our clients to improve their resilience and enhance their recovery efforts, Jeff is hands-on leader known for his dogged advocacy on behalf of the communities we serve. He constantly identifies opportunities to ensure that our clients are leveraging all possible avenues to enhance their preparedness or build back better after a disaster. Jeff has experience in higher education from his time at New York University and also in healthcare leadership from his time serving on the H1N1 pandemic team in Rhode Island. Jeff is a Certified Emergency Manager and FEMA Master Exercise Practitioner. He holds numerous Incident Management Team certifications and is also a volunteer firefighter. Jeff has 15 years of experience.

PROJECT ROLE

Emergency Management Subject Matter Expert

EDUCATION

- MA, International Relations, Salve Regina University
- BA, Administration of Justice, Salve Regina University

CERTIFICATIONS

- Certified Emergency Manager
- Master Exercise Practitioner
- FEMA Type III All-Hazard IMT

- **Weld Hazard Mitigation Plan, Weld, Colorado.** Led the team that reviewed and updated the County's Hazard Mitigation Plan. iParametrics developed a suitability model on Esri ArcGIS Pro to identify areas of highest risk to Weld County. The model transformed the hazard-specific layers to a common hazard scale and weighted the hazard types relative to one another.
- **State of Vermont Critical Infrastructure List Program.** Led the project to create a comprehensive critical infrastructure list for the state of Vermont that summarized infrastructure from across multiple owners and stakeholders. Drove the facilitation process, including meetings as the pandemic hit the state, and the development of mapping and tools to help the state understand their data.
- **AWIA Assessment, Various Locations.** Jeff provided emergency management services to assist and support the creation of a several Risk and Resilience Assessments (RRAs) and Emergency Response Plans (ERPs) for water systems across the United States.
- **Rebuild by Design.** Project Executive. Worked with the team to create a plan to analyze over two decades of historical disaster data to help Rebuild by Design communicate the need for resilient infrastructure funding, The project mapped declaration, obligation, and social vulnerability data on the county-level for each state nationwide and provided tables of the underlying data broken down by county, assistance type, and disaster.
- **Grants Management and COVID-19 Recovery.** Currently leading teams assisting clients across the United States, including Providence, RI; Somerville, MA; and Sparta, NJ, with documenting and applying for FEMA reimbursements related to the COVID-19 pandemic. Worked with clients and the analytics team to develop iParametrics' Grants Management System for these programs, which is used by clients to process grant applications submitted by citizen users.



ROYCE WOODRUFF, D.SC.

DIRECTOR OF DISASTER RECOVERY

Dr. Royce Woodruff is a seasoned emergency management professional with over 20 years of experience. He has responded to a variety of different natural disasters throughout his career. Royce is a former Hazard Mitigation Grant Program Specialist for the Federal Emergency Management Agency. In this role, he deployed to several disasters throughout the southeastern US. He also worked as a Senior Emergency Management Specialist under a contract with the Louisiana's Governor's Office of Homeland Security and Emergency Preparedness for Hurricanes Katrina, Rita, Ike, and Gustav. For this role, he coordinated a state-wide campaign to educate local government, businesses, and the general public about the various federal program available to them due to Hurricane Katrina. In recent years, he has assisted with other natural disasters including the April 2014 Floods in the Florida panhandle, the 2015 Winter Storm Juno in Massachusetts, and the Flagler County Response to Hurricane Matthew.

PROJECT ROLE

Emergency Management Subject Matter Expert

EDUCATION

- Doctorate, Emergency Management, Jacksonville State University, 2018
- Master's in Public Administration, Emergency Management, Jacksonville State University, 2004
- BS, Sociology, Jacksonville State University, 1994

CERTIFICATIONS

- Sports Security Management Certificate Program

EXPERIENCE

- **Grants Management for the Unified Government of Kansas City and Wyandotte County, Kansas.** Providing the Unified Government with support for grants management and recovery efforts.
- **COVID-19 Pandemic Response, City of Lowell, Massachusetts.** Assisting the iParametrics team of disaster response specialists who are assisting the City with COVID-19 recovery, including strategic planning for grants opportunities, including CARES Act and ARPA, creating and managing an Emergency Operations Center with a call center, and planning for vaccine distribution.
- **Grants Management for Providence, Rhode Island.** Assisting the team with grants management support for Providence's COVID-19 recovery, including developing and implementing a Grants Application System created by the iParametrics analytics team.
- **Grants Subject Matter Expert, San Juan Puerto Rico.** Led and trained a group of Subject Matter Experts in Public Assistance and 406 Hazard Mitigation and conducted training sessions on hazard mitigation in Public Assistance (406) and the Hazard Mitigation Grant Program (404).
- **ARPA Grant Management for Sumner County, Tennessee.** Leading the County's recovery planning and grants efforts to use ARPA funding for COVID-19 recovery. Providing grants management, compliance review, and reporting requirements for the federal funding program.



HEATHER GIBBS
TRAINING SPECIALIST

Heather is an experienced training administrator and planner, currently working with the iParametrics training team to plan, deliver, and enhance the online learning experience for iParametrics' 5,000+ online learners through the Learning Management System (LMS). She coordinates with team members to develop and update training programs and meet project goals, resulting in increased client satisfaction and user experience.

Heather's role includes research of various training topics to aid in the design and development of training courses to support the company's Emergency Management and Security and Risk Management divisions. She uses Moodle, Rise 360, Storyline 360, and Camtasia to create engaging online learning courses and develops course content by narrating courses, shooting video, and editing content.

PROJECT ROLE

Emergency Management and Training Coordinator

EDUCATION

- BA, Sociology, Wheaton College, 2002

EXPERIENCE

- **iParametrics, LLC.** Training Coordinator. Collaborates with the design team to design, develop, conduct, and administer eLearning programs currently serving over 5,350 participants to increase subject-matter expertise in the emergency management field. She reviews and analyzes training results to enhance training content and delivery resulting in a 91% average satisfaction rate with the overall learning course and create guidance documents and instructional videos for online navigating learning environments, data gathering processes, and web-based portals.
- **National Center for Campus Public Safety (NCCPS).** Research Associate. Assembled, reviewed, and organized NCCPS materials and files into online content management and file sharing platforms, directed web developer on the implementation of design features, functionality improvements, and the resolution of issues ensure a quality user experience, and collaborated with team members to coordinate the NCCPS free webinar series to host 26 webinars for 3,700+ participants.
- **State of Vermont, Department of Public Safety.** Homeland Security Program Planner. Conducted capabilities assessments and developed strategies to identify needs, prioritize preparedness activities, and measure program accomplishments, providing needed support to over 400 emergency preparedness agencies. She designed online surveys, researched and analyzed data across multiple years, and identified progress to maintain 100% federal grant requirement compliance.

SECTION 2

APPROACH TO COMPLETING THE WORK

Project Methodology

In this section we describe our general methodology to completing the Vermont MVI project. The graphic below summarizes this methodology, which is explained on the following pages.



Research
- Literature Surveys
- Interviews, Community Outreach
- Data Source Selection



Data Development
- Data Acquisition
- Profiling
- Cataloging
- Cleansing
- Structuring/Transformation
- Enrichment



Modeling/GIS
- Model Development & GIS Processing
- Machine Learning



Application Development Iterations
- Requirements & Design
- Development
- Testing
- Client Reviews
- Deployment



Operations & Maintenance



Appendix B: iParametrics conducted a literature review to support our proposal development. Please see Appendix B for our findings.

Research

In the context of a data analytics project, we perform research to ensure we are up to speed on the body of knowledge and current best practices related to the project's problem statement and to identify the data sources applicable to this project. The iParametrics project team will leverage knowledge acquired from our continuous research and any additional research as prescribed by the RFP. In fact, the team that will support the Vermont MVI project conducted preliminary research of material sourced from the organizations referenced in the RFP (see table on next page) to better understand this project's objectives, generate preliminary ideas for the Vermont MVI, and model the project workplan with the highest degree of confidence. The team's summary assessment of these resources can be found in Appendix B: MVI Literature Review (linked here).

Entity	Resource
State of California	• CCHViz • Legislative Analyst's Office - Assessing Vulnerability of State Assets to Climate Change • CAP III, Climate Change Vulnerability Assessment
State of Maine	• State of Maine Vulnerability Mapping • Maine Department of Agriculture, Conservation and Forestry Planning for Climate Variability
Green Mountain Power	• Green Mountain Power Climate Plan
State of Vermont	• Vermont Heat Vulnerability Index • Vermont Populations Vulnerable to Climate Change • Vermont Climate Change Mapping Tool

The output of the research phase is a clearly defined problem statement, a description of the solution that will address the problem, and a list of data sources that will be consumed by the solution. Per the RFP, a draft problem statement will be presented to the state at the kickoff meeting for your review and concurrence.



Data Development

DATA ACQUISITION

After the data sources have been identified, iParametrics initiates the data acquisition process. Some data may be available as a data dump that we import into our infrastructure and host and update on a periodic schedule. In other cases, the data is accessed via an API, either in real-time or with periodic updates. If the data is only available commercially, we proceed with the necessary contracting and purchasing activities. **At this time, we believe that no commercial data will be required for the Vermont MVI project.** However, should a need for commercial data be required or beneficial, iParametrics will discuss that option with the state.

Appendix A: Please see Appendix A for our Data Sources (linked here).

As noted above, with respect to the Vermont MVI project, iParametrics has access to and has processed many of the data sets we expect to be use in the Vermont MVI project. Please refer to Appendix A: Data Sources (linked here).

PROFILING

Profiling is the formal and rigorous process of evaluating the data with respect to currency, completeness, consistency, structure, internal relationships, content, etc. The

result of this process is a documented profile of each data set, together with an evaluation of its strengths and potential weaknesses.

CATALOGING

Cataloging is a formal extension of the prior process, whereby each data set is organized with a description of its attributes and metadata into a catalog that can be readily referenced in the future without needing to re-analyze the data.

CLEANSING

Even the best data sets may contain inconsistencies and errors that need to be removed or compensated for, particularly when multiple disparate data sets are used together. Data may contain missing values, duplicates, outliers, corrupt data, inconsistently formatted data, etc.

The iParametrics process corrects for these issues before they are added to the final repository.

STRUCTURING/TRANSFORMATION

Data structuring and transformation are related. This is the process of taking the cleansed raw data and transforming it into a structure that is most appropriate to the specific use case. This process will often vary by project. iParametrics regularly works with and combines many disparate data sets - data sets that were not originally designed to work together or designed for the purpose of the current project. For example, iParametrics has combined FEMA hurricane declarations (which identifies hurricanes by a disaster number) with NOAA hurricane weather data (which identifies hurricanes by a serial number).

Another example of transformation is conversion of data in one form to another form, for example, rain gauge data or geographic point data to a raster file using interpolation methods to get continuous precipitation cover for a geographic area. Transformation is also used to assure that data is not only internally consistent within a dataset but also consistent across disparate data sets.

Oftentimes, the data needs to be restructured into a format expected by the target system that will consume it, which may be a machine-learning algorithm, a programming function, a GIS application, or a visualization tool.

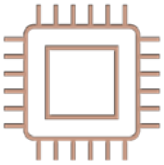
ENRICHMENT

Sometimes raw data is enriched by filling in missing or inconsistent data from additional data sources. This is particularly important in the case of data with

Data Disaggregation:
Disaggregated data refers to the separation of compiled information into smaller units to elucidate underlying trends and patterns. Compiled data may come from multiple sources and have multiple variables or "dimensions." It is oftentimes aggregated such that the underlying and meaningful trends become obfuscated.

Once collected, data can be divided by various dimensions, depending on the information available and the objectives sought. iParametrics has extensive experience with data disaggregation and analyzing data across national databases, registries, and information systems. We use data to understand the true profile of a community, its risk, and local priorities.

long time horizons because it is not uncommon for these data sources to change over time. Based on our experience, it is seldom sufficient to use the raw data as is. In addition to transformation, as described above, often the data is augmented with other attributes derived from machine-learning methods such as attribute creation and attribute selection. The overall outcome of this entire process to this point for iParametrics is a Prepared Data Repository, purpose built for the project.



Modeling, GIS Processing, & Machine Learning

This function creates the model that ingests the data prepared via the prior steps and outputs the MVI data that can be consumed by the end-user visualization tool. Some general principles that would apply to the development of the Vermont MVI model include the following:

- **The index would rank all the municipalities in Vermont against each other.** Since the ranking will be strictly relative, e.g., on a scale of 1-100, the numerical score itself has no independent meaning. Also, the MVI will be a relative index within Vermont only and will not have reference to other US counties or municipalities. For greater resolution, we anticipate making base calculations at the census block group or tract level and rolling up to the municipality level if the data supports it. If not, calculations will be done at the municipality level.
- In building a relative index like this across multiple factors, **several transformations may need to be applied to various factors.** Pre-processing of geographic intersections of data will also be executed using GIS processing tools such as ArcGIS. Techniques like K-means clustering may be used to group municipalities into similarities for comparison. Bayesian weighting may be used, for example, for population samples where the population density is low. Different components of the index will need to be normalized using min-max normalization to the same scale to relate them together. These and other statistical, machine-learning, and GIS techniques may be used to manipulate and prepare the data for processing, modeling, and presentation.

Artificial Intelligence and Machine Learning:
Artificial Intelligence and Machine Learning has its own formal methodology (Data Collection, Data Preparation, Attribute Creation and Selection, Algorithm Selection, Model Training, Evaluation, Refinement and Iteration, Testing, Deployment) which iParametrics follows but is not reproduced here for the sake of brevity.

- For this project, **we do not see the need to build a full machine-learning model,** but it is possible, based on our experience with similar models, that certain machine-learning techniques may benefit the Vermont MVI tool. For example, in our research of vulnerability indices such as Skylab and FEMA NRI, we notice they are often limited variant indices (e.g., age vs projected extreme heat days vs county population, or three variables). In an online interactive tool, it is intuitive and useful for the user to manipulate the individual variables (this method is applicable to the Vermont MVI tool). However, this approach may lead to misleading results if the variables are correlated or interact in non-intuitive ways. As a trivial example, "age" could be correlated with "geography" if the selected geography is small and contains a senior living facility. This could result in the "double counting" of the importance of a variable when assessing the vulnerability of the population.

  Machine-learning models can incorporate many variables simultaneously to achieve the optimal result across all variables and can be used to minimize these effects and create an optimal ranking for the given target. Given that the Vermont MVI would consist of multiple sub-indices it is possible that a machine-learning model may be of benefit.

  If this were to be the case, iParametrics would endeavor to use fundamental machine-learning techniques like correlation analysis and outlier analysis in the data profiling, cleansing, and transformation processes and attribute creation and selection in the data enhancement process. Note that the implementation of any machine-learning techniques would take place only after prior consultation with and agreement from the state to ensure a successful handover and a manageable go-forward maintenance and support program by the ANR.



Application Development/Iterations

APPLICATION REQUIREMENTS & DESIGN

Once the data has been identified, ingested, and prepared and a suitable MVI model calculation has been obtained, the next step is to ingest that data into the end-user interactive tool. Per the RFP requirements, the data and calculation engine will be hosted in the cloud and the visualization and interactive interface will be presented through a web interface.

Since Vermont ANR is familiar with the ArcGIS, iParametrics proposes the end-user interface to be hosted in ArcGIS Online.

Informed by meetings with Vermont ANR and representatives of the user community selected by ANR, iParametrics will finalize the initial tool requirements and general look and feel.

In general, we anticipate that the user tool will have at least the following characteristics:

- Factors will include the population, average age, employment, and grand list; active public and civic organizations; and distance from emergency services and shelter, as required by statute. Other factors may include climate change threats and the characteristics of infrastructure, municipal services, population, front-line populations, and employment.
- The user interface component can be implemented on an online platform for the public to engage with.
- The tool will allow the public to zoom in and out on locations of interest, turn layers on and off, and export data. All data and information will be spatially located and presented.
- The tool will allow the public to view, in both tabular and map format, a MVI ranking of all the municipalities in Vermont, allowing the user to sort from highest MVI ranking (most vulnerable) to lowest MVI ranking and vice versa.
- The tool will allow the public to drill down to an individual municipality and see the risk factors associated with that municipality's score.
- The tool will allow the public to search for addresses.
- The tool will allow the public to re-sort the ranking based on factors.
- The tool will allow the public to export the municipal-level data detail in tabular form (e.g., Excel or CSV) and in vector form (shape file).

iParametrics generally follows an Agile development methodology. As such, iParametrics will present to ANR progressive mockups of the final interface during development for ANR input and modification. Therefore, these development steps are not sequential but rather cyclical. Requirements and design can be modified as we progress.

APPLICATION DEVELOPMENT

The next step is the development of the end-user-facing GIS-based application, based on the requirements and design generated in the prior step.

APPROACH TO COMPLETING THE WORK CONTINUED

Appendix C:

The iParametrics project team that would deliver the Vermont MVI tool created a simple app (using data from our Mitigation Assessment analysis for the State of Vermont) and deployed it to ArcGIS Online. This sample app also highlights several of the end-user features requested in the RFP.

Please see Appendix C for screen shots and a link to the sample app.



iParametrics has experience working with various GIS software, programming languages, business intelligence software, workflow automation tools, and file hosting services both on-premises and in the cloud. We design each application's technical architecture based on the project requirements and consider factors such as data size, existing infrastructure, licensing requirements, and security and compliance. For example, we frequently work with QGIS and ArcGIS for spatial data processing but will aim to use the software with which the production support team is most familiar.

For this project, we propose using a combination of GIS software, programming languages, and file hosting services: During the acquisition phase, iParametrics will initially gather and host any data that requires a data dump within a folder on our SharePoint site or Dropbox tenant. For any data sources available through an API or web services, we can use R or ArcGIS Pro to pull the data, if the state prefers. Any data documentation from the research to cataloging phases will also be saved in the SharePoint or Dropbox tenant.

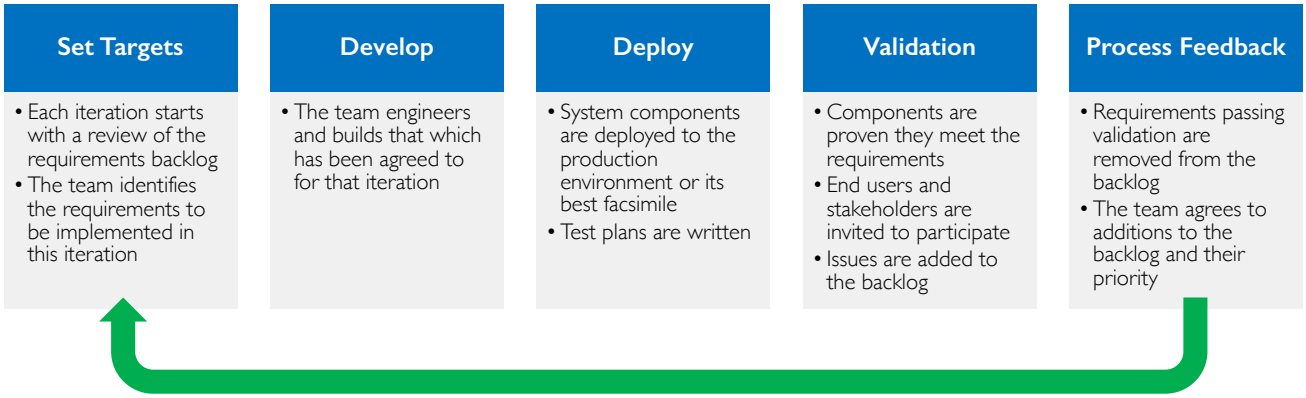
Once we have acquired, profiled, and cataloged all the data, iParametrics will use R, Python, and/or ArcGIS Pro from the cleansing phase through the machine-learning/GIS/modeling phase. The specific software or programming language will be chosen based on the specific data processing needed. For example, spatial intersections may be performed in ArcGIS Pro, while machine-learning techniques may be better suited to be performed in R or Python. When certain actions can be performed in multiple software, we will default to the software most familiar to or convenient for the client. Any scripts, project files, or new data files will be saved to a SharePoint or Dropbox folder.

Upon completion of the MVI calculation, the individual factors and calculated index will be mapped in an ArcGIS Pro project. This data will be published to ArcGIS Online as hosted feature services and used in the ArcGIS Online web application. Once the project has been completed, iParametrics will zip and transfer the folder to ANR to ensure that ANR receives all artifacts for future maintenance and updates. iParametrics will assist ANR in transferring the ArcGIS Online hosted features and web application to ANR's tenant.

We plan to discuss the technical architecture with the state during the Project Kickoff Meeting and can amend the above based on feedback.

APPROACH TO COMPLETING THE WORK CONTINUED

Agile Approach to Solution Development Iterations



APPLICATION TESTING

The Agile development process is cyclical and iterative and testing is performed at each stage of development within each iteration to identify bugs and deliberate design changes early and often. During the final iteration, complete rigorous application testing is performed to eliminate to the extent possible any remaining bugs. The application testing activity also includes usability testing, which is focused on ensuring the user interface (and the user manual) is intuitive and responsive and allows the user to obtain the information they seek from the tool.

CLIENT REVIEW AND FEEDBACK

At the defined steps in the development process, iParametrics will present to ANR the status of development in the form of mockups, prototypes, and live demonstrations. The outcome of each development iteration is a version of the final output that becomes progressively more complete until delivery of the final solution and ANR sign off.

DEPLOYMENT

During the Application Development phase, iParametrics will deploy the solution to the target platform and conduct end-user testing. This is an iterative exercise, e.g., build-deploy-test, build-deploy-test, etc. Once ANR has approved the final application, iParametrics will coordinate a final release of the solution to the production site.

Ideally, the iterative and final deployments will be made to the same site (e.g., the same location within the ArcGIS portal). That decision, however, needs to be made in conjunction with the client. If the test deployment site differs from the production

deployment site, additional and final testing of the solution on the final production site would be executed.



Operations and Maintenance

In the final phase of the project, iParametrics will hand over the MVI solution (with all supporting specifications and artifacts) to Vermont ANR. As described above, we propose the user interface component of the solution to be built on ArcGIS and ANR can deploy it to your ArcGIS Online tenant. iParametrics will also provide a complete catalog of data sources, files, scripts, end-user manual, and the support and maintenance manuals in source format.

However, more than just a document, the iParametrics team can develop a quick orientation training that introduces the MVI solution and the associated documentation. We used a similar approach when we supported the State's Homeland Security Unit in its Statewide Critical Infrastructure Project (detailed in Section 3) that we completed last year. Appendix D is an example training document our team created for our grants management system administrators. A similar approach could be used for the Vermont MVI end-users and the ANR team that will provide post-production support.

Project Approach & Management

This section describes how iParametrics will staff, deliver, and plan the work to execute the methodology tailored for the Vermont MVI project described in the previous section.

STAFFING

iParametrics has the internal resources to deliver this project in its entirety; there will be no sub-contractors. We will be able to schedule the work to ensure the project is completed as per the schedule agreed upon with the state.

TABLE OF DELIVERABLES

To facilitate our project planning and costing, iParametrics augmented the list of deliverables in the RFP per the table below. The deliverable numbers are cross-referenced to tasks in the project schedule. This table provides a summary view of the deliverables. If required, iParametrics can break these deliverables into sub-deliverables when we elaborate on the project workplan post contract award.

APPROACH TO COMPLETING THE WORK CONTINUED

Phase	Task	#	Name	Description
I	0	1.00	Project kickoff meeting	
I	0	1.01	Project initiation workplan	
I	0	1.02	Project management	• Ongoing project management tasks (resolve issues, maintain the project plan, manage schedules, track deliverables, prepare invoices, etc). • Bi-weekly 30-minute meetings/presentations with GWSA Director. • Bi-weekly one-hour meetings with ANR staff and Vermont Climate Council.
II	0	2.00	Project management	Same as 1.02
III	0	3.00	Project management	Same as 1.02
IV	0	4.00	Project management	Same as 1.02
I	1	5.00	Research Report	• With the GWSA Director, review and prioritize the research items to be included. • Research work from Maine, California, Green Mountain Power, Dept of Health, Transportation, Commerce & Community Development, ANR, and other models (TBD). • Plan and execute meetings with Agency staff (up to 3), online stakeholder events (up to 2), and stakeholder interviews (7-10). • Analyze results of the research, meetings, interviews and prepare draft report. • Incorporates feedback from the review sessions with the GWSA Director and the VCC and prepare and present final report.
II	2	6.00	MVI tool framework, factors, and methods definition	• One to three meetings with the GWSA Director to agree upon a statement of purpose, application, and the supporting goals and objectives of the MVI. • Presentation to ANR staff and VCC on the framework and factors to be included in the MVI tool. • Incorporate feedback from first presentation. • Prepare and present final report on the methods to develop the MVI tool delivered to the GWSA Director.
III	3	7.00	MVI tool and documentation development	• Complete all activities related to the MVI tool development (e.g., technical design, software engineering, model building, QA/testing, deployment, etc.), and user and administrator guide development. • Includes two to four working sessions with ANR staff to refine the tool and determine the relative score breakdown. • Includes presentation of final tool to GWSA Director and members of the Vermont Climate Council.

Phase	Task	#	Name	Description
IV	4	8.00	Final Report and Presentation	• Preparation and presentation of the draft Final Report to ANR staff. • Incorporation of feedback from the draft presentation. • Preparation and presentation of final Final Report. • Complete all project closeout/handover activities.

Project Plan

A draft plan to execute the work for the deliverables listed above is presented in the following pages, using the framework presented in the RFP as a starting point. The plan includes contingencies for holidays and other scheduling impacts and, based on our experience with the technology and the subject matter, **we are confident the iParametrics team can deliver the final product before February 28, 2023**.



The work plan above shows the overview of the project timeline to meet the goal of February 28, 2023.

TASK 0: PROJECT MANAGEMENT

General

The Project Manager and Primary Point of Contact for the Vermont MVI project will be Mark Homrich. Mark's professional experience includes software development management, consulting, project and program management, and product management

For this project, we will use finite task-based scheduling (Microsoft Project) augmented with our Agile-based software development methodology (Task 3: Develop MVI Tool). This approach provides maximum flexibility and responsiveness to the software development efforts while promoting regular and consistent feedback loops with all project stakeholders.

The project schedule will be updated on a regular basis by the project manager and will be always available to the stakeholders.

APPROACH TO COMPLETING THE WORK CONTINUED

iParametrics has a wide range of tools we use to make sure our clients reach their end goal. This includes the use of Microsoft Teams. We use Microsoft Teams to create a digital workspace which allows us to communicate and connect with ANR.

Our information management systems, services, and processes are second to none. We have procured and maintained these systems which will be used extensively to support the state and team to achieve the objectives in an efficient and effective manner. We adhere to one central philosophy in task performance, "plan the work and work the plan". Our team will conduct research and outreach, as appropriate, to gather all the information needed to ensure the project is successful. This will include coordinating project logistics, gathering information for ensuring successful contract administration, and learning more about your needs.

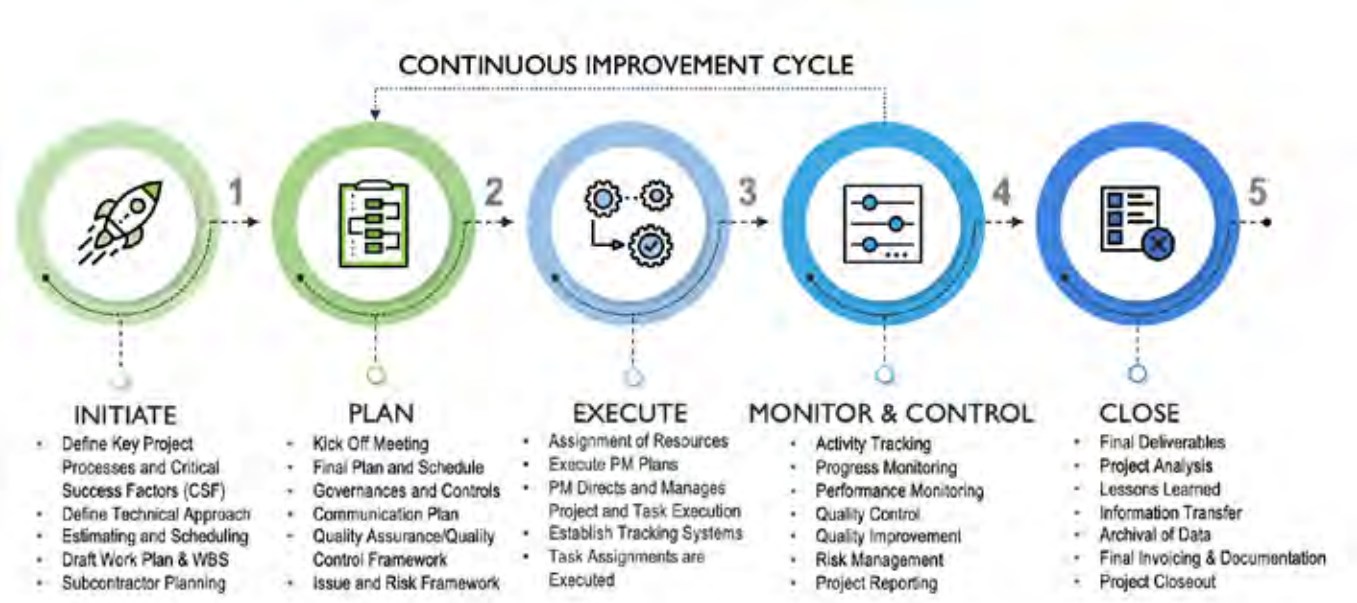
As this is carried out, our initial team is assembled and our Project Manager Mark Homrich will conduct a kickoff meeting with your team to officially start the engagement.

This meeting will allow us to fully understand your project gaols, including challenges and needs, and align our mutual expectations under this engagement.

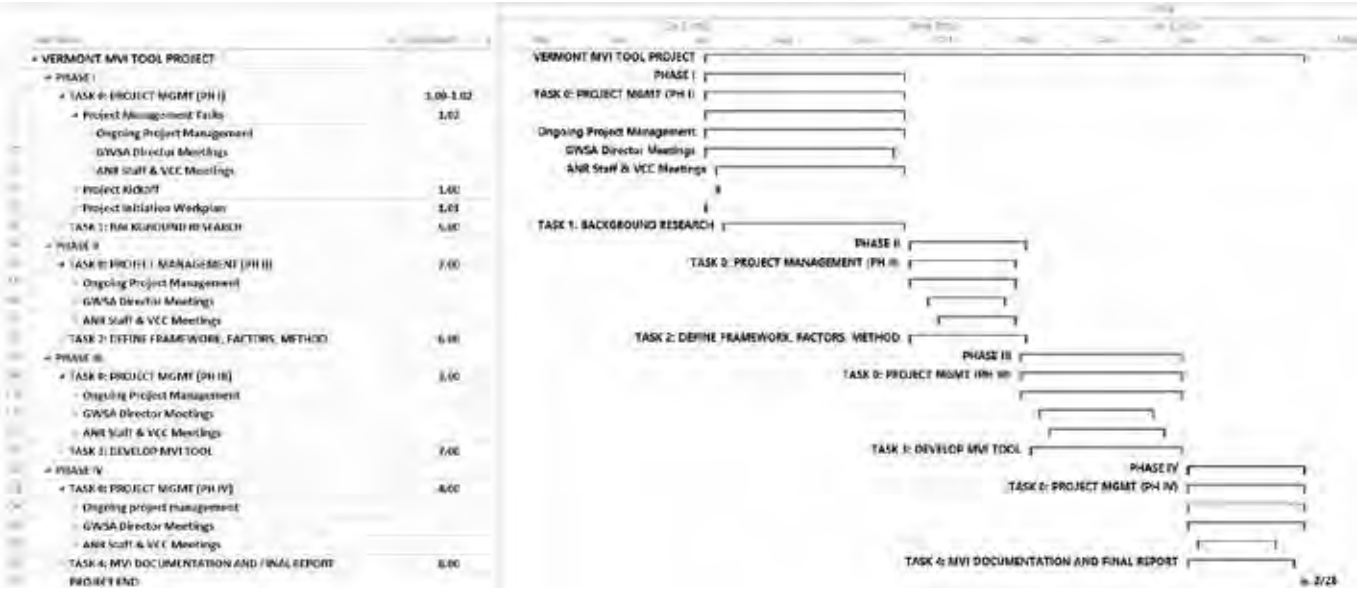
After the kickoff meeting, we will establish specific project milestones, a defined reporting process, and continuous monitoring to ensure we remain on schedule, meeting the technical and quality milestones of the project. By keeping you informed and involved, we ensure timeliness of all deliverables and streamline the process for your reviews and approvals. **You are an integral part of the process.** This will reduce surprises when it comes to in-progress reviews and draft documents and allows us to rapidly move from one phase to the next.

iParametrics' core project management philosophy will guide our approach. Our project management processes are effective because we have continuously improved them through contract performance, incorporating continually-evolving industry best practices, and the use of proven technologies. Our management approach and process are outlined on the next page:

APPROACH TO COMPLETING THE WORK CONTINUED



Task 0: Workplan



The Task 0 workplan supports the completion of six deliverables over four phases. The draft workplan, a summary view of which is shown above, has all bi-weekly GWSA director and bi-weekly ANR staff meetings scheduled on alternate weeks. The exact dates of these meetings will be scheduled as agreed upon with the state and can be combined with other meetings as appropriate.

Mark will maintain the schedule and update it as required. He will distribute status reports on weekly basis at a minimum and will provide more frequent updates on critical issues if required.

TASK 1: BACKGROUND RESEARCH

Task 1 aligns with the Research Phase described, during which iParametrics will leverage the Research functions as described in previous sections. Our team has deep experience conducting stakeholder surveys and interviews, community-based research, and end-user feedback sessions. For surveys, our team uses tools such as Survey Monkey and Nintex Workflow Cloud and response data is captured in project-specific Microsoft SharePoint sites.

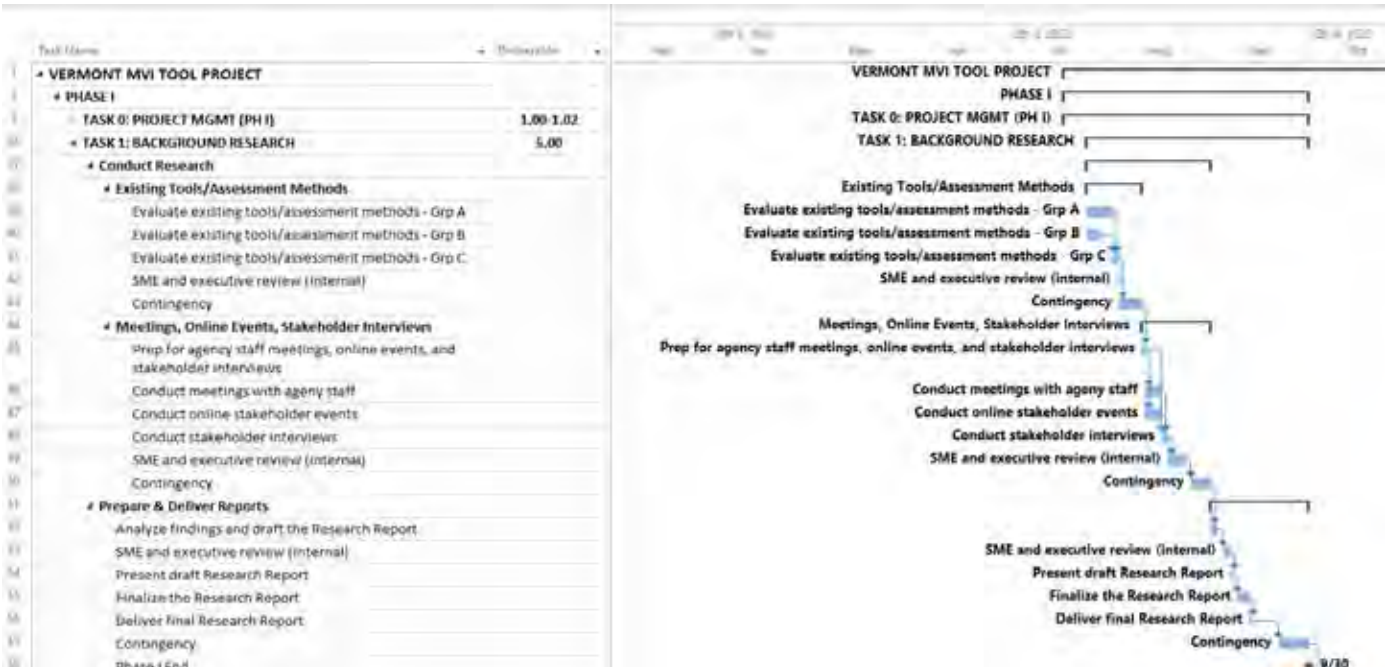
Before beginning this phase of work, our team will discuss the data needed to be successful. The data will include the best available data related to hazards, risks, vulnerabilities, community assets, existing plans, policies, and programs, and past projects. We will always attempt to use the best possible data available, which will result in a more accurate understanding of your current situation.

We will conduct a review of all newly developed or updated community plans, documents, studies, and other related data that should be incorporated, integrated with, or referenced as part of this project. We will supplement this content and data with information from other local, regional, state, and federal sources to ensure the use of best available data to support the planning process.

We will work together to identify data gaps and develop mitigation actions to address any deficiencies.

A summary of the data used, as well as gaps identified, will be reviewed with the state's project lead. Identified gaps may help to identify and guide new actions identified in the project plan. Please note that much of the research the iParametrics team conducted for previous projects, like Weld County Hazard Mitigation Plan, State of Florida Mitigation Assessment Reports, State of Vermont Critical Infrastructure Vulnerability Assessments, and the Rebuild by Design deliverables (as noted in Section 3), is very similar and will directly apply to the research we expect to do for this project.

Task 1: Work Plan



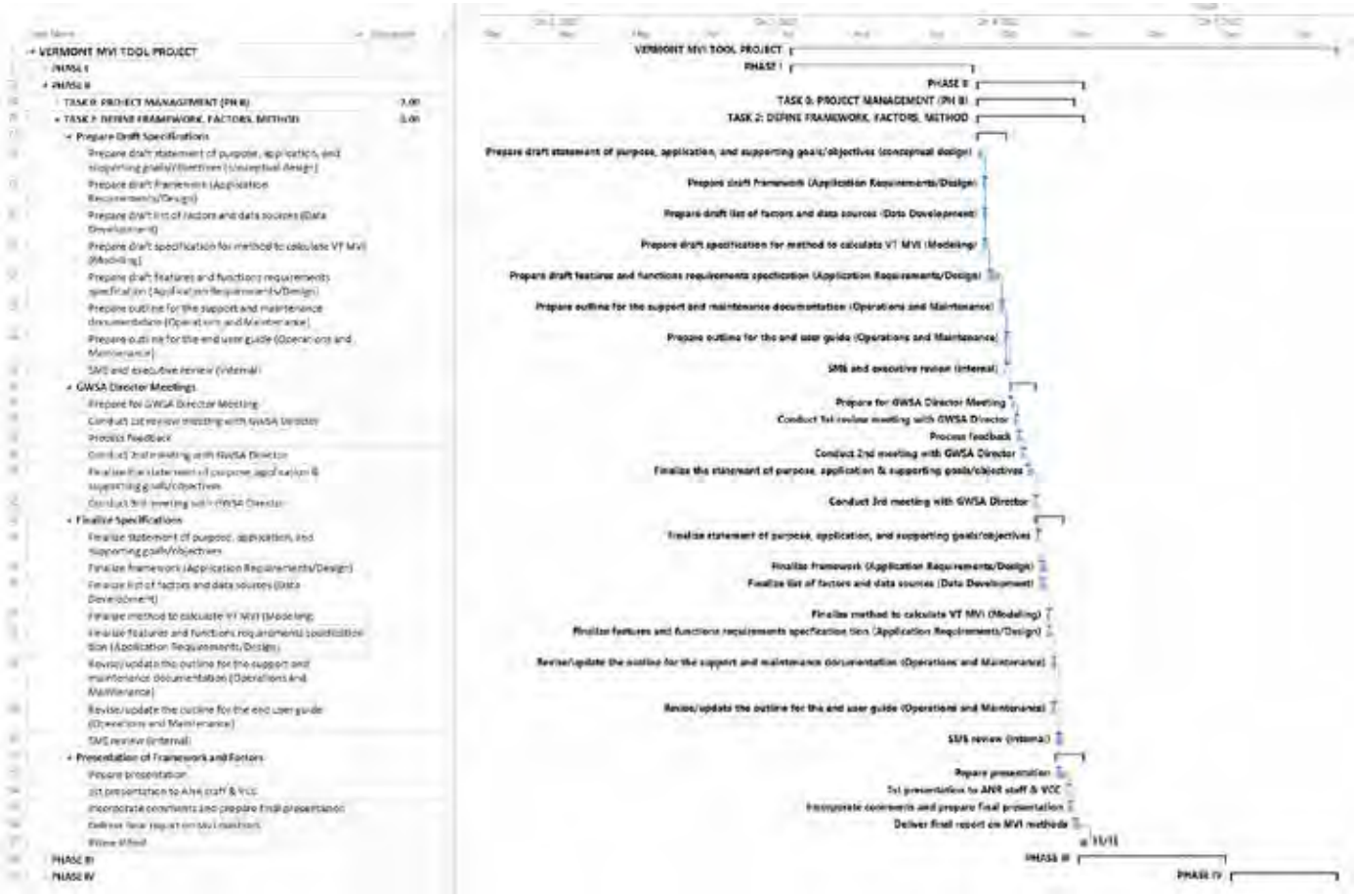
TASK 2: DEFINE THE FRAMEWORK, FACTORS, AND METHOD TO BE INCLUDED IN THE MVI TOOL

Task 2 aligns with the Data Development, Machine Learning/GIS/Modeling and Application Requirements/Design activities described above. A critical sub-task is the authoring of the statement of purpose, application, and supporting goals/objectives of the Vermont MVI, as the other design artifacts will follow from it.

We typically invest a relatively high proportion of our effort in these activities so that the solution scope is clearly defined and agreed upon. As such, Task 2 will include detailed drafts of the end-user interface and a detailed definition of the deployment architecture.

As much as possible, we prototype in the same platform on which the production system will be delivered. This ensures clear communication of the design intent vs the end-user experience. This approach also allows our solution development effort (Task 3) to execute with reduced risk.

Task 2: Work Plan



TASK 3: DEVELOP THE MUNICIPAL VULNERABILITY INDEX TOOL

The specifications developed in Task 2 will be consumed in Task 3, which is primarily concerned with the final preparation of the data, the building and testing of the model and the end-user interface, and the authoring of the end-user and support/maintenance documentation. That work is executed via repetitions of the MVI Tool Development Iterations sub-task. The purpose of this approach is to obtain stakeholder and end-user feedback as early and as often as possible throughout the development cycle.

A best practice followed by iParametrics is to "document as you go." With this approach, all specifications, including the end-user and system maintenance/support manuals, are updated as we develop and refine the data management methods, the MVI model,

the end-user application interface, and other elements of the complete solution. This ensures that the handover artifacts are current and complete and minimizes that amount of effort required for Phase IV/Task 4.

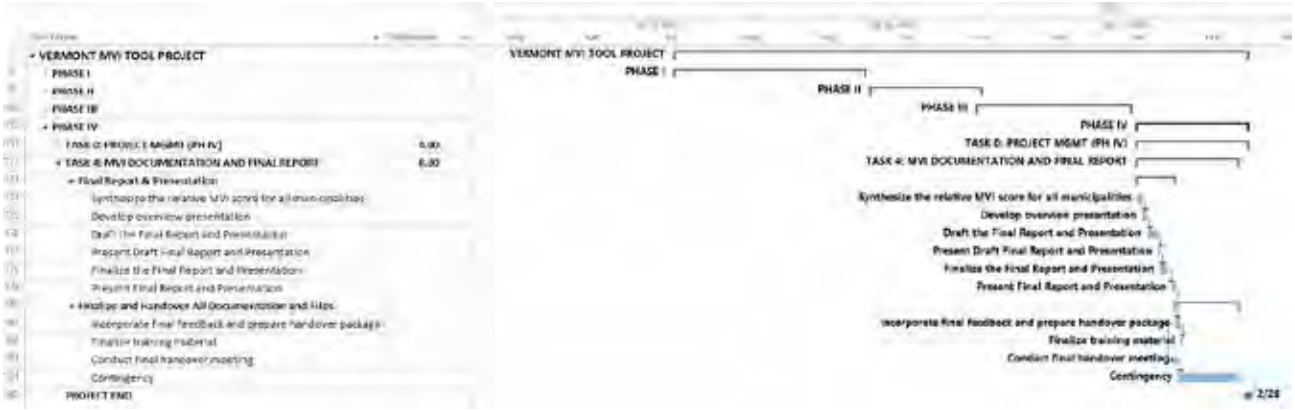
Task 3: Work Plan



TASK 4: MVI DOCUMENTATION AND FINAL REPORT

In Task 3, the project team will have calculated the relative MVI scores for all municipalities as they execute their development iterations and process stakeholder feedback. The team will also update all project documentation and artifacts as they execute each sprint. As such, Task 4 is primarily concerned with the preparation and delivery of the final presentation, the packaging of the handover package, and the physical handover/instructional meeting.

Task 4: Work Plan



SECTION 3

EXPERIENCE

As our nation faces the increasing frequency of climate related events, iParametrics has applied its data analytics and digital solutions competency to deliver a variety of solutions for our clients. Projects relevant to the Vermont MVI are described in the case studies in the following pages.



WELD COUNTY, COLORADO
HAZARD MITIGATION ANALYSIS

SITUATION

Weld County has an area of over 4,000 square miles and a population of over 325,000 residents. The county seat is Greeley and comprises the Greeley, CO, Metropolitan Statistical Area (MSA), which is also included in the Denver–Aurora, CO, Combined Statistical Area.

iParametrics was retained to provide data science and analytical analysis to update Weld County's 2016 Multi-Jurisdictional Hazard Mitigation Plan (HMP) in collaboration with local municipalities, fire departments, school districts, and other community organizations. This plan is designed to reduce the risks posed by hazards that affect the county and must be updated and approved by FEMA every five years to keep it current and to maintain eligibility for certain types of disaster assistance. Hazard mitigation planning helps residents, business owners, elected officials, and municipal departments think through how to plan, design, build, and establish programs for risk reduction.

TASK

iParametrics was tasked with developing an analytical and quantitative approach to answer the question: **Where are the areas of highest risk within Weld County?** The project incorporated advanced analytics and geospatial modeling into the HMP by developing a geospatial analytics model to execute the risk identification component of the HMP.

ACTION

iParametrics developed a suitability model in Esri ArcGIS Pro to identify the areas of highest risk to Weld County. The model ingested data from 10+ state and federal agencies to represent the hazard types of highest concern to Weld County, such as severe storm, tornado, winter weather, prairie fire, hazardous material, and public health. In addition to gathering the data for the model, we also transformed the raw data, which varied in type (point, line, and polygon vector data and raster data) into continuous raster layers using various geoprocessing tools.

The hazard types were then weighted relative to one another based on impact analysis, and then combined to generate a composite risk layer. Criteria data was curated, prepared, and used for each hazard type of interest. The hazard types, corresponding datasets, preparation methods, and resolution were customized based on the project requirements outlined by the County. To combine the various hazard-specific layers into a composite risk layer, each data layer was transformed to a common hazard format and scale. County analysis and categorical data was transformed using the Unique Categories transformation method, while continuous data was transformed using the Linear option under the Continuous Functions transformation method. In addition to handling the transformations, the model also allowed for control over the criteria weight before generating the composite risk scores and mapping.

For this analysis, the weights were changed to reflect the potential magnitude of the population and spatial features that would be affected in the case of the corresponding hazard event. After establishing the weights, the model was used to run the calculations and output the composite risk analysis for inclusion in the hazard mitigation plan.

WELD COUNTY, CO, HAZARD MITIGATION ANALYSIS CONTINUED

COMPARABLE DATA USED FOR THIS PROJECT

- Population
- Agriculture
- Social vulnerability characteristics
- Historic hazard characteristics

KEY DATA SOURCES

- American Community Survey
- Census Bureau
- MRLC (vegetative cover and agriculture)
- CoreLogic
- FEMA
- CDC

OUTCOME

iParametrics delivered hazard-specific maps detailing the data sources used for each hazard type, as well as a composite risk map for the County. The approach offered many advantages, including:

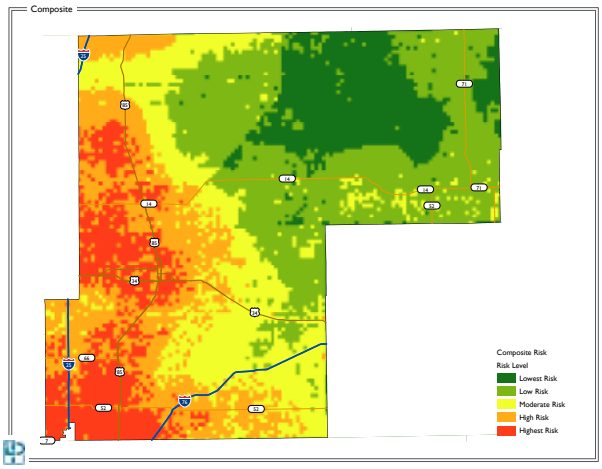
- Objective, data-driven outcomes
- Flexible and open methods
- Reproducible workflows and results
- Easily updated analyses over time and after events
- Defensible output

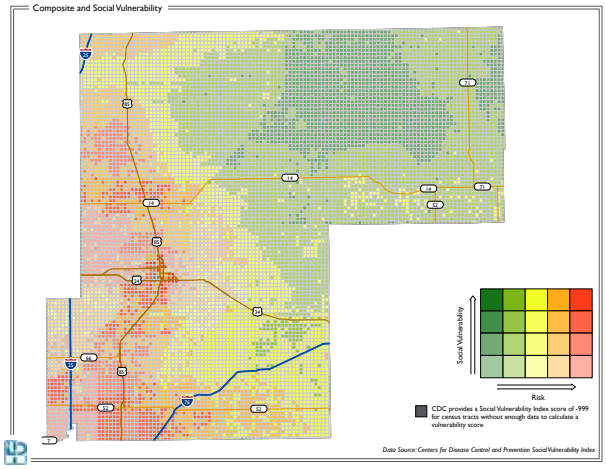
The analysis was recognized by the State Hazard Mitigation Officer as a possible new standard for hazard mitigation planning.

This project was similar in concept to the Vermont MVI project in that it sought to rank geographic areas within a County based on nine natural and man-made hazards relative to vulnerability within the County. Some of those hazards (risk of severe storm, public health, etc.) would also be relevant to MVI. In particular, we would anticipate inclusion of MRLC agriculture and vegetative cover data as a component within the MVI to help to pick up rural-community impact.

One key difference between MVI and this project is that the Weld County project is a current analysis, whereas MVI would be projections into the future based on climate change projections. Conceptually, however, the nature of the task is very similar and is conceptually straightforward to replace the current state data with future state projections and run the same type of analysis.

We anticipate that the static reports that we would present to ANR from this project as part of the final deliverables would be of the same nature and quality as the examples shown here.







NATIONWIDE
REBUILD BY DESIGN

COMPARABLE DATA USED FOR THIS PROJECT

- Population characteristics
- Social vulnerability characteristics
- Historic hazard mitigation funding

KEY DATA SOURCES

- American Community Survey
- CDC
- FEMA Open Data

SITUATION

As the world faces rising populations, mass migration, climate change, social injustices, and economic challenges, communities cannot afford to wait until after the next crisis to plan for the future. Through regional competitions, local engagements, research, and policy, Rebuild by Design is re-imagining the way communities find solutions for today's large-scale, complex problems by creating collaborations across communities and governments.

Rebuild by Design's efforts include comprehensive studies and reports calling for resilient infrastructure funding to address the physical and social vulnerabilities exposed by increased hazard events. The organization's proposed program calls for the infrastructure to maximize benefits to ecology, public health, and social resilience while reducing risk to transportation and other critical infrastructure, housing, and main streets. The proposed program also supports comprehensive planning to ensure that communities understand their long-term risks so they can direct growth to higher ground and support a comprehensive buy-out program for those areas which we cannot protect and instead need to move out of harm's way.

TASK

iParametrics was tasked with analyzing historical disaster data to support Rebuild by Design's initiatives. We were responsible for the generation of appropriate analytics, maps, tables, and visualizations to clearly communicate the compelling messaging of Rebuild by Design's program.

ACTION

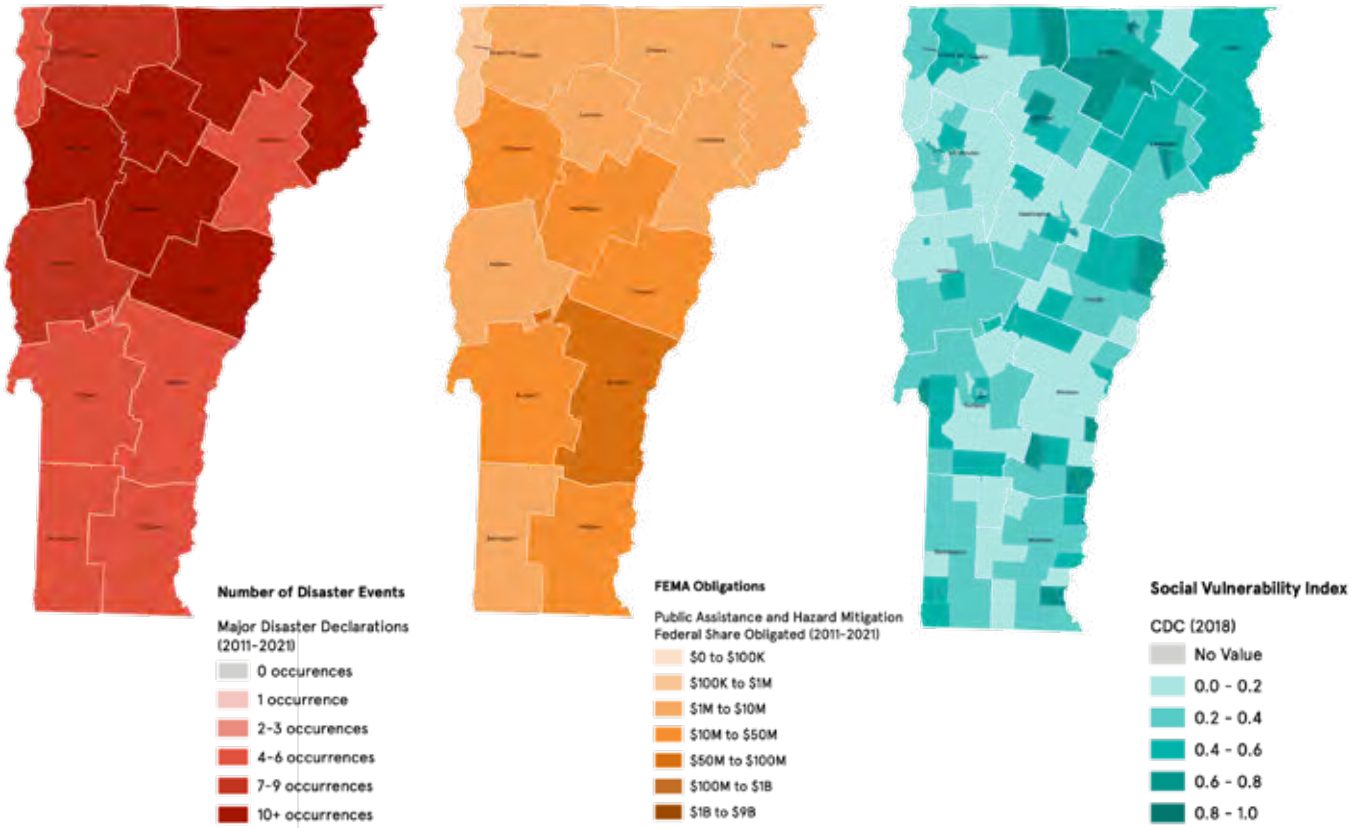
iParametrics analyzed federal declaration and disaster spend data nationwide from the past two decades with a focus on FEMA Public Assistance and Hazard Mitigation data. We also incorporated social vulnerability data to better understand the effects of disasters on vulnerable populations. To support Rebuild by Design's report, we generated county-level maps for each state nationwide, visualizing the aforementioned variables, We also provided tables with the underlying data and broken down by county, assistance type, and disaster.

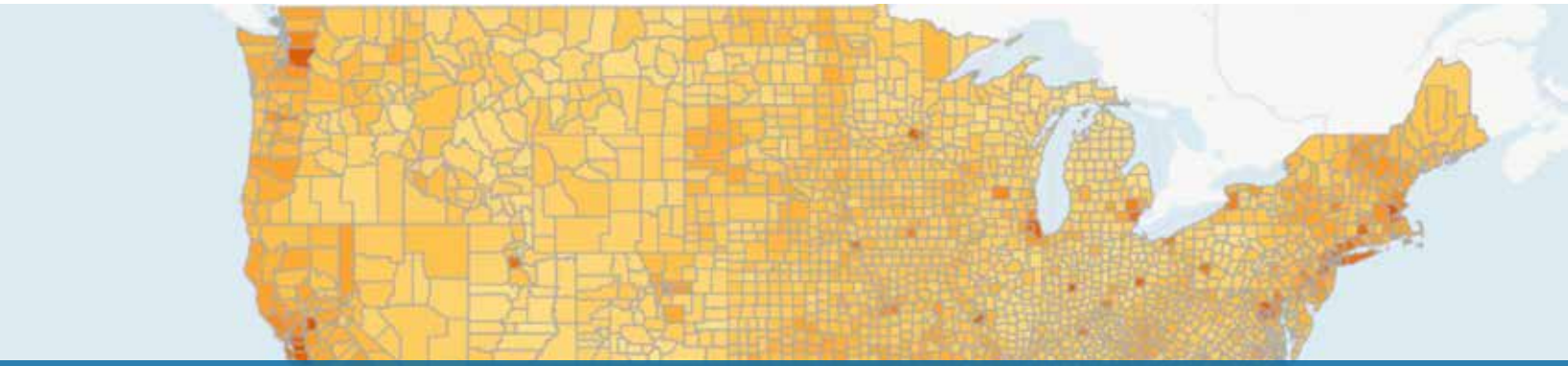
REBUILD BY DESIGN CONTINUED

OUTCOME

The nationwide report will be delivered on or before September 2022.

iParametrics has worked extensively with disaster and social vulnerability data that could be included in the Vermont MVI and has experience working with spatial analysis and generating maps and visualizations, similar to the ones shown below that were designed for this project. .





NATIONWIDE
SITE SUITABILITY ANALYZER

COMPARABLE DATA USED FOR THIS PROJECT

- Population
- Community Capital Index (includes metric for active public and civic organizations)
- Employment, specifically public jobs
- Hazard data

KEY DATA SOURCES

- American Community Survey
- Census Bureau
- BRIC
- LEHD Origin-Destination Employment Statistics (LODES)
- FEMA

SITUATION

iParametrics works with federal, state, and municipal government programs to deliver multi-faceted solutions in the areas of emergency and risk management, decision and analytical sciences, and program and cost consulting. The company is constantly servicing a growing list of clients and was looking for a method to target suitable counties.

TASK

Our emergency management team and a partner company tasked our analytics and digital solutions team to create an interactive tool that allows them to run nationwide suitability analyses. These analyses allow the user to find counties within the nation most applicable to disaster-related searches, answering questions like, "**where should we be targeting work after a disaster?**" or "**which counties may be under-prepared in the event of a disaster?**" Due to the open-endedness of the problem statement, the tool had to be flexible and adaptable to various use cases.

ACTION

Our analytics and digital solutions team developed a cloud-based application that allows users to search for counties within the nation that meet user-specific criteria. Specifically, the application provides a user interface for running disaster-related site suitability analyses on-demand. Users can break down their questions into individual data components related to population, infrastructure, financial, and vulnerability data to calculate a single "suitability score," where counties with higher scores more closely meet the search criteria. The application provides user-friendly controls, like check boxes and sliders to pick and weight factors, and outputs results instantly in tabular and spatial forms. The dynamic nature of the application allows users to run "what if" scenarios, where they can play with different combinations and weights of data.

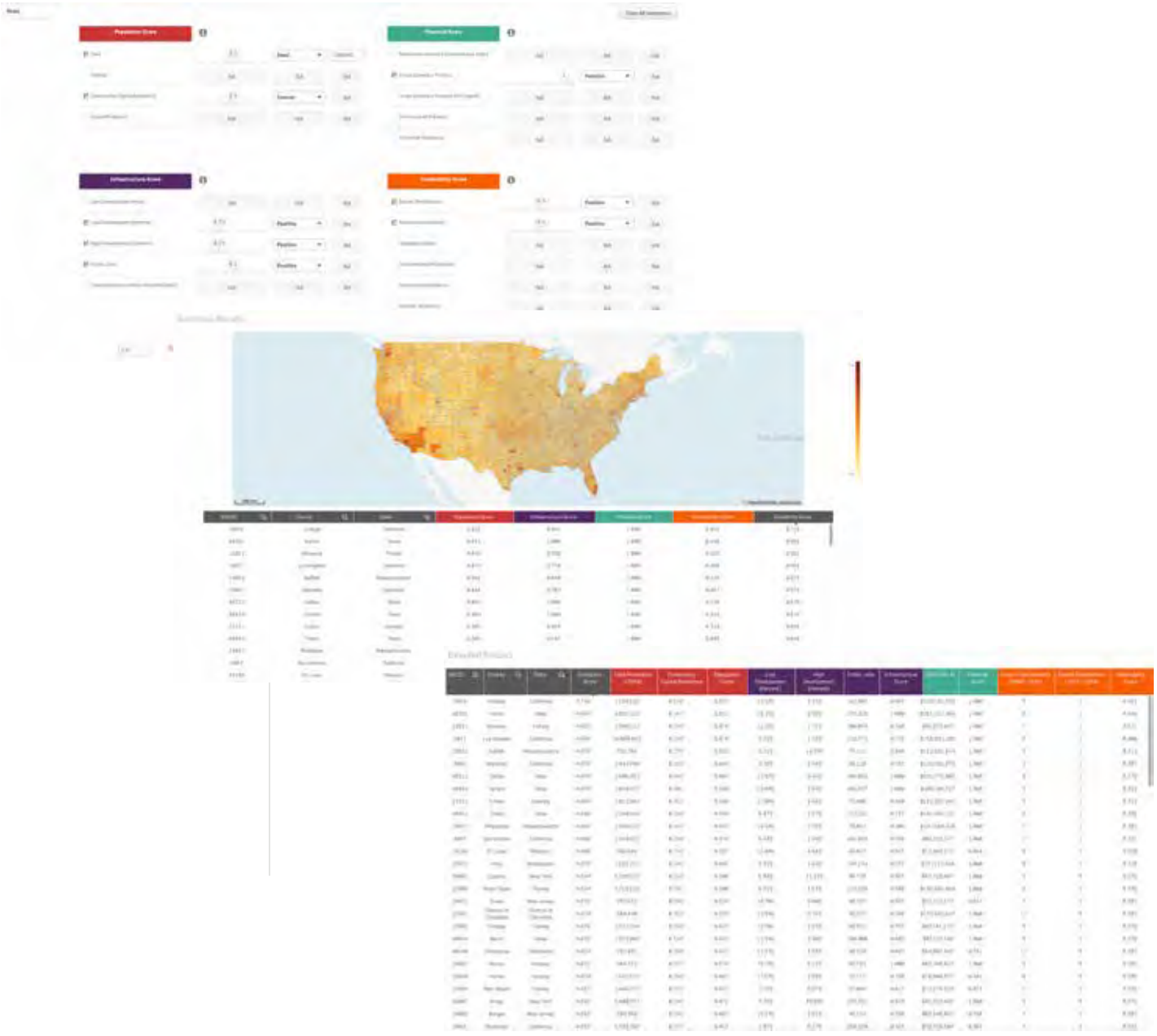
OUTCOME

iParametrics has used this tool extensively to identify communities vulnerable to various kinds of risks and to identify targets where risk mitigation services would be particularly apropos. This data is then used to assist such communities in understanding their risks.

SITE SUITABILITY ANALYZER CONTINUED

Similar to Vermont's MVI request, the Site Suitability Analyzer is a cloud-based interactive tool that allows users to dynamically and repetitively run various "what if" scenarios to hone in on targets of focus for mitigation efforts.

Like the Weld County project, it was designed to evaluate current conditions rather than project conditions into the future (climate change).





NATIONWIDE
RAPID HURRICANE RESPONSE MANAGEMENT SYSTEM

COMPARABLE DATA USED FOR THIS PROJECT

- Emergency services and shelter information
- Community vulnerability
- Infrastructure
- Impact of weather events

KEY DATA SOURCES

- BRIC
- HIFLD
- FEMA
- NOAA
- CDC

SITUATION

When a disaster strikes, a determination must be made to measure if the resources needed to recover are expected to exceed local and state resources. If they do, the state and local communities are eligible to apply for federal disaster funding. Preliminary Damage Assessments (surveying damages) are conducted to enable states, local jurisdictions, and FEMA to determine the magnitude of damage and impact of a disaster event.

The process typically takes a minimum of 40 days and on large disasters can take many months to complete. During this time, much need recovery funding is delayed.

TASK

In conjunctions with Fluor Corporation, a prime FEMA subcontractor, iParametrics developed a Preliminary Damage Assessment (PDA) and decision support tool to greatly reduce the disaster declaration timeframe. The tool also provides situational awareness and decision support capabilities to emergency planners and first responders.

ACTION

Using over 40 databases, machine learning, feature engineering, geospatial engineering, and analytical techniques, iParametrics developed a probability model that runs within R (Environment for Statistical Computing) that classifies if a county will be declared eligible for federal disaster funding under FEMA's Public Assistance program. This allows end-users to make rapid and complete assessments for Public Assistance funding during the PDA phase of a disaster, within hours of the event rather than months later.

During COVID this tool was expanded to demonstrate how emergency managers may handle simultaneous disasters of a hurricane and pandemic at the same time. One feature of this extension was to identify viable temporary housing facilities outside of the hurricane risk zone that were also suitable for social distancing and show the capacity, distance, and route to each facility. Further, it also identified hospitals outside the risk zone, together with current hospital capacity, taking existing COVID patients into account, and showed the distance and route to each one.

RAPID HURRICANE RESPONSE MANAGEMENT SYSTEM CONTINUED

OUTCOME

The system can identify the majority of counties to be declared federal disaster areas with a greater than 95% accuracy within one day of hurricane landfall. This allows planners to begin identifying and mobilizing the appropriate personnel and physical resources in advance of the actual disaster declaration with confidence that the declaration will in fact be made.

Further, it identifies, in detail, major infrastructure within the predicted declared counties, including hospitals, schools, power, sewer, water, communications facilities, roads, and bridges, etc. This detail includes specific infrastructure location geo-coordinates, together with characteristics of the facility (like number of students for a school, or number of beds for a hospital).

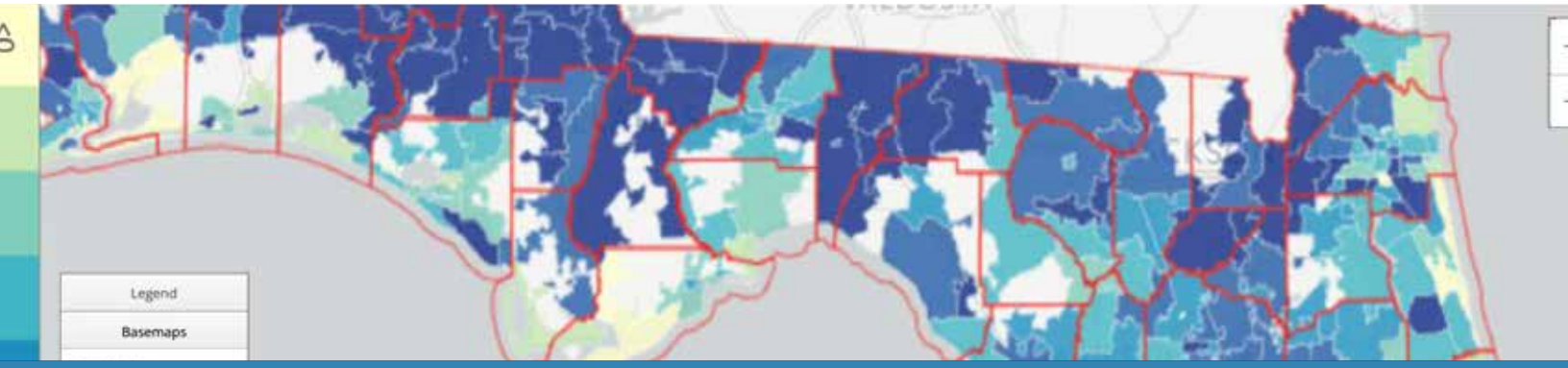
Finally, as mentioned, for displaced residents and hospital patients, it identifies viable alternative housing and hospital resources, together with exact routing information.

Though the objective for this project was different that Vermont MVI objective, it does illustrate in one application several technical features directly relevant to the MVI deliverables:

- It is an "operationally focused" interactive on-line application
- It provides for the ability to zoom in and out on locations of interest
- It provides numerous options for manipulation of the data
- It provides several different "purpose built" views for different user types
- It addresses electrical, housing, transportation, etc. Infrastructure with granular details
- It provides for extensive export capabilities
- It addresses impact on both city and residential counties
- It calculates distances (and routing) from emergency services and shelter







STATE OF FLORIDA

MITIGATION ASSESSMENT REPORTS

COMPARABLE DATA USED FOR THIS PROJECT

- Population (including characteristics)
- Climate change threats
- Infrastructure

KEY DATA SOURCES

- American Community Survey
- Census Bureau
- CDC
- NOAA
- HIFLD

SITUATION

Numerous federal agencies, including FEMA, DOT, and HUD, have made mitigation funding available to aid state and local communities to reduce the risks they face from disasters and natural hazards, including climate change. This has led to state and local communities needing to answer the difficult and complex question of "**where should I spend my mitigation dollars?**"

TASK

The State of Florida tasked iParametrics with analytically prioritizing which counties should receive mitigation dollars. The state also wanted a visual report to summarize and communicate the data and findings.

ACTION

iParametrics performed a comprehensive mitigation assessment for the state of Florida by analyzing historical, point-in-time, and projected data. Specifically, the report included an analysis of federal spending, disaster frequency and magnitude, vulnerable populations, infrastructure density, and climate change projections to understand the state's profile.

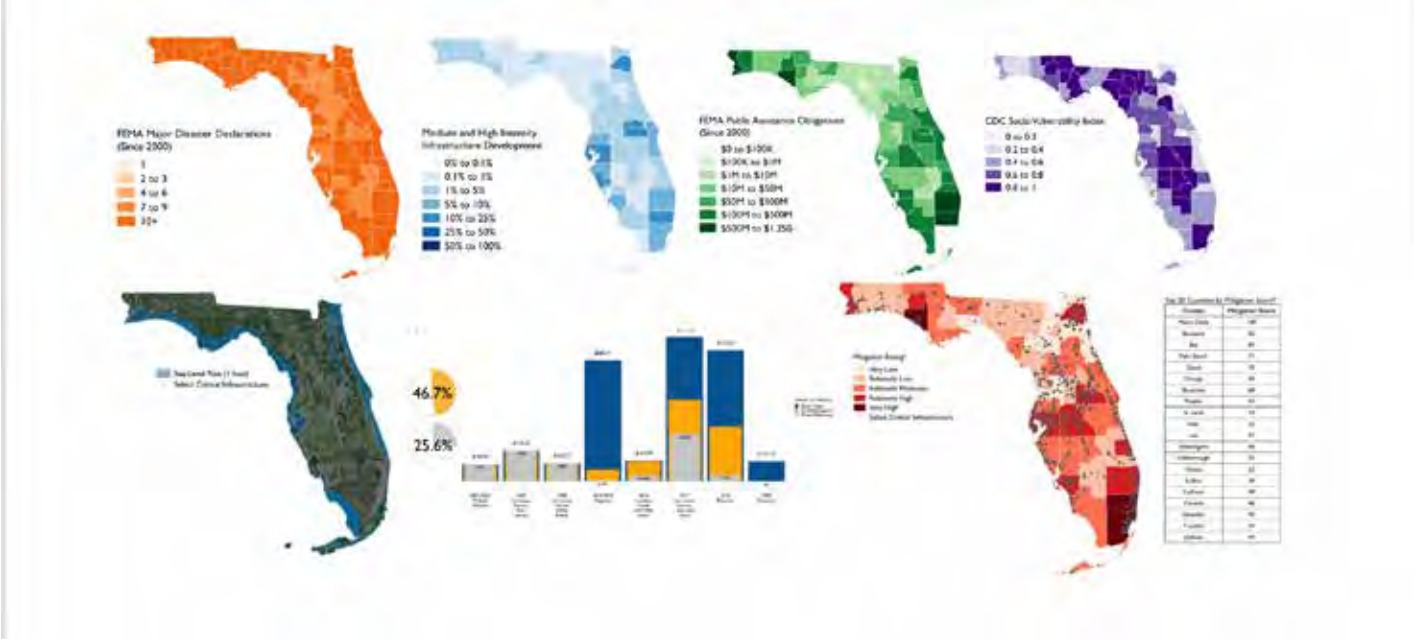
The analysis also included the development of a mitigation score, which used some of the aforementioned factors to determine which counties in the state are in most need of mitigation funding. All of the data and analyses were summarized into a report using graphics, maps, and tables to easily communicate the findings and for disbursement to various stakeholders within the state.

OUTCOME

The products developed by iParametrics and our partner for the State of Florida began a thought-provoking discussion within the senior leadership of the Governor's Office of Policy and Budget as well as FDEM. Additional work is being scoped across multiple agencies to identify how data developed by iParametrics can be leveraged to enhance decision and grant making throughout the state.

STATE OF FLORIDA MITIGATION ASSESSMENT REPORTS CONTINUED

In line with the objectives of the MVI, this project calculates a "score" (i.e., "Index") to understand the state's vulnerability in a spatial context. This project focuses on vulnerabilities that should specifically warrant mitigation spending, so the data sources used are not identical to the data sources relevant to the MVI's objectives, but the framework still applies. In addition, this project incorporated climate change projections to provide understanding of both present and potential future risks.





NATIONWIDE
CRITICAL INFRASTRUCTURE ANALYZER

COMPARABLE DATA USED FOR THIS PROJECT

- Infrastructure characteristics
- Location-based risk scores

KEY DATA SOURCES

- HIFLD
- CoreLogic (fee-based data set)

SITUATION

iParametrics works with our clients to protect our nation's most important infrastructure, including through all-hazards risk assessments, security and risk planning, and mitigation processes. When assessing our clients' assets, we rely on our subject matter experts, but also understand the importance and power of objective, data-driven input.

TASK

We worked with our team of licensed and certified professionals in security and risk management to develop an application for our clients that supplements the work of our subject matter experts with analytics-based risk assessments.

ACTION

iParametrics developed a cloud-based application that calculates risk scores on an address-level. The application allows users to generate an assessment on-demand of their infrastructure assets against 12 different natural and man-made hazards, such as crime, earthquake, hurricane, and tornado. Users can pull their infrastructure from our database, which includes over 4.5 million public infrastructure assets, or use their own custom list.

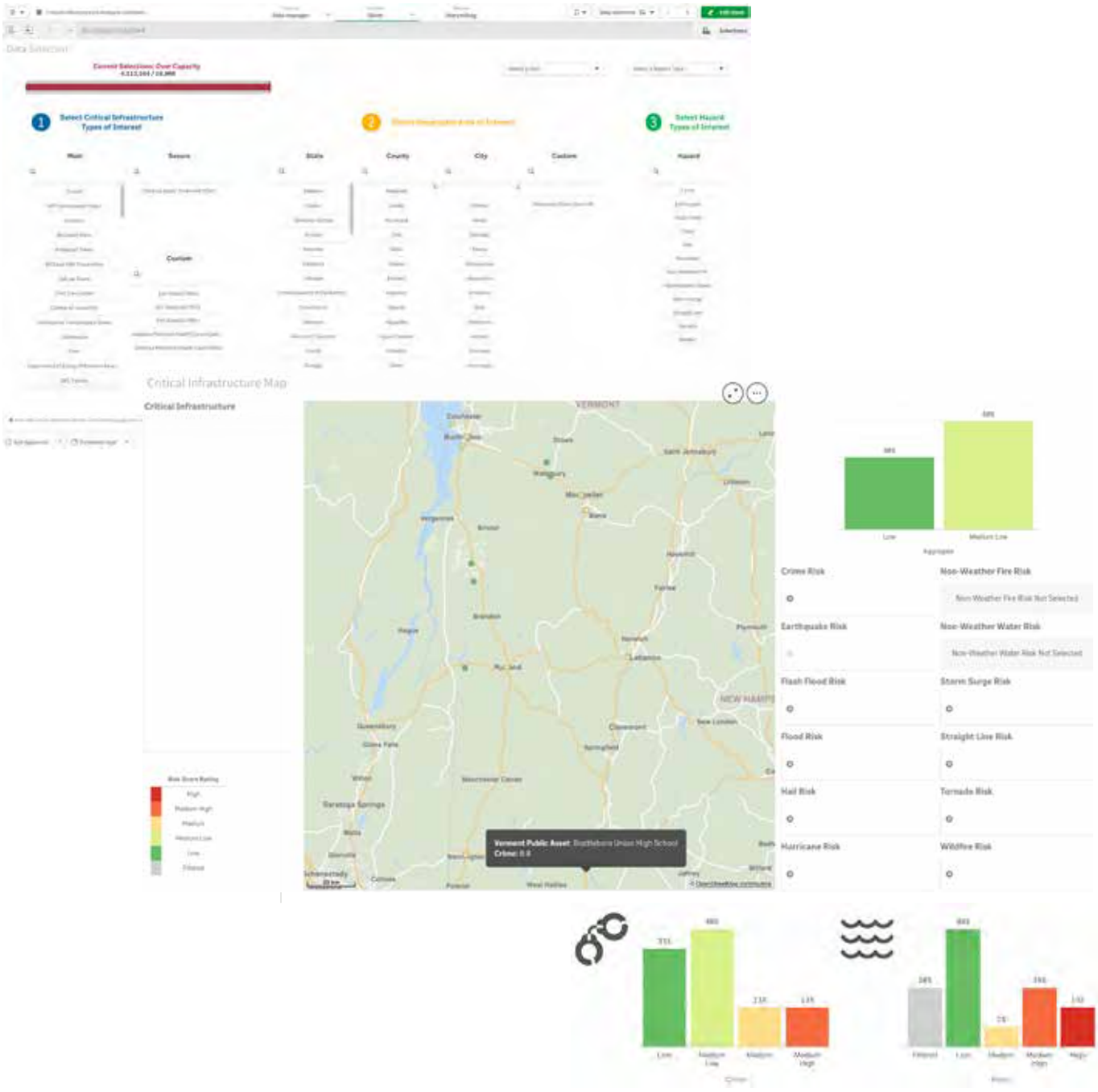
The tool also includes non-public and secure data sources that can be accessed on behalf of clients that have appropriate clearance to see that data. The resulting assessment includes spatial, graphical, and tabular outputs, such as maps plotting the assets, colored by risk score, and summary bar charts showing the distribution of risk within the portfolio. The application is interactive, allowing users to zoom to different assets, turn on and off risk layers, filter to specific points, and export the underlying data.

OUTCOME

As implied by the name, the focus of the tool is on infrastructure critical to the effective operation of communities, including power, water, communications, healthcare, etc. iParametrics has used this tool effectively to augment our detailed and customized risk assessment work.

CRITICAL INFRASTRUCTURE ANALYZER CONTINUED

The Critical Infrastructure Analyzer looks at vulnerability on an address-level using a spatial, online platform. The Critical Infrastructure Analyzer also provides users with extremely detailed information about the characteristics of each facility. Similar to the objectives of the Vermont MVI tool, the Critical Infrastructure Analyzer allows users to zoom in and out of maps, turn on and off data layers, and filter and export data.





STATE OF VERMONT

CRITICAL INFRASTRUCTURE VULNERABILITY ASSESSMENTS

COMPARABLE DATA USED FOR THIS PROJECT

- Distance from emergency services
- Infrastructure characteristics
- Vulnerability characteristics
- Risk characteristics
- Parcel data

KEY DATA SOURCES

- HIFLD
- HERE
- FBI UCR
- CoreLogic

SITUATION

When building disaster recovery plans, an understanding of infrastructure resources is critically important to first responders and emergency services. The State of Vermont requested a consultant team to create a GIS database that could visually show the critical infrastructure throughout the state, including roads, bridges, water, and education facilities.

In late 2019, the State of Vermont engaged iParametrics to create a GIS-layered Vermont Critical Infrastructure List. After we collected data from public agencies on their critical infrastructure, we applied the criteria in the Vermont Infrastructure and Resilience Plan to develop a single, comprehensive Vermont Critical Infrastructure List.

TASK

The Vermont Homeland Security Unit tasked iParametrics with first creating a single, comprehensive list of critical infrastructure assets in the state and a GIS layer for each sector. Subsequently, we were tasked with running vulnerability assessments for a subset of the state's assets.

Once data collection was complete, we created a GIS layer for each Critical Infrastructure Sector, as identified by the United States Department of Homeland Security (DHS), that includes the list of all facilities identified on the Vermont Critical Infrastructure List. This project creates a comprehensive list that the state emergency managers could use in disaster planning and mitigation. Education outreach was tailored by sector and included both in-person and virtual meetings to discuss the project and the reason for cooperation.

ACTION

Our team identified infrastructure through a variety of state-owned and open-source data sets, including aerial LiDAR, VTrans road centerline data, VTrans bridge and culvert inventory, and primary information from communities across the state. Finally, our team entered this information into a GIS system that allows state officials to visualize the assets in the state and understand their criticality when planning for and responding to emergencies.

VERMONT CRITICAL INFRASTRUCTURE ASSESSMENTS CONTINUED

OUTCOME

This project was delayed due to the COVID-19 pandemic but was completed in 2021. The iParametrics team successfully cultivated a list of Vermont's state-level critical infrastructure assets, created a GIS map product, and conducted outreach and surveys. The tool is now in use for the State's emergency managers.

As illustrated by this project, iParametrics has worked with Vermont on risk assessment and mitigation projects in the past. With respect to the MVI work, this project also shows analysis of distance from emergency services and use of infrastructure and parcel data. We anticipate that the static reports that we would present as part of the final deliverables for the MVI project would be of the same graphic quality as the examples shown here.





VARIOUS LOCATIONS

AWIA RISK AND RESILIENCE ASSESSMENTS

COMPARABLE DATA USED FOR THIS PROJECT

- Distance from emergency services
- Infrastructure characteristics
- Vulnerability characteristics
- Risk characteristics
- Parcel data

KEY DATA SOURCES

- HIFLD
- HERE
- FBI UCR
- CoreLogic

SITUATION

In October 2018, the United States Legislature passed America's Water Infrastructure Act (AWIA). This amendment to the Safe Drinking Water Act requires every community water system serving a population of more than 3,300 people to conduct a Risk and Resiliency Assessment (RRA) and develop a comprehensive Emergency Response Plan (ERP). Federally mandated deadlines for completion of the tasks were based on the size of the utilities.

iParametrics worked with community water and wastewater systems across the country to conduct risk and resilience assessments of their systems. Major areas of support include identification and resolution of vulnerabilities, exercises, physical security assessments, technology, budget, and development of Environmental Protection Agency (EPA)-compliant emergency response plans. The assessments must take into consideration both malevolent and natural hazards and must be conducted using a reliable methodology.

Profiled below are four such representative assessments: **Bend, Oregon; Davidson Water, North Carolina; City of Greeley, Colorado**; and **Johnston County, North Carolina**.

TASK

In each case, iParametrics was awarded a contract to conduct an RRA and develop the ERPs.

- Bend's system serves a population of over 62,000 and includes 25 groundwater wells, 15 finished water storage reservoirs, six booster pump stations, and approximately 420 miles of transmission and distribution mains.
- The Davidson County community water system serves a population of over 100,000 and was among the first system required to certify having completed the requirements.
- The City of Greeley and the Johnston County community water system both serve populations of over 100,000 each.

ACTION

For all of the projects, the iParametrics team used a combination of the AWWA J100 seven-step process and the EPA's VSAT tool to meet AWIA RRA requirements. We developed an emergency

AWIA RISK AND RESILIENCE ASSESSMENTS CONTINUED

response plan that outlined strategies for physical security and cybersecurity response using the best parts of the existing customer ERP, the EPA template, and the AWWA G440. The goal was to give each client a tool that was not only compliant but also served as a first-use document in any crisis with "Rip & Run" templates for the most common hazards.

For all four of these projects - Bend, Davidson County, Greeley, and Johnston County – and for AWIA projects in general, iParametrics employed a robust team of engineering, security, and emergency management specialists certified by the AWWA in the AWIA process. The team conducted a series of workshops using the AWWA J-100 Risk and Resilience Methodology. The team also evaluated over 50 threat-asset pairs and conducted site visits to determine criticality, vulnerability, and evaluate existing countermeasures.

OUTCOME

For many of these projects, despite initiating the process in the middle of a national pandemic, we adjusted our workshops and site visits in a manner to remain on schedule without any impact to quality or performance.

For all these projects, our team completed all tasks required by the law ahead of the required deadlines, allowing the community water system to certify and preclude the possibility of penalties from the enforcement arm of the EPA. In addition, the utilities now have a detailed multi-year plan and schedule for the implementation of additional protective measures to ensure safe community drinking water.

These projects are all good examples of how our analytics and digital solutions team works closely with other iParametrics teams to create the best deliverable for the client. In this case, personnel from our security and risk management team conducted extensive subject matter expertise, including site surveys and direct interviews, while the analyses and graphical depictions created by the analytics and digital solutions team greatly expedited the process of turning the data into actionable results and presenting them in an easily understandable format.

In our work for Vermont on this MVI, we anticipate augmenting the skills of our analytics personnel with the expertise of our subject matter expertise in all aspects of risk management, risk mitigation, and event response. These projects also demonstrate the same methodology applied to a variety of different client types. In some cases, the client was an individual city or county; in other cases it was a water system serving an entire region.

Due to the classified nature of this work, we are unable to share report examples.



WESTERN AREA POWER ADMINISTRATION

RISK ASSESSMENT PROGRAM

COMPARABLE DATA USED FOR THIS PROJECT

- Distance from emergency services
- Infrastructure characteristics
- Vulnerability characteristics
- Risk characteristics
- Parcel data

KEY DATA SOURCES

- HIFLD
- HERE
- FBI UCR
- CoreLogic

SITUATION

The United States power delivery system is incredibly complex. It consists of a visible network of generating units, substations, transmission lines, distribution lines, and other components. It also includes the less visible devices that sense and report on the state of the system, including the automatic and human controls operating the system and the intricate web of IT and communication systems tying everything together. This system carries electricity from large central generation facilities to customers throughout the country. It is fragile and inherently vulnerable due to its age and the fact that transmission lines often span hundreds of miles, in addition to many key facilities being unguarded.

In 2015, iParametrics was awarded a multi-year contract to act as the security consultant for one of the nation's largest multi-state electric transmission utilities to ensure system security and resilience. Our client was one of the largest providers of electricity in the United States, encompassing over $4 billion in assets and transmitting more than 30 billion kilowatt-hours of power through an integrated 17,000+ circuit-mile transmission system across 15 central and western states. The system provides power to hundreds of communities and over 40 million consumers throughout the United States.

TASK

Under this program, iParametrics developed an enterprise-wide security and resilience planning program by performing risk assessments of system assets with the goal of ensuring power transmission and distribution systems are less vulnerable to natural and malevolent disruptions. The project included over 300 sites across the utility's 15-state service region

ACTION

iParametrics assessed the agency's Bulk Electric System (BES) connections and supporting facilities, including headquarters' facilities, regional offices, high-voltage and extra-high-voltage transmission stations and substations, dozens of dams, solar, and wind power generating stations, operations centers, and maintenance facilities. We performed threat and vulnerability assessments, analyzed existing physical security measures, electronic security systems, policies, procedures, and practices in each location, and provided findings and recommendations, parametric system design, and cost

WAPA RISK ASSESSMENT PROGRAM CONTINUED

budgets for corrective action to enhance the utility's enterprise security program. The analytics and digital solutions team augmented this effort by analyzing threat, vulnerability, and hazard data and creating graphics to illustrate salient points in an easy to absorb format.

OUTCOME

This four-year contract spanned over 300 facilities across 15 states and required an aggressive completion schedule framed by the customer's budgeting cycle. Due to the overarching and complex nature of the project, it required input, collaboration, and engagement with utility leaders and employees, private and public sector power providers, federal, state, and local regulating authorities, law enforcement, and security staff. All work was completed on time and within budget. iParametrics received performance assessment ratings, which measure the project quality and performance, of Very Good to Exceptional throughout the term of the engagement.

This project illustrates some of the work that iParametrics has done related to various critical infrastructure. In this case, our work was on power generation, transmission, and distribution. Similar studies have been completed related to communications, water systems, transportation, and more.

Due to the classified nature of this work, we are unable to share report examples.



US INTERNATIONAL WATER AND BOUNDARY COMMISSION

CRITICAL INFRASTRUCTURE THREAT AND VULNERABILITY ASSESSMENTS

COMPARABLE DATA USED FOR THIS PROJECT

- Distance from emergency services
- Infrastructure characteristics
- Vulnerability characteristics
- Risk characteristics
- Crime characteristics
- Parcel data

KEY DATA SOURCES

- HIFLD
- HERE
- FBI UCR
- CoreLogic

SITUATION

The United States Section of the International Boundary and Water Commission (USIBWC) required a complete technical threat and vulnerability assessment for each of its facilities along the United States/Mexico border. This included all USIBWC building offices, field offices, water and wastewater treatment plants, hydraulic dams, and associated structures. Many of these facilities are subject to transnational crime which occurs in the border region.

TASK

iParametrics performed assessments to evaluate risk and existing risk controls and systems in place to determine the economic feasibility of replacing or upgrading current systems to effectively protect the facilities for employee safety, facility security, theft prevention, vandalism of property and assets, and the prevention of terrorism.

ACTION

iParametrics conducted a series of physical security inspections of US critical infrastructure facilities (dams, bridges, and waterways) located along the southern US border. The program included a complete risk assessment and phased enhancement and mitigation plan for each facility. The program included:

- Phase I: Threat and Vulnerability Assessment (TVA)
- Phase II: TVA Briefing and Report
- Phase III: Mitigation Plan, Cost Estimate, and Phased Schedule
- Phase IV: Program Management of the implementation of recommendations

The physical security assessment was conducted in a joint effort between the homeland security team and analytics and digital solutions team. The analytics and digital solutions team ran detailed site vulnerability assessments for each asset. Using data from disparate sources, the assessments included parcel and infrastructure, emergency routing, man-made and natural hazard risk, and detailed crime analyses.

IBWC CRITICAL INFRASTRUCTURE ASSESSMENTS CONTINUED

OUTCOME

The analytics and digital solutions team augmented this effort by analyzing threat, vulnerability, and hazard data and creating graphics to illustrate salient points in an easy to absorb format.

This project illustrates the use of data to evaluate facility vulnerability and risk and highlights our experience working with spatial analysis to generate maps and visualizations. We anticipate that the static reports that we would present as part of the final deliverables for the MVI project would be of the same graphic quality as the examples shown here.



SECTION 4

CAPACITY TO COMPLETE THE WORK

iParametrics has the resources with the requisite skillsets on staff and available to deliver the Vermont MVI project. We do not require third-party or outside contractors to deliver this work.

Examples of our work, as permissable, can be found in the previous section. Appendix C and D show samples of our training documents and a sample app, which highlight our team's ability to complete this work.

Our project manager, Mark Homrich, Vice President of Analytics and Digital Solutions, has scheduling authority over the primary technical resources that will conduct the research and develop the solution. Jeff Stevens, Vice President of Emergency Management and Community Resilience, has scheduling authority over the line-of-business subject matter experts who will work with the analytics and development resources at critical review junctures throughout the project. Mark and Jeff's teams execute many projects in this fashion.

iParametrics can afford to be selective on the projects for which we bid, and we only bid with the confidence that if we are selected, we are fully prepared to deliver as promised.

SECTION 5

COST PROPOSAL

For the Vermont MVI project, iParametrics estimates the total cost to be $119,472. The hourly rates are inclusive of all overhead rates. Travel or incidental expenses will be charged without mark-up.

Please see specific Cost Proposal information, as requested, below.

By Budget Category		
Personnel	$115,972	
Materials	$0	*there are no extraordinary material fees required for this project.
Travel	$3,500	For project kickoff meeting and subsequent onsite meetings. TBD
Total	**$119,472**	

By Deliverable	*1.00 Project Kickoff*	*1.01 Project Initiation and Workplan*	*1.02 Project Mgmt Phase I*	*2.00 Project Mgmt Phase II*	*3.00 Project Mgmt Phase III*	*4.00 Project Mgmt Phase IV*	*5.00 Research Report*	*6.00 MVI Tool Framework*	*7.00 MVI Tool Development*	*8.00 Final Report*	**Total**
Personnel	$1,550	$760	$10,758	$5,426	$7,995	$6,468	$22,530	$19,415	$33, 120	$7,950	$115,972
Materials											
Travel	$2,500								$1,000		$3,500
Total	**$4,050**	**$760**	**$10,758**	**$5,426**	**$7,995**	**$6,468**	**$22,530**	**$19,415**	**$34,120**	**$7,950**	**$119,472**

By Task	*Phase 0*	*Phase I*	*Phase II*	*Phase III*	*Phase IV*	**Total**
Personnel	$32,957	$22,530	$19,414	$33,120	$7,950	$115,972
Materials						
Travel	$2,500			$1,000		$3,500
Total	**$35,457**	**$22,530**	**$19,414**	**$34,120**	**$7,950**	**$119,472**

COST PROPOSAL CONTINUED

By Personnel				
Name	**Rate**	**Hours**	**Cost**	**Roles**
Payton Duran	$95.00	264	$25,111	Research, MVI Tool Specification and Solution Development
Heather Gibbs	$125.00	51	$6,334	Functional SME, Documentation and Training
Mark Homrich	$190.00	169	$32,167	Project Management
John Lorimer	$185.00	25	$4,564	Technical SME
Ariel Mallet	$115.00	356	$40,915	Research, MVI Tool Specification and Solution Development (lead)
Jeff Stevens	$185.00	17	$3,186	Functional SME
Royce Woodruff	$168.00	22	$3,696	Functional SME, MVI Tool Quality Assurance
		904	**$115,972**	

Appendix B. Certificate of Compliance

https://bgs.vermont.gov/sites/bgs/files/files/purchasing-contracting/contracts/Certificate%20of%20Compliance%205_16_17.pdf

CERTIFICATE OF COMPLIANCE

For a bid to be considered valid, this form must be completed in its entirety, executed by a duly authorized representative of the bidder, and submitted as part of the response to the proposal.

A. **NON COLLUSION:** Bidder hereby certifies that the prices quoted have been arrived at without collusion and that no prior information concerning these prices has been received from or given toa competitive company. If there is sufficient evidence to warrant investigation of the bid/contract process by the Office of the Attorney General, bidder understands that this paragraph might be used as a basis for litigation.

B. **CONTRACT TERMS:** Bidder hereby acknowledges that is has read, understands and agrees to the terms of this RFP, including Attachment C: Standard State Contract Provisions, and any other contract attachments included with this RFP.

C. **FORM OF PAYMENT:** Does Bidder accept the Visa Purchasing Card as a form of payment?

_____Yes__X__No

D. **WORKER CLASSIFICATION COMPLIANCE REQUIREMENT:** In accordance with Section 32 ofThe Vermont Recovery and Reinvestment Act of 2009 (Act No. 54), the following provisions and requirements apply to Bidder when the amount of its bid exceeds $250,000.00.

Self-Reporting. Bidder hereby self-reports the following information relating to past violations,convictions, suspensions, and any other information related to past performance relative to coding and classification of workers, that occurred in the previous 12 months.

Summary of Detailed Information	Date of Notification	Outcome
n/a		

Subcontractor Reporting. Bidder hereby acknowledges and agrees that if it is a successful bidder, prior to execution of any contract resulting from this RFP, Bidder will provide to the State a list of all proposed subcontractors and subcontractors' subcontractors, together with the identity of those subcontractors' workers compensation insurance providers, and additional required or requested information, as applicable, in accordance with Section 32 of The Vermont Recovery andReinvestment Act of 2009 (Act No. 54), and

Bidder will provide any update of such list to the State as additional subcontractors are hired. Bidder further acknowledges and agrees that the failure tosubmit subcontractor reporting in accordance with Section 32 of The Vermont Recovery and Reinvestment Act of 2009 (Act No. 54) will constitute non-compliance and may result in cancellation of contract and/or restriction from bidding on future state contracts.

E. Executive Order 05 – 16: Climate Change Considerations in State Procurements Certification

Bidder certifies to the following (Bidder may attach any desired explanation or substantiation. Please also note that Bidder may be asked to provide documentation forany applicable claims):

1. Bidder owns, leases or utilizes, for business purposes, space that has received:
   - ☒ Energy Star® Certification
   - ☐ LEED®, Green Globes®, or Living Buildings Challenge℠ Certification
   - ☐ Other internationally recognized building certification:

2. Bidder has received incentives or rebates from an Energy Efficiency Utility or Energy Efficiency Program in the last five years for energy efficient improvements made at bidder's place of business. Please explain:

   We installed Smart Thermostats throughout the office

3. Please Check all that apply:
   - ☐ Bidder can claim on-site renewable power or anaerobic-digester power ("cow-power"). Orbidder consumes renewable electricity through voluntary purchase or offset, provided no such claimed power can be double-claimed by another party.
   - ☐ Bidder uses renewable biomass or bio-fuel for the purposes of thermal (heat) energy atits place of business.
   - ☒ Bidder's heating system has modern, high-efficiency units (boilers, furnaces, stoves, etc.), having reduced emissions of particulate matter and other air pollutants.
   - ☒ Bidder tracks its energy consumption and harmful greenhouse gas emissions. What tool is used to do this? We use the Google Nest system
   - ☒ Bidder promotes the use of plug-in electric vehicles by providing electric vehicle charging, electric fleet vehicles, preferred parking, designated parking, purchase or lease incentives, etc..
   - ☐ Bidder offers employees an option for a fossil fuel divestment retirement account.
   - ☒ Bidder offers products or services that reduce waste, conserve water, or promote energyefficiency and conservation. Please explain:

We do our best to provide all of our services/work products in electronic format to reduce the use of paper and other supplies.

4. Please list any additional practices that promote clean energy and take action to address climate change:

We offer on-site recycling at our headquarters office, including paper, cardboard, aluminum, and K-cup recycling.

F. Acknowledge receipt of the following Addenda:

Addendum No.: No addenda but did receive answer to questions Dated: 6/2/2022 Addendum

No.: _____ Dated: _____ Addendum

No.: _____ Dated: _____

Bidder Name: iParametrics, LLC Contact Name: Paul S. Pelletier

Address: 6515 Shiloh Road, Suite 200 Fax Number: 770-664-6696

Alpharetta, GA 30005 Telephone: 770-664-6636

E-Mail: paul.pelletier@iParametrics.com

By: _____ Name: Paul S. Pelletier

Signature of Bidder (or Representative) (Type or Print)

END OF CERTIFICATE OF COMPLIANCE

Data Provider	Service, Data, or Tool	Description	Count of Independent Datasets	License Type	Category
ACS	Data	The American Community Survey (ACS) helps local officials, community leaders, and businesses understand the changes taking place in their communities. It is the premier source for detailed population and housing information about our nation. Dataset count based on independent housing and population datasets.	49	Public	Demographic Data
BLS	Data	An independent national statistical agency that collects, processes, analyzes, and disseminates essential statistical data for the public, Congress, other federal agencies, state and local governments, business, and labor.	16	Public	Demographic Data
CDC	Data	The Centers for Disease Control and Prevention is the national public health agency of the United States. They have 1,184 unique datasets in 24 different categories. These includes the Social Vulnerability Index (SVI), general health statistics, public health surveillance, and others.	24	Public	Demographic Data
Census Bureau	Data	Quality data about people and economy, mostly used for socio economic data, or population insights. Dataset count based on categories used including people and population, race and ethnicity, families and living arrangements, health, education, business and economy, employment, housing, and income and poverty.	9	Public	Demographic Data
CoreLogic	Data	Uses property characteristics to provide accurate risk assessments.	N/A	Commercial	Diasaster Data: Mitigation
EPA	Data	The Environmental Protection Agency is an independent executive agency of the United States federal government tasked with environmental protection matters. They have 7,200 unique datasets in 17 different categories including Air, Climate Change, Water, Sustainability, Energy, and more.	17	Public	Mixed Data
FBI	Data	The Uniform Crime Reporting (UCR) Program generates reliable statistics for use in law enforcement. The UCR Program includes data from more than 18,000 city, university and college, county, state, tribal, and federal law enforcement agencies. Agencies participate voluntarily and submit their crime data either through a state UCR program or directly to the FBI's UCR Program.	10	Public	Demographic Data
FEMA Open data	Data	Collects vast amounts of data on multiple aspects of emergency management — Disaster Information, Individual Assistance, Public Assistance, Hazard Mitigation, National Flood Insurance Program (NFIP), and Grants. Data sets are available for download, along with an application programming interface (API) that provides data in an easily digestible, machine readable format.	22	Public	Disaster Data: Declaration, Mitigation, and Obligations
FEMA Open data Disaster Information	Data		5	Public	Disaster Data: Declaration
FEMA Open data Hazard Mitigation	Data		5	Public	Disaster Data: Mitigation
FEMA Open data Individual Assistance	Data		6	Public	Disaster Data: Obligation
FEMA Open data Public Assistance	Data		6	Public	Disaster Data: Obligation
HERE	Service	Combines location content and software. Can run adaptive applications, such as driver hazard warnings or routing-as-a-service. Powers new mobility and supply chain solutions - all while maintaining user privacy and security. Used for routing service.	N/A	Commercial	Geography: Mobility
HIFLD Open	Data	Provides National foundation-level geospatial data within the open public domain that can be useful to support community preparedness, resiliency, research, and more. Has 375 total datasets	275	Public	Geography: Shapefiles
HIFLD Open Emergency Services	Data		22	Public	Geography: Shapefiles
HIFLD Open Law Enforcement	Data		11	Public	Geography: Shapefiles
HIFLD Open Natural Flood Hazards	Data		35	Public	Geography: Shapefiles
HIFLD Open Natural Hazards	Data		119	Public	Geography: Shapefiles
HIFLD Open Public Health	Data		14	Public	Geography: Shapefiles
HIFLD Open Transportation	Data		42	Public	Geography: Shapefiles
HIFLD Open Water Supply	Data		32	Public	Geography: Shapefiles
HIFLD Secure	Data	Provides both FOUO and commercially licensed geospatial foundation level data within the secure Geospatial Information Infrastructure (GII) Platform to support homeland security and homeland defense missions. Has 361 total datasets.	192	Commercial	Geography: Shapefiles
HIFLD Secure Emergency Services	Data		51	Commercial	Geography: Shapefiles
HIFLD Secure Law Enforcement	Data		57	Commercial	Geography: Shapefiles
HIFLD Secure Natural Flood Hazards	Data		2	Commercial	Geography: Shapefiles
HIFLD Secure Natural Hazards	Data		18	Commercial	Geography: Shapefiles
HIFLD Secure Parcel	Data		3	Commercial	Geography: Shapefiles
HIFLD Secure Public Health	Data		25	Commercial	Geography: Shapefiles
HIFLD Secure Roads and Routing	Data		3	Commercial	Geography: Shapefiles
HIFLD Secure Transportation	Data		10	Commercial	Geography: Shapefiles
HIFLD Secure Water Supply	Data		23	Commercial	Geography: Shapefiles
HVRI	Data	The Hazards Vulnerability & Resilience Institute (HVRI) is an interdisciplinary research and training center focused on the development of spatial analytical information, data, methods, and application for integrating hazard and climate information to advance equitable planning and management and adaptive capacity in communities as they respond to disaster risks and climate change. Data tools are BRIC — Baseline Resilience Indicators for Communities, SoVI® — Social Vulnerability Index, Socioeconomic Impacts of Natural Hazards — HazDash, and SHELDUS™ Data.	4	Public / Commercial (SHELDUS)	Disaster Data
HVRI BRIC	Data	Baseline Resilience Indicators for Communities	N/A	Public	Disaster Data
HVRI HazDash	Data	Socioeconomic Impacts of Natural Hazards	N/A	Public	Disaster Data
HVRI SHELDUS	Data	Spatial Hazard Events and Losses Database for The United States	N/A	Commercial	Disaster Data
HVRI SoVI	Data	Social Vulnerability Index	N/A	Public	Disaster Data
ICPSR	Data	The Inter-university Consortium for Political and Social Research, was established in 1962. An integral part of the infrastructure of social science research, ICPSR maintains and provides access to a vast archive of social science data for research and instruction. Used for FBI agency IDs.	2	Public	Demographic Data
LightBox	Data	Provides commercial, geographical, spatial, and environmental building data.	N/A	Commercial	Demographic Data
MRLC	Data	The Multi-Resolution Land Characteristics (MRLC) consortium is a group of federal agencies who coordinate and generate consistent and relevant land cover information at the national scale for a wide variety of environmental, land management, and modeling applications.	10	Public	Imagery
MRLC Urban Imperviousness	Data		31	Public	Imagery
MRLC Land Cover	Data		26	Public	Imagery
MRLC Tree Cover	Data		12	Public	Imagery
NOAA	Data	Daily weather forecasts, severe storm warnings, and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality and affect more than one-third of America's gross domestic product. Data is usually in the categories : Land Surface, Ocean, Radar, or Satelite.	N/A	Public	Mixed Data
TIGER	Data	TIGER data include political and census boundaries (states, counties, tracts, block groups, blocks, zip code tabulation areas, urban boundaries, tribal subdivisions, Congressional districts, etc.) that can be used in conjunction with tabular data.	7	Public	Geography: Shapefiles
USGS	Data	Monitors, analyzes, and predicts current and evolving dynamics of complex human and natural Earth-system interactions and to deliver actionable intelligence at scales and timeframes relevant to decision makers. The USGS provides science about the natural hazards that threaten lives and livelihoods; the water, energy, minerals, and other natural resources we rely on; the health of our ecosystems and environment; and the impacts of climate and land-use change.	N/A	Public	Mixed Data
			721		

Vermont Spatial MVI Proposal Preparation

Literature Review

iParametrics reviewed tools and other artifacts from organizations sited in the Vermont Spatial MVI Tool RFP. As expected, we found that these organizations are addressing the same concerns as the State and that there is an ample amount of qualified research and experiences from which the Vermont MVI project can draw. Our review also identified potential ideas for the Vermont MVI tool that could be incorporated as features of the model or the end user application.

Summary Table

Title	Agency	Brief Summary	Format	Potential Ideas for MVI
Climate Change and Health Vulnerability Indicators	California Department of Public Health	• Indicators to help stakeholders better understand the people and places that are more susceptible to adverse health impacts associated with climate change • Suite of 21 indicators of climate exposure, population sensitivity, and adaptive capacity to the impacts of climate change • Being used by local and state programs to plan to meet the needs of the communities most at risk of harm from climate change	Cloud-based Tool	• Incorporation of adaptive capacity data, which refers to the broad range of responses and adjustments to the impacts of climate change, including the capacity to moderate potential damages, take advantage of opportunities, and cope with the consequences • Visualization of vulnerability by plotting exposure against sensitivity, which also reveals any regional vulnerabilities
Assessing Vulnerability of State Assets to Climate Change	California Legislative Analyst's Office	• Evaluated the current efforts being made by state departments to assess the potential for severe risks to state facilities posed by climate change	Report	
Climate Change Vulnerability Assessment	California Department of Water Resources	• Conducted department-wide vulnerability assessment to better prepare its decision-making for an uncertain future • Attempts to evaluate, describe, and quantify, where possible, the agency's vulnerabilities to expected increases in wildfire, extreme heat, and sea-level rise, as well as to changes in hydrology and ecosystems that will impact the agency's facilities, operations, and other activities	Report	• Conceptual framework of vulnerability, where exposure and sensitivity together define risk and risk against adaptive capacity defines vulnerability
Assessing the Impacts Climate Change May	Maine Climate Council in	• Aimed to identify vulnerable communities, geographies, and economic sectors to focus on	Static Maps	• Analysis of economic vulnerability through potential job loss and GDP loss from flooding

Have on the State's Economy, Revenues, and Investment Decisions – Volume 1: Vulnerability Assessment	partnership with Eastern Research Group and Synapse Energy Economics	throughout the assessment of climate impacts on Maine through spatial mapping, including bi-variate analyses • Used to inform, refine, and select the strategies that were incorporated into Maine's Climate Action Plan		and sea-level rise as well as distribution of jobs by sectors, where natural resource job sectors (e.g. tourism, fishing, agriculture, forestry) were of highest concern
Municipal Climate Adaptation Guidance Series	Municipal Planning Assistance Program and nine of Maine's Regional Planning Organization with funding from the Maine Coastal Program	• Series of guidance documents to help local governments in Maine identify practical steps to help make their communities more resilient in the face of rising sea-levels and more frequent intense storm events • Explain how to identify threats to community resources, and how to respond to those threats by integrating climate adaptation measures into existing local policies, practices, and ordinances • Series includes guidance on transportation, stream smart crossings, wastewater infrastructure, drinking water, storm water, comprehensive planning, shoreland zoning ordinance, site plan review ordinance, and subdivision ordinance	Toolkit	• Inclusion of potential loss in tax base within economic vulnerability
Climate Plan	Green Mountain Power	• Provides clear goals to create a more reliable and resilient energy system for customers that can better withstand and more quickly recover from severe storms, while also aiding in the transition to a more distributed grid that helps cut greenhouse gases in pursuit of Vermont's energy policy objectives.	Report	
Vermont Heat Vulnerability Index	Vermont Department of Health	• Draws together seventeen different measures of vulnerability in six different themes: population, socioeconomic, health, environmental, climate, and heat illness • Measures are combined to measure the overall vulnerability of Vermont towns to heat-related events.	Static Maps	• Calculation of relative vulnerability by calculating values as standard deviations against the state mean
Population Vulnerable to Climate Change	Vermont Department of Health	• Identifies populations most adversely affected by climate change	Toolkit	• Incorporation of data representing percentage of population vulnerable to climate change based on identified criteria (e.g. homeless population, population in multi-story units, outdoor workers, etc.)

Climate Change Mapping Tool	State of Vermont	• Maps layers relevant to climate change within the state, allowing users to explore what climate change could mean for the state and for particular regions and communities • Aims to help users understand and make investments to prepare for changes	Cloud-based Tool	• Incorporation of similar data layers, including infrastructure, precipitation projections, temperature projections, health status, disease incidence, etc.

Researchers Notes

There are several things to take away from my brief research of the sources and tools. First, I would note the assertions made by both the Legislative Analyst's Office for the State of California that most state agencies are in the planning stages of climate impact mitigation and Maines Department of Agriculture which states "few of the tools are based on data that are useful for decision-making at the local level." There are significant amounts of data available to start building these tools based on plans laid out by state agencies like the Department of Health in Vermont and these can used as our guide for where to collect relevant data for variables, vulnerable populations, and projections based on issues already being faced by climate change in the state. These data sources point out a tremendous need for a localized tool that utilizes the plan of action in each state or organization. Therefore, it appears that the gap in research is not particularly in the data available, but how to create the most useful tool that analyzes the data in a useful way for each municipality. Vermont, for instance, will experience more extreme weather events in the form of longer frost seasons with less snow, more annual precipitation with one inch of rain occurring twice as much as fifty years ago, higher temperatures, earlier springs, and shorter winters. This information would help the Vermont MVI tool development because we know what has been researched and reviewed as the highest risks, and what populations will be the most vulnerable will be the same as any other being people with health vulnerabilities, elderly, infants, and those lacking economic, social, or political resources. Moreover, we know geographically people who live in flood plains, and urban areas will be more vulnerable than some in rural areas due to extreme flooding events and extreme temperature increases.

With the information that has been well collected and laid out we have a great starting point to identify the resources we need to collect and focus on for the Vermont project. The Skylab tool presents itself as likely the best and only example so far of a working tool and Vermont's Department of Health as the best source of information to focus on when going into the planning and development of the Vermont MVI tool. It is my opinion that the other resources are useful in that they show an obvious need for a working tool for local municipalities, while showing that there has been impactful research and climate plans written to help get to the next step of implementing tools for those areas.

Vermont Spatial MVI Project Sample Application

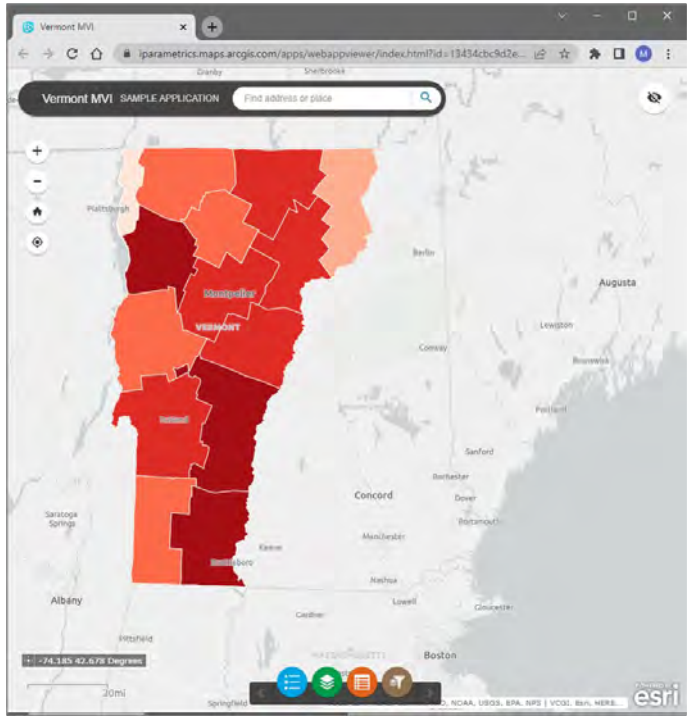
The purpose of this sample application is to present, as an example, the technical intent of the proposed platform and demonstrate a limited set of end user features.

© 2022 iParametrics LLC

Introduction

The images in this appendix are screen shots of a working prototype of public-facing application developed by the iParametrics team using ArcGIS and published to ArcGIS Online.

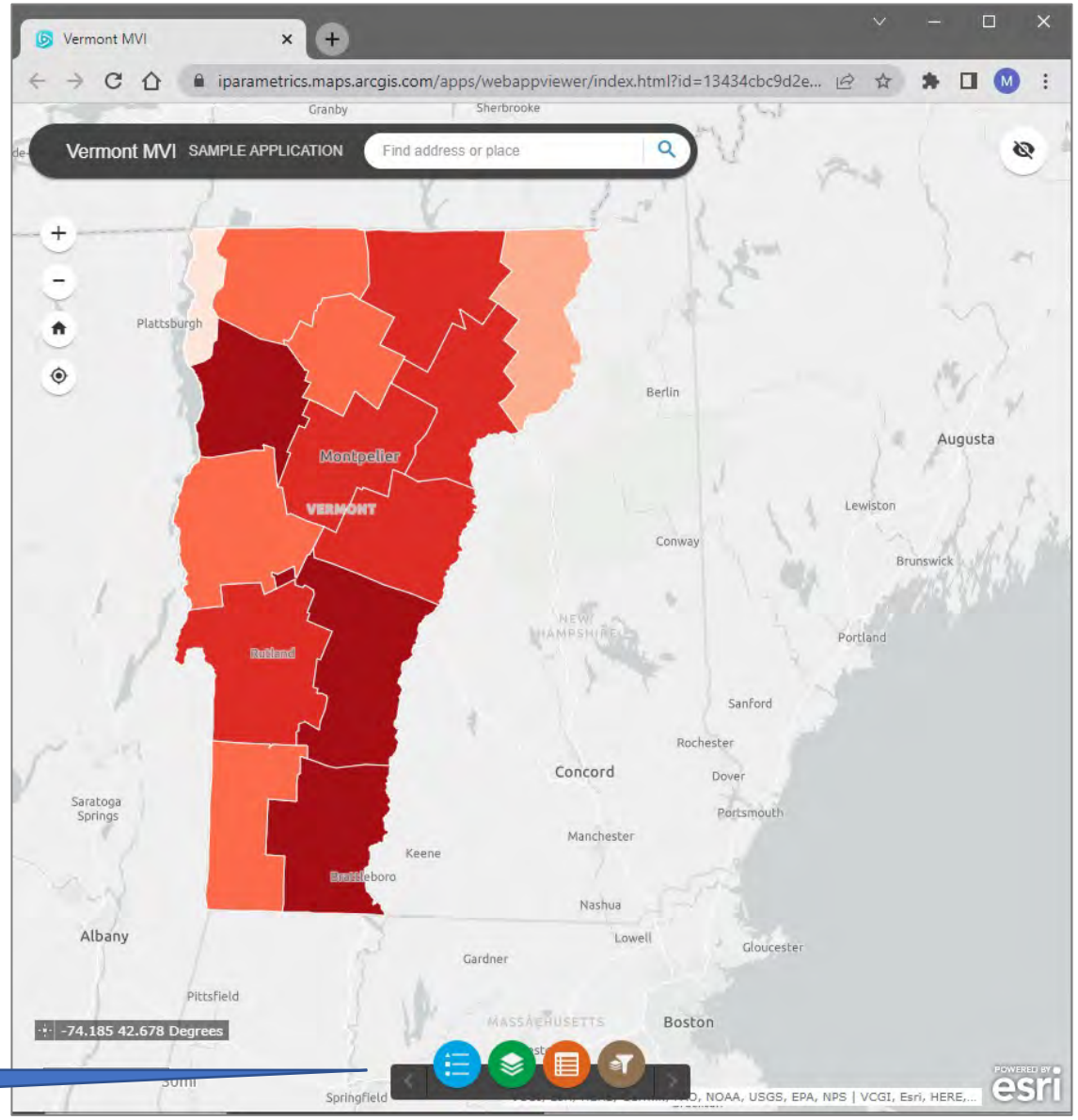
The prototype presents data from a nationwide hazard mitigation assessment tool (created by iParametrics) that calculates a relative mitigation score for each county within a state. A county's mitigation score is derived from four weighted factors: social vulnerability index from the CDC, infrastructure development density from the National Land Cover Database from the MRLC, historical FEMA obligations, and historical FEMA declarations. Note that these four are just those that were selected from a much longer list of factors/data sources that includes demographic data, economics, population, climate change, and others.



Landing Page

The user accesses the tool by opening the provided link. No user account/login credentials are required and there is no app to download.

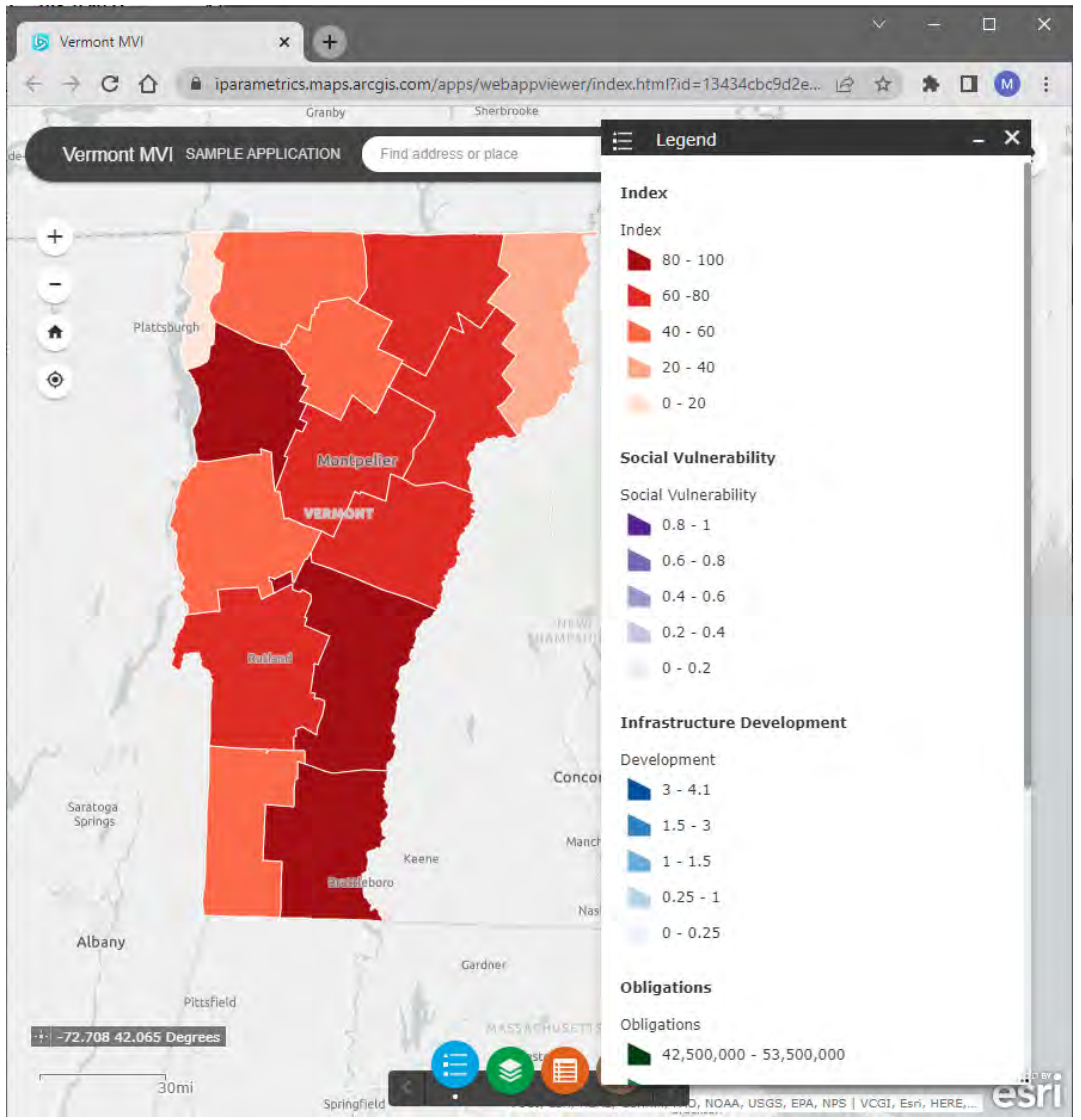
Each county is shaded with a color corresponding to its composite mitigation score relative to other counties in the state.



End User Tools

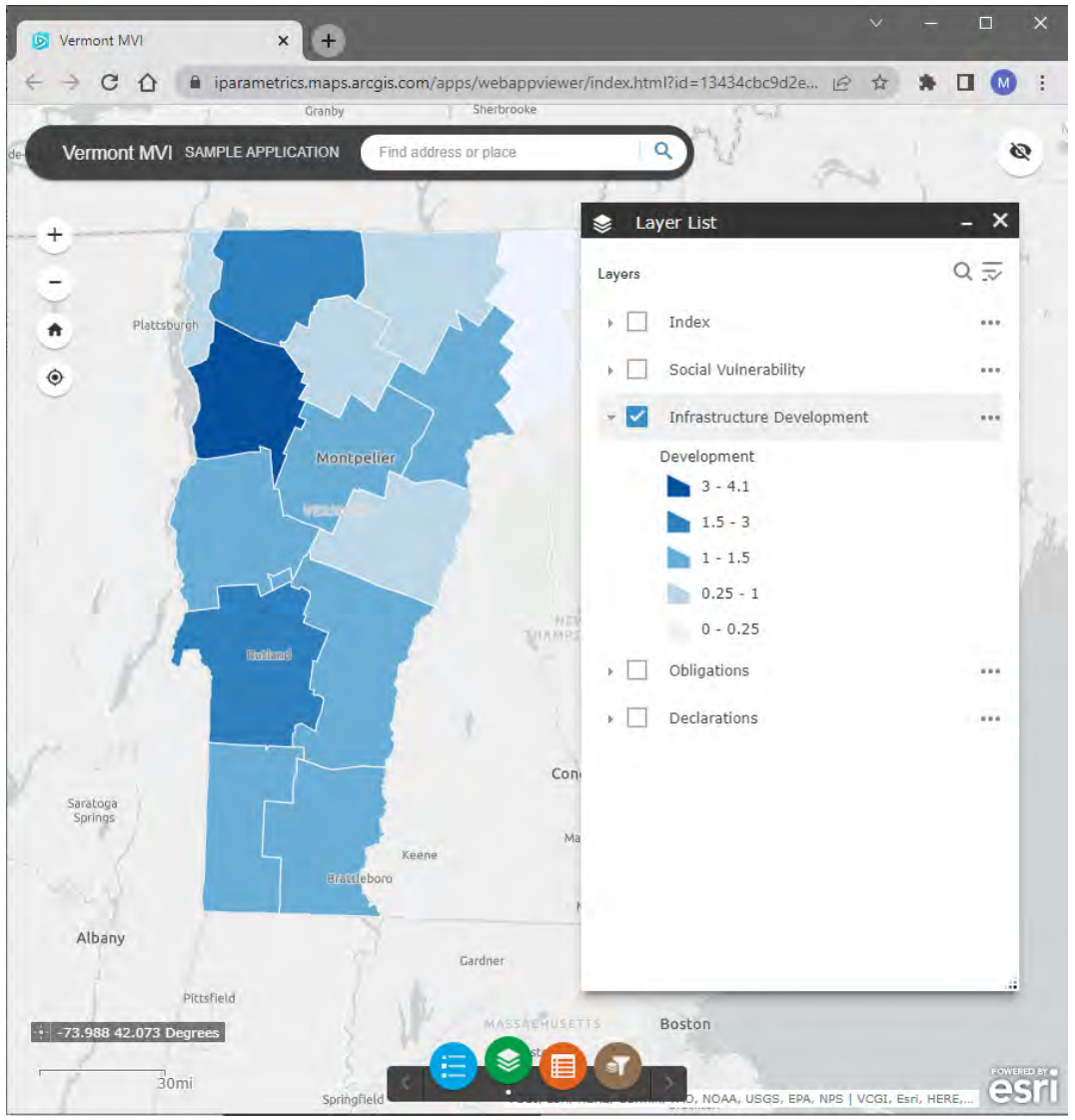
Legend

The “Legend” tool exposes composite index and the four underlying factors (social vulnerability, infrastructure development, FEMA obligations, and FEMA disasters).



Layer List

The “Layer List” allows the user to visualize the map with, for example, just one factor selected.



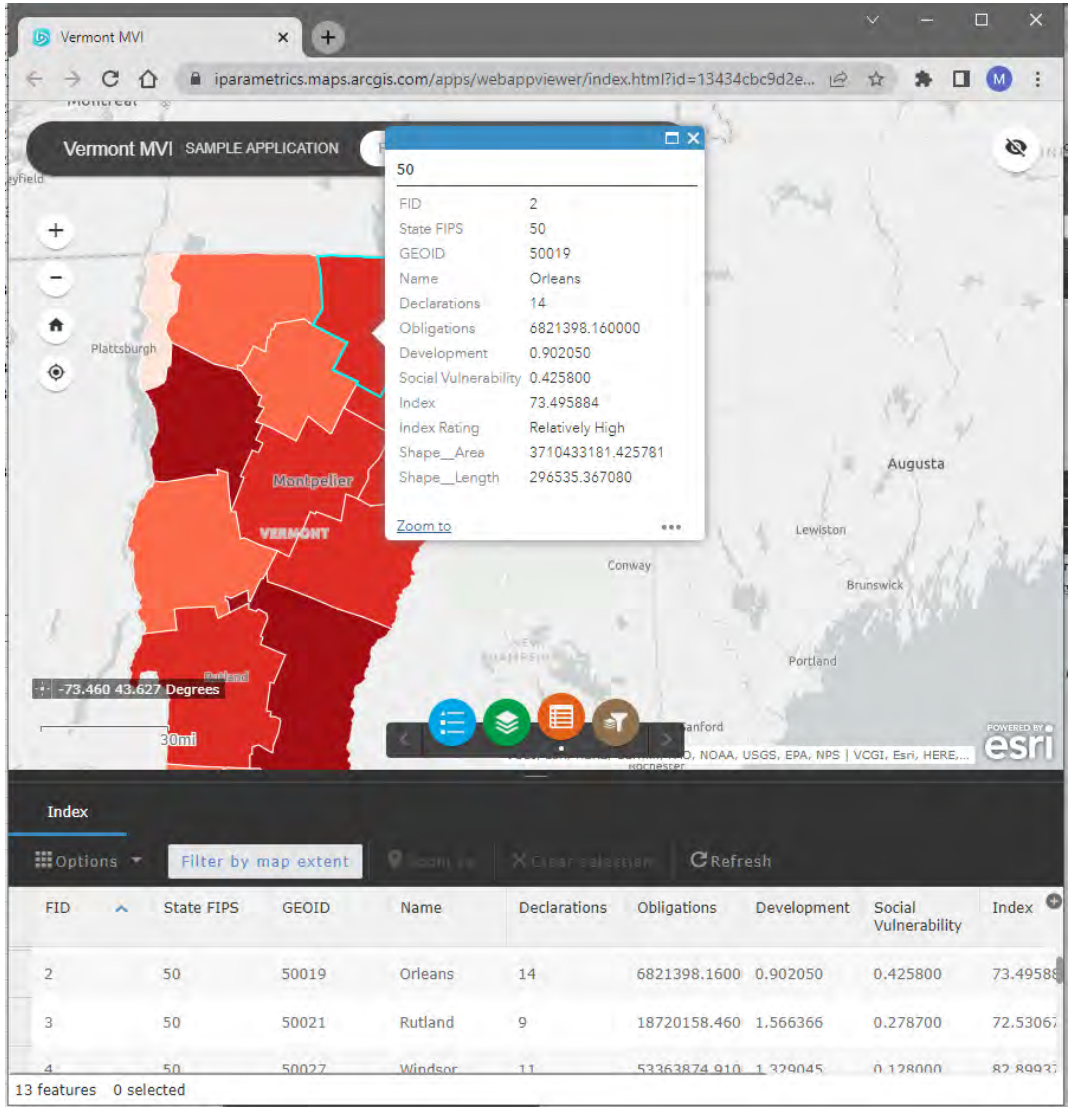
Attribute Table

The “Attribute Table” allows the user to display a data table showing each county’s composite index and the value for each weighted factor, along with other data that can be included in the database but does not have to be a factor in the index.

The user can select a county and the table will jump to that county’s row in the table. In the Vermont MVI tool, the map selections and listings would be the municipalities.

The user can export the table data to a CSV file.

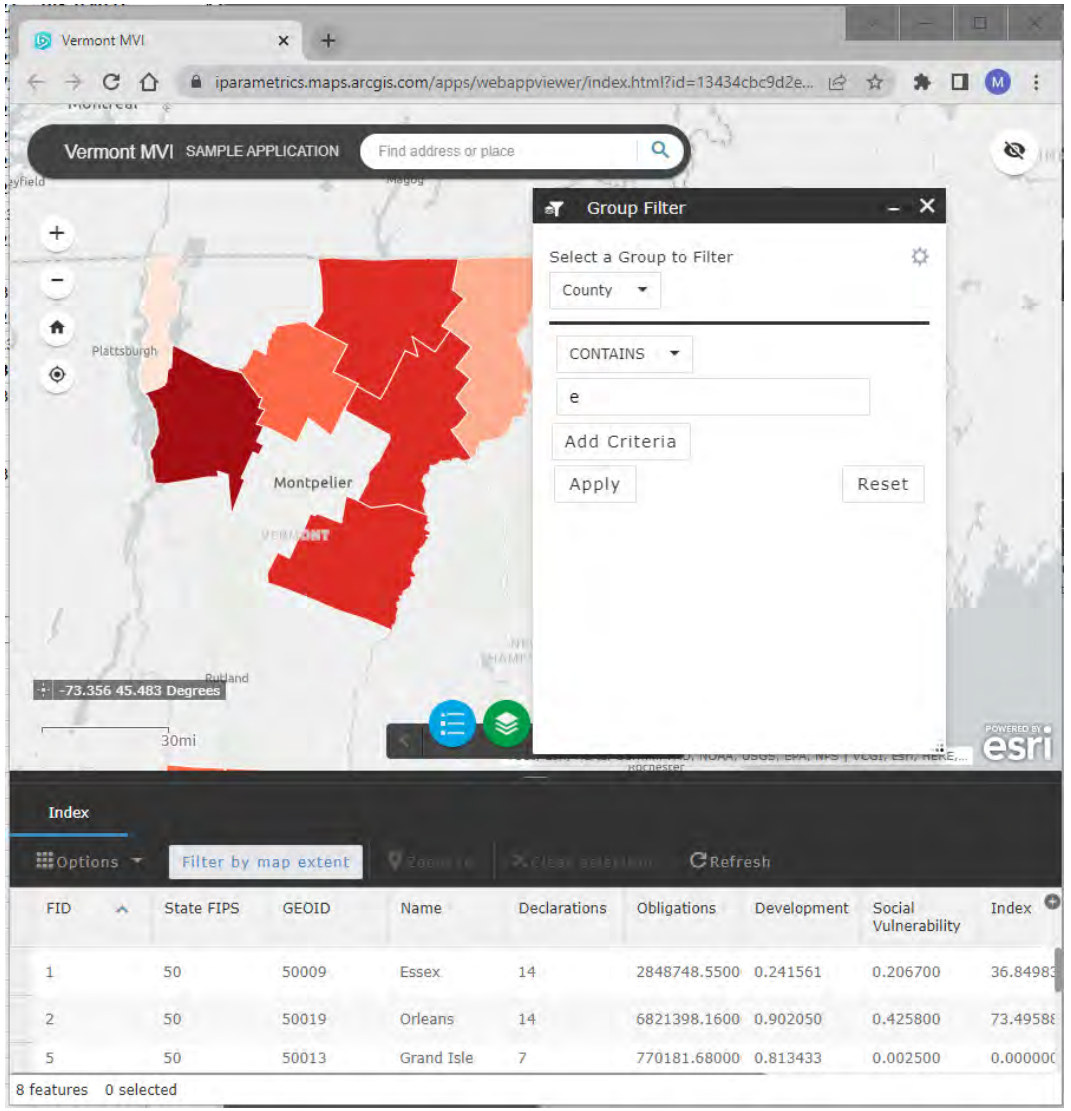
For the Vermont MVI tool, we can configure the data elements that should appear in the popup pointing to the selected county.



Group Filter

The “Group Filter” allows the user to enter different criteria with which the tool will then select the matching counties (or municipalities, as in the case of the Vermont MVI tool).

For example, the Vermont MVI tool could include a filter with which the user could select municipalities of a given population range.



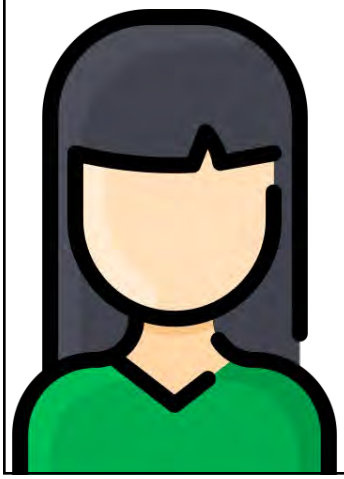


iParametrics Grant Management System

Case Manager User Manual

Version 2.1
Released August 2021
© 2021 iParametrics LLC

CASE MANAGER MODULES



- A Using the System
- B How to Claim an Application
- C How to Work an Application
- D How to Submit a Request for Information
- E How to Escalate an Application
- F How to Work a Returned Application
- G How to Input Payment Information
- H Using the Dashboard
- I Best Practices

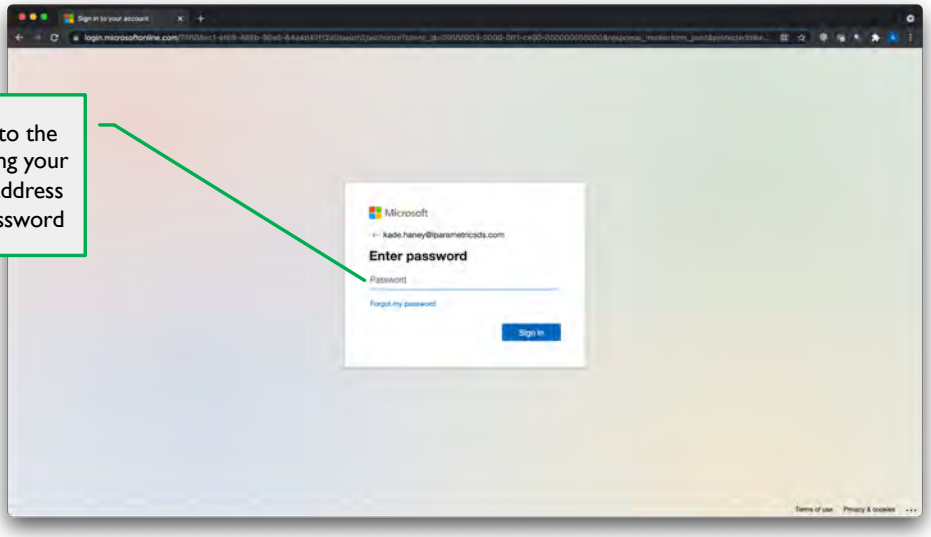
A

Using the System

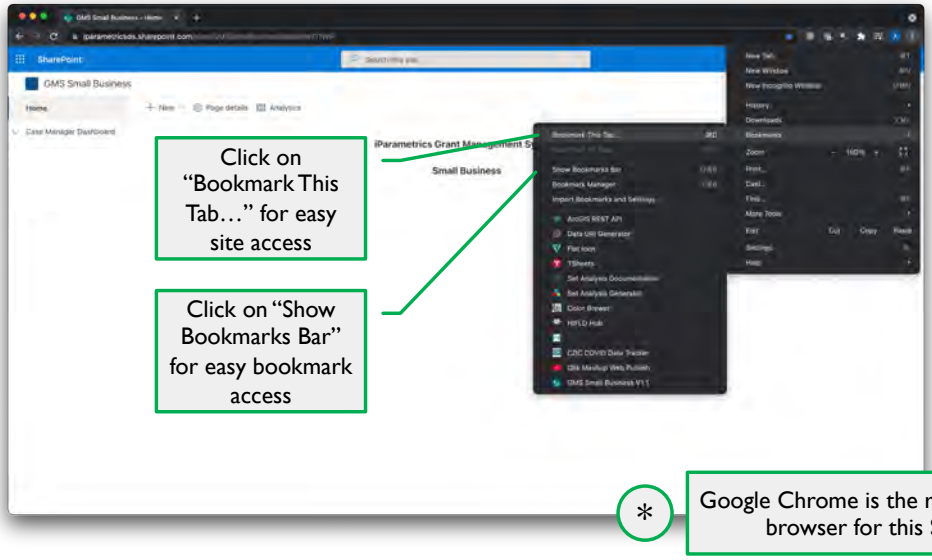
The Grant Management System is a cloud-based system hosted on Microsoft Azure. This module will walk you through how to access and navigate the System.

A Using the System

Log into the site using your email address and password

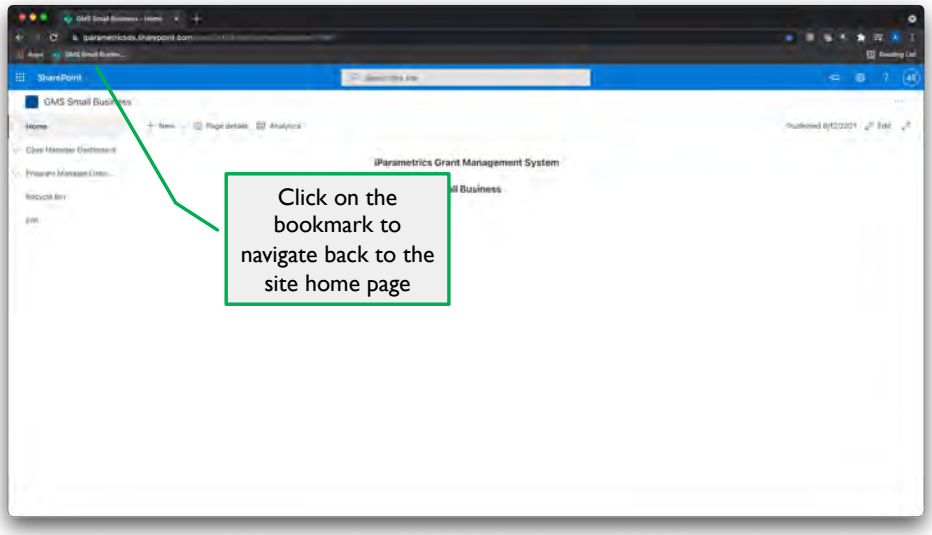


A Using the System

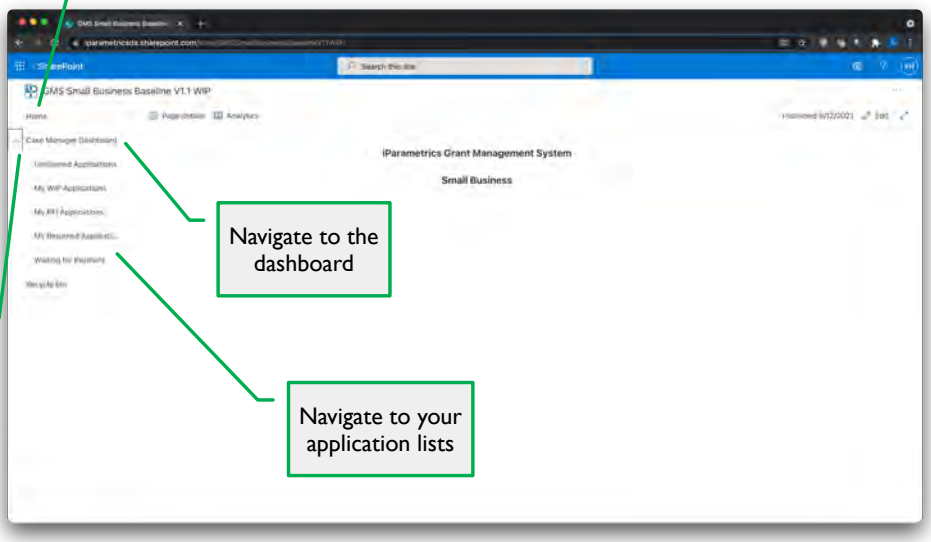


* Google Chrome is the recommended browser for this System

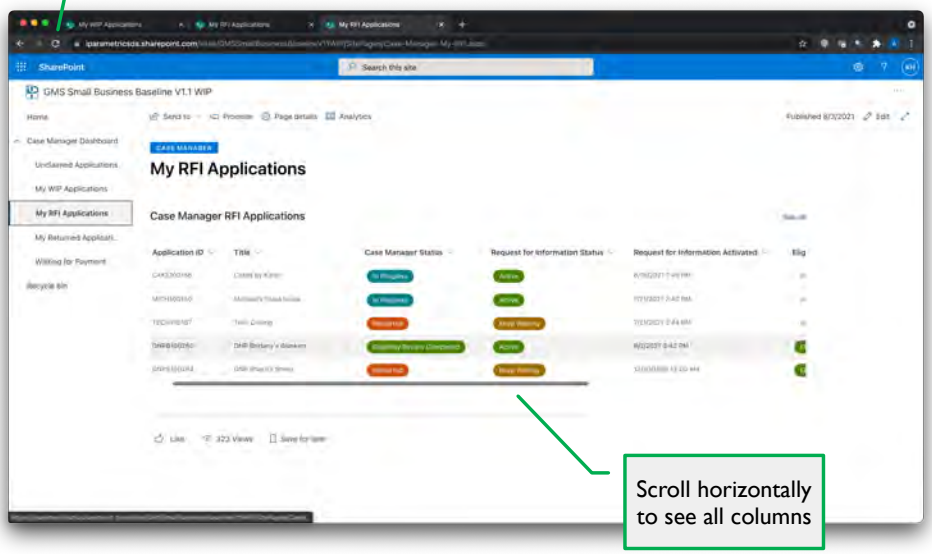
A Using the System



A Using the System



A Using the System

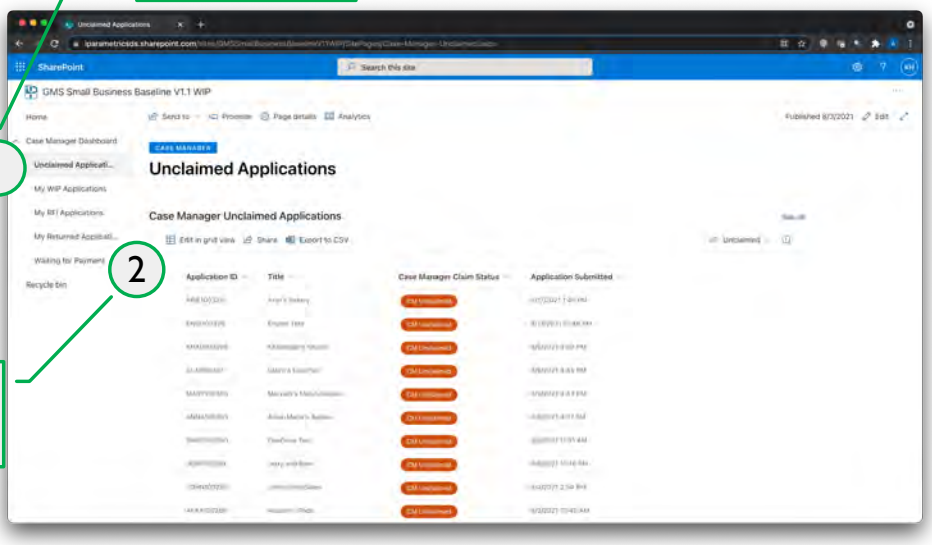


B How to Claim an Application

When an applicant submits their application, the application will first go into a list of unclaimed applications that all case managers have access to. In order to begin the review process, you will need to claim the application. This module will walk you through how to claim an application.

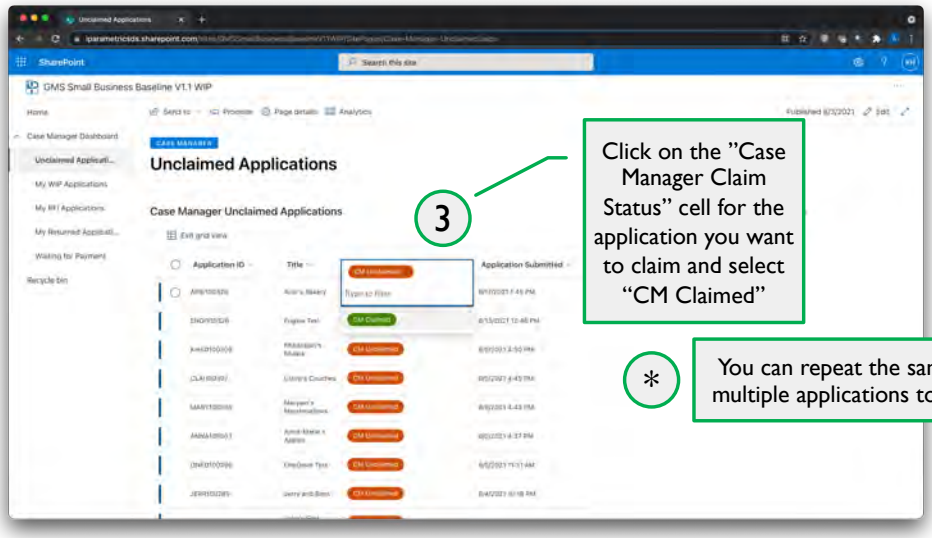
B How to Claim an Application

Navigate to the "Unclaimed Applications" page



Click the "Edit in Grid View" button

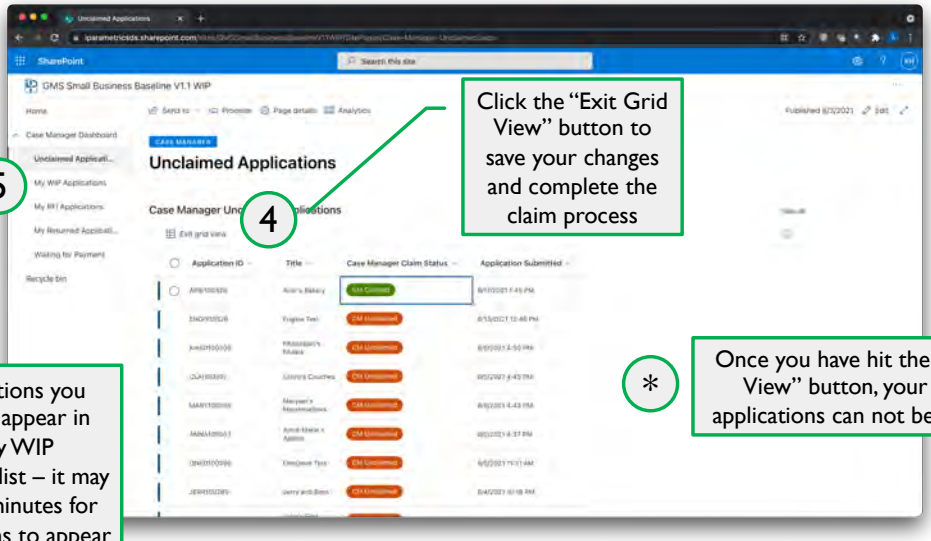
B How to Claim an Application



Click on the "Case Manager Claim Status" cell for the application you want to claim and select "CM Claimed"

* You can repeat the same step on multiple applications to bulk claim

B How to Claim an Application



Click the "Exit Grid View" button to save your changes and complete the claim process

The applications you claimed will appear in your "My WIP Applications" list – it may take 1 to 3 minutes for the applications to appear

* Once you have hit the "Exit Grid View" button, your claimed applications can not be unclaimed

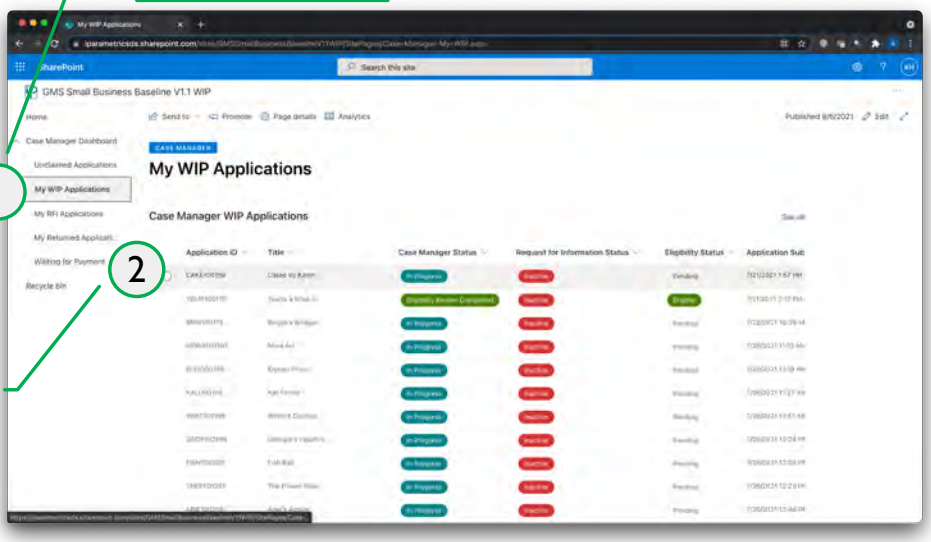
C

How to Work an Application

As a case manager, you will be responsible for the first steps in the review process, including the eligibility review and financial review, if applicable. This modules will walk you through how to work an application and complete your review using the Case Manager Form.

C How to Work an Application

Navigate to the "My WIP Applications" page

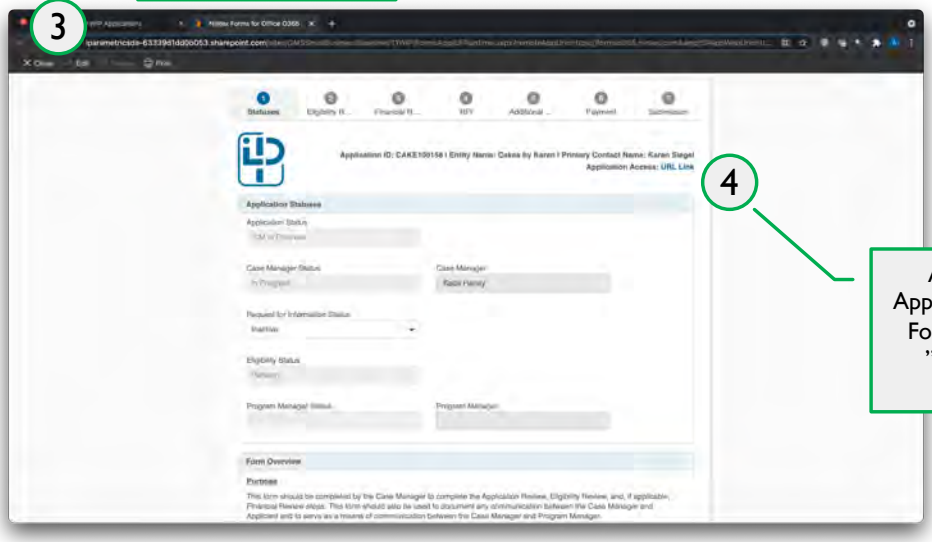


Double-click on a row to open the application

C How to Work an Application

Click the "Edit" button to begin making entries in the form

3



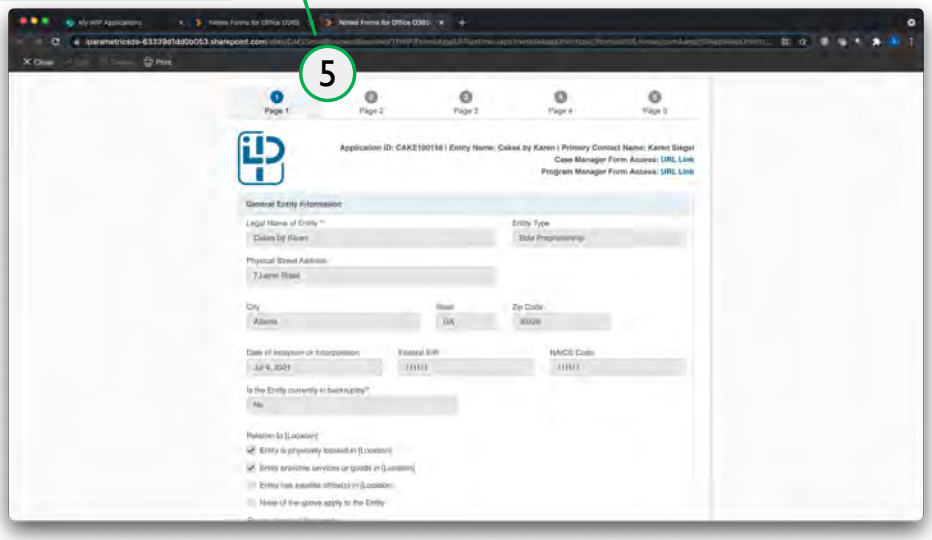
4

Access the Application Intake Form using the "URL Link" hyperlink

C How to Work an Application

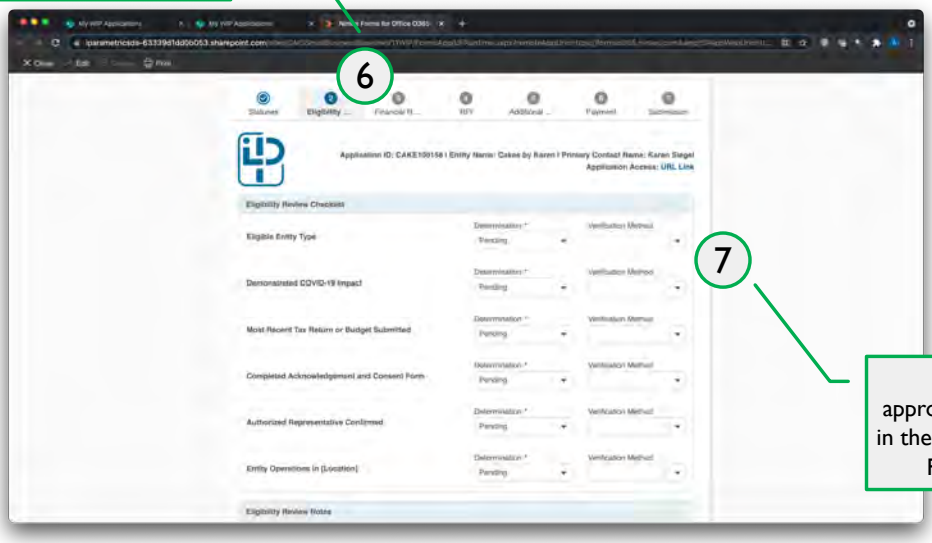
Click the tabs to see the various pages of the Application Intake Form

5



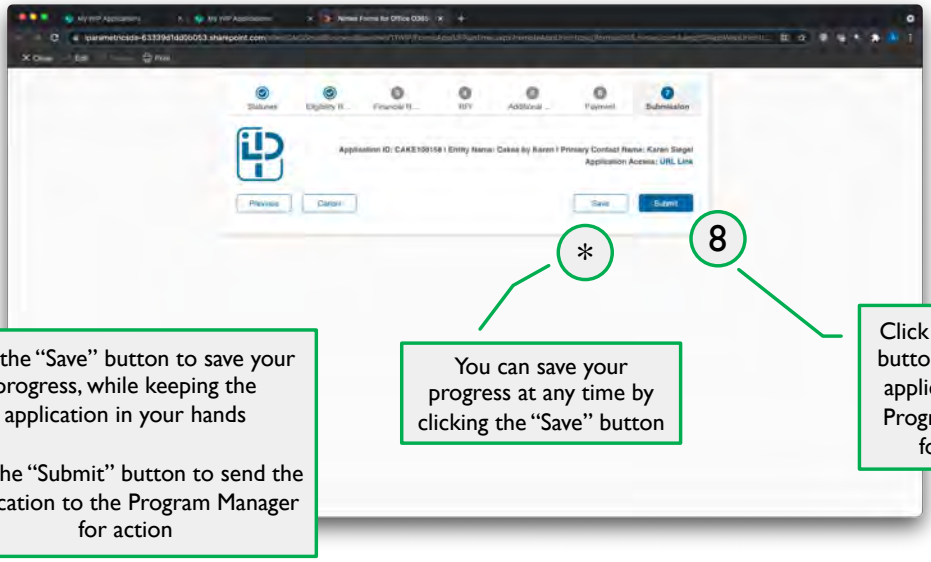
C How to Work an Application

Click the tabs to navigate to the various pages of the Case Manager Form



Make the appropriate entries in the Case Manager Form tabs

C How to Work an Application



* Use the "Save" button to save your progress, while keeping the application in your hands

Use the "Submit" button to send the application to the Program Manager for action

You can save your progress at any time by clicking the "Save" button

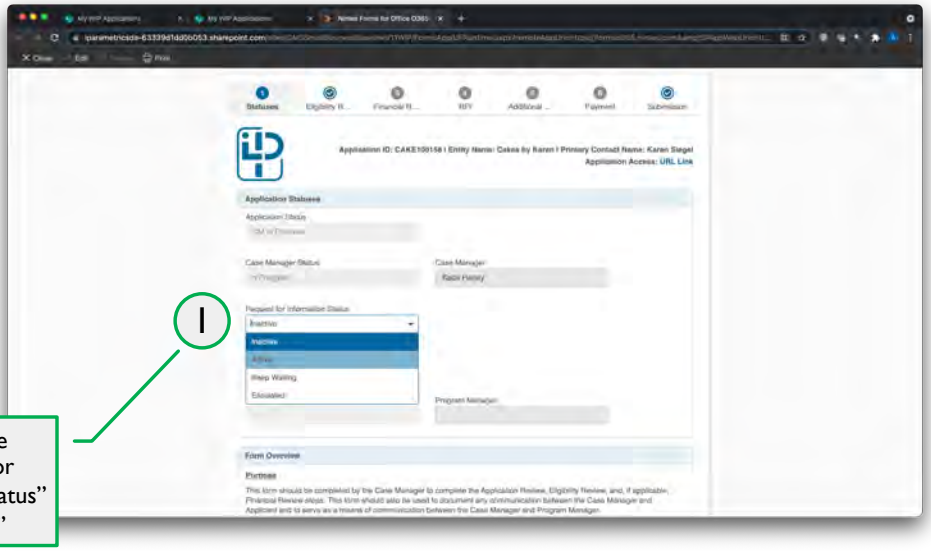
Click the "Submit" button to send the application to the Program Manager for review

D

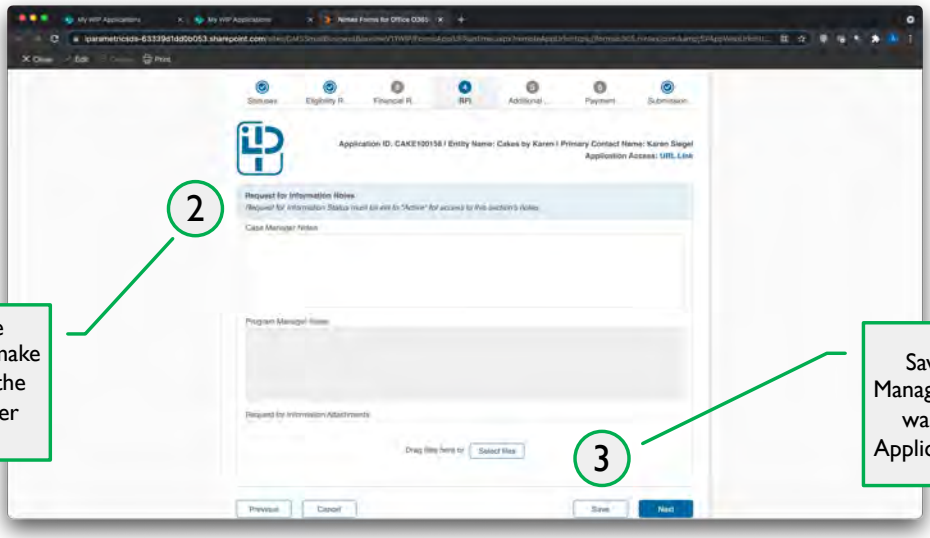
How to Submit a Request for Information

When reviewing an application, you may encounter a situation where you cannot make the necessary determinations because of missing or incorrect information from the applicant. This module will walk you through how to request the necessary information from the applicant by submitting a request for information.

D How to Submit a Request for Information



D How to Submit a Request for Information



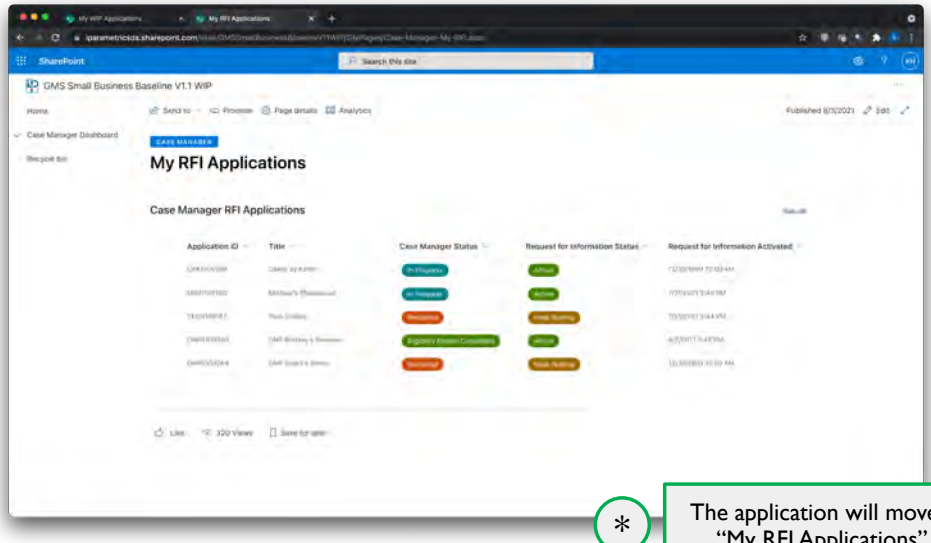
2

Contact the Applicant and make a notation in the "Case Manager Notes".

3

Save the Case Manager Form while waiting for the Applicant's response

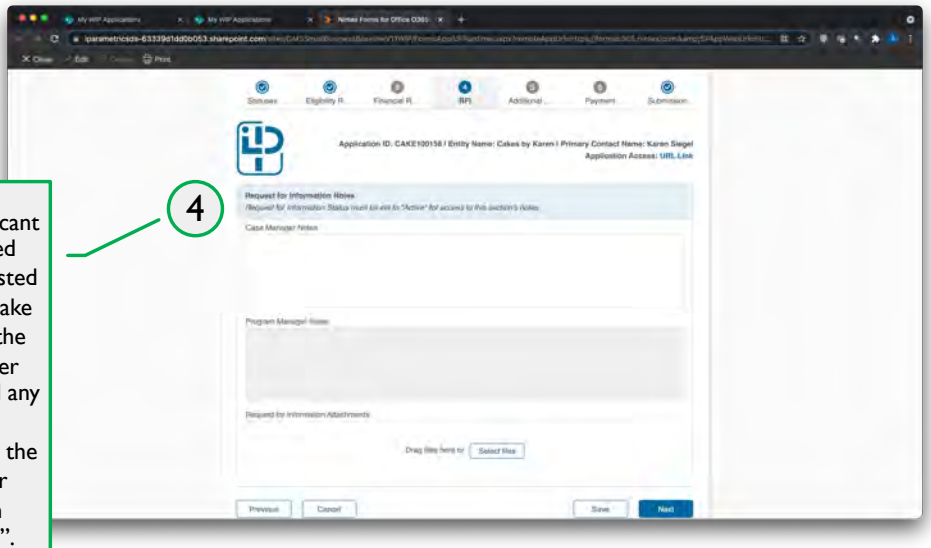
D How to Submit a Request for Information



*

The application will move to the "My RFI Applications" page

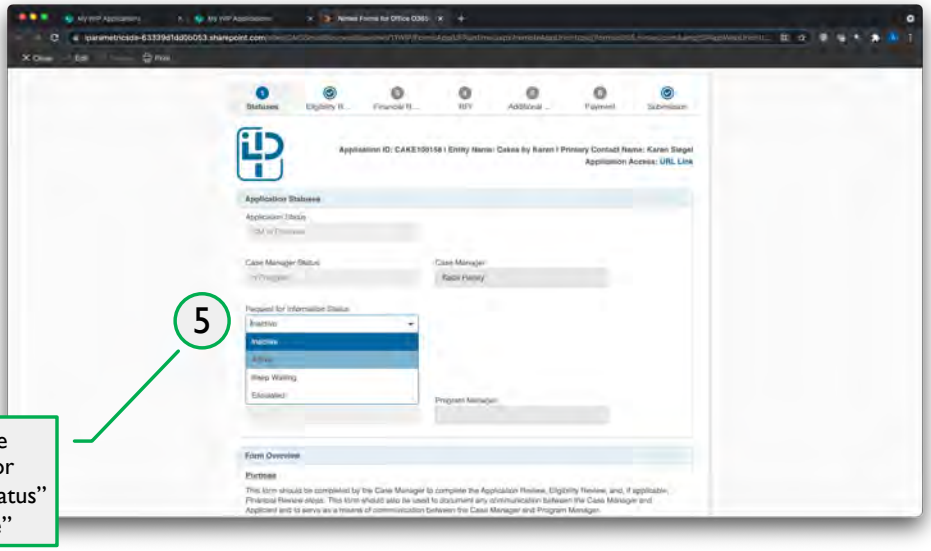
D How to Submit a Request for Information



4

Once the Applicant has responded with the requested information, make a notation in the "Case Manager Notes". Upload any emails or attachments to the "Request for Information Attachments".

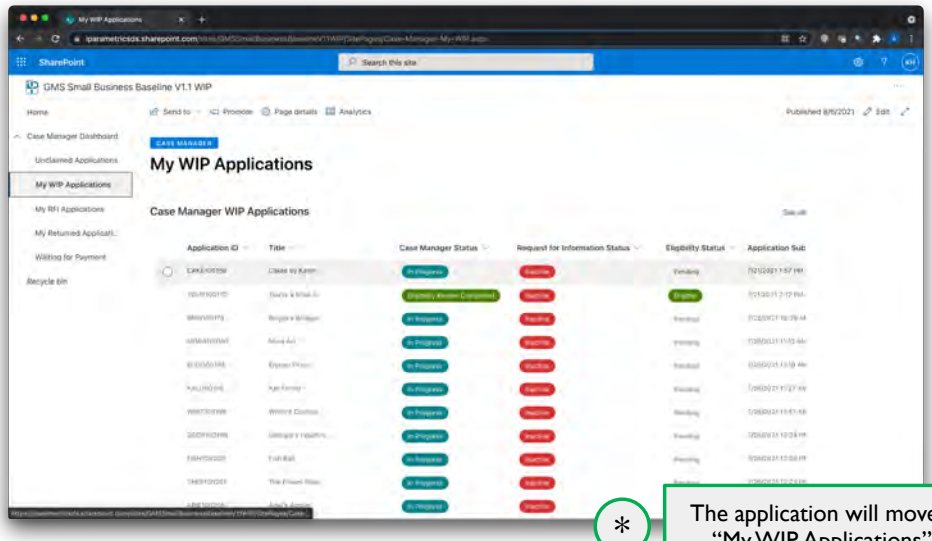
D How to Submit a Request for Information



5

Change the "Request for Information Status" to "Inactive"

D How to Submit a Request for Information

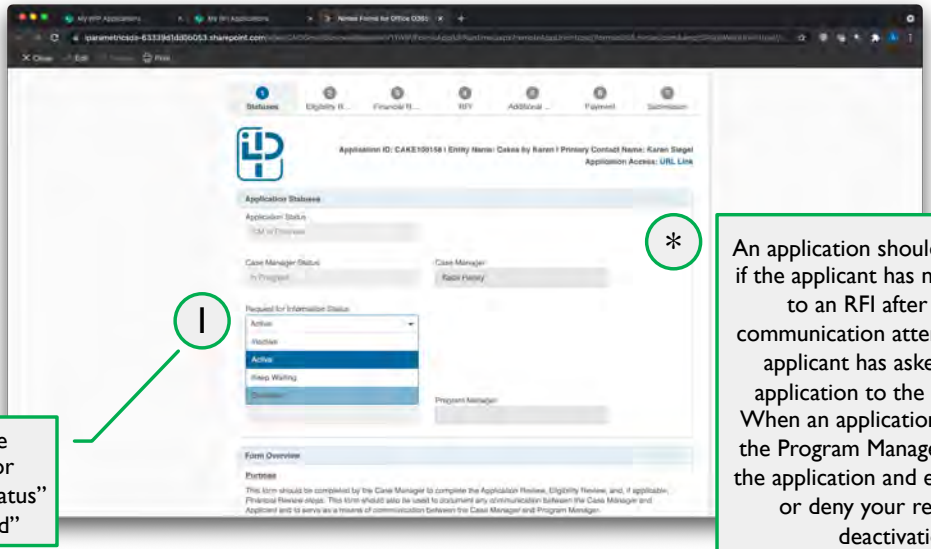


* The application will move to the "My WIP Applications" page

E How to Escalate an Application

After submitting a request for information, you may not be able to proceed with the review process because of an unresponsive applicant. If after multiple contact attempts, the applicant does not respond or if an applicant asks to rescind their application, you may need a program manager to deactivate an application. This module will walk you through how to escalate an application to a program manager for deactivation approval.

E How to Escalate an Application



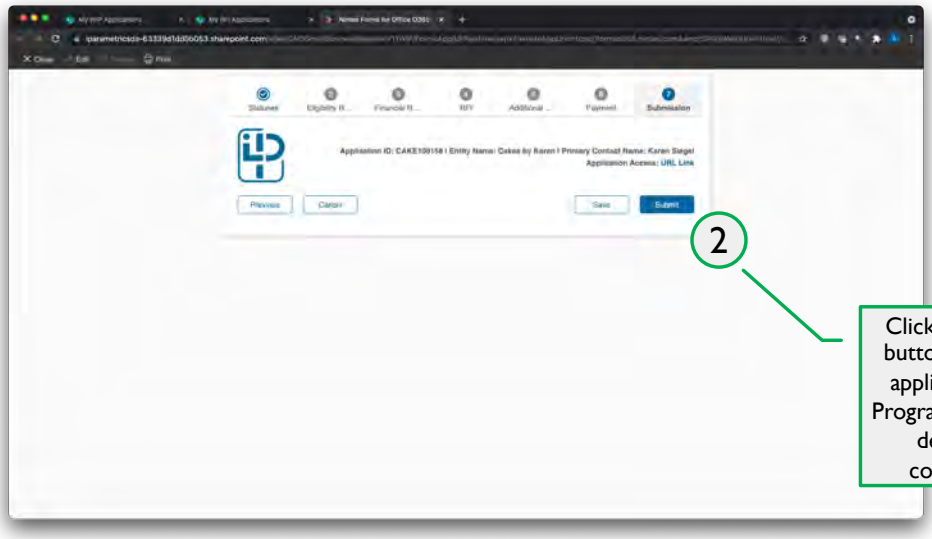
1

Change the "Request for Information Status" to "Escalated"

*

An application should be escalated if the applicant has not responded to an RFI after multiple communication attempts or if the applicant has asked for their application to the deactivated. When an application is escalated, the Program Manager will review the application and either approve or deny your request for deactivation.

E How to Escalate an Application

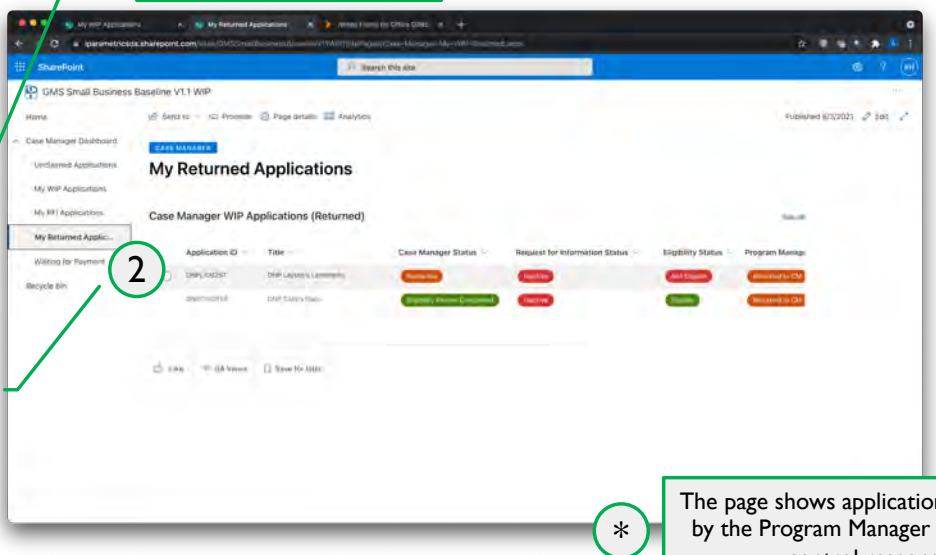


F How to Work a Returned Application

After submitting an application to a program manager for review, the program manager can return an application to you because of quality control reasons or due to a deactivation request denial. This module will walk you through how to work a returned application in either case.

F How to Work a Returned Application

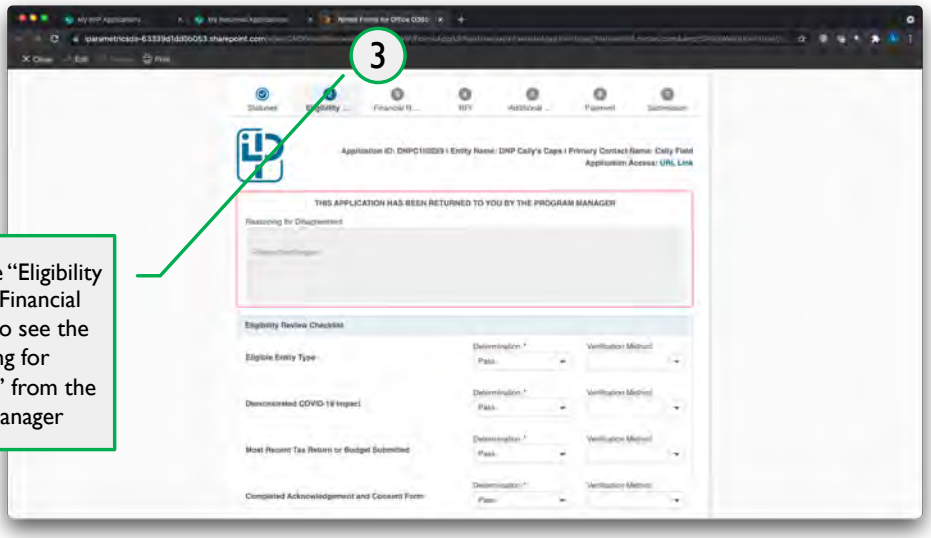
Navigate to the "My Returned Applications" page



Double-click on a row to open the application

* The page shows applications returned by the Program Manager for quality control reasons

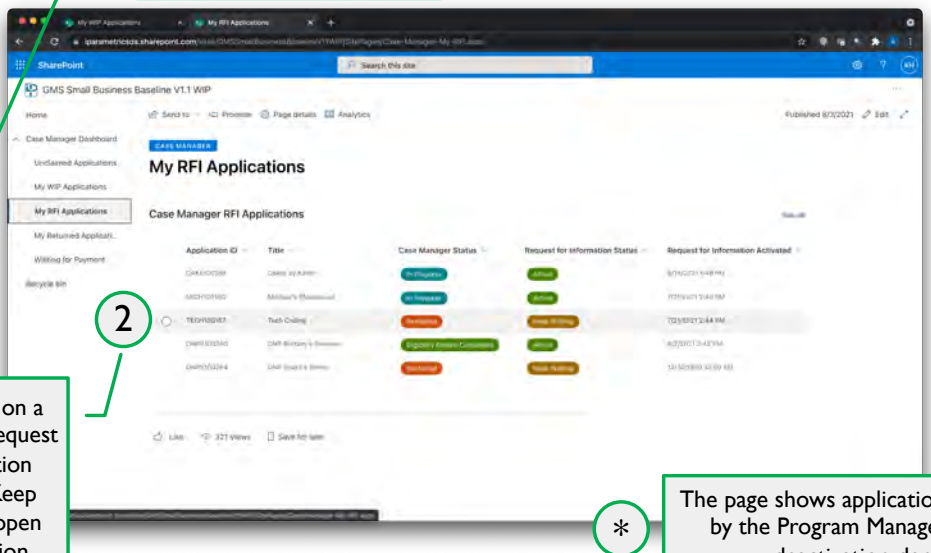
F How to Work a Returned Application



Navigate to the "Eligibility Review" or "Financial Review" tab to see the "Reasoning for Disagreement" from the Program Manager

F How to Work a Returned Application

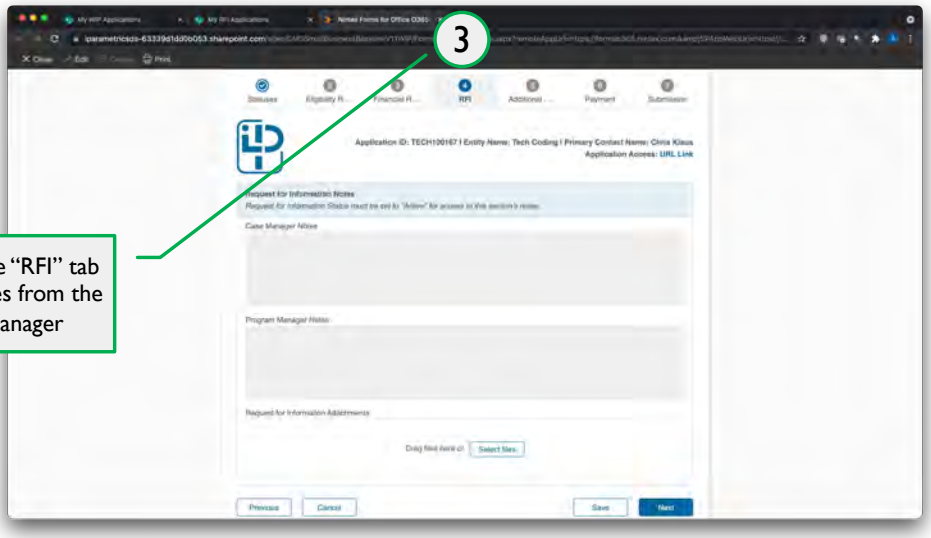
Navigate to the "My RFI Applications" page



Double-click on a row with a "Request for Information Status" of "Keep Waiting" to open the application

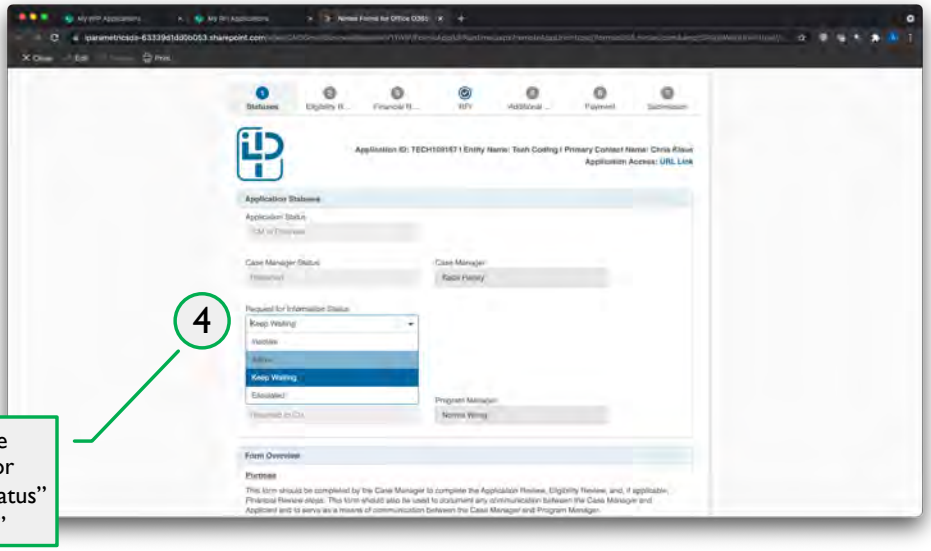
* The page shows applications returned by the Program Manager after a deactivation denial

F How to Work a Returned Application



Navigate to the "RFI" tab to see the notes from the Program Manager

F How to Work a Returned Application

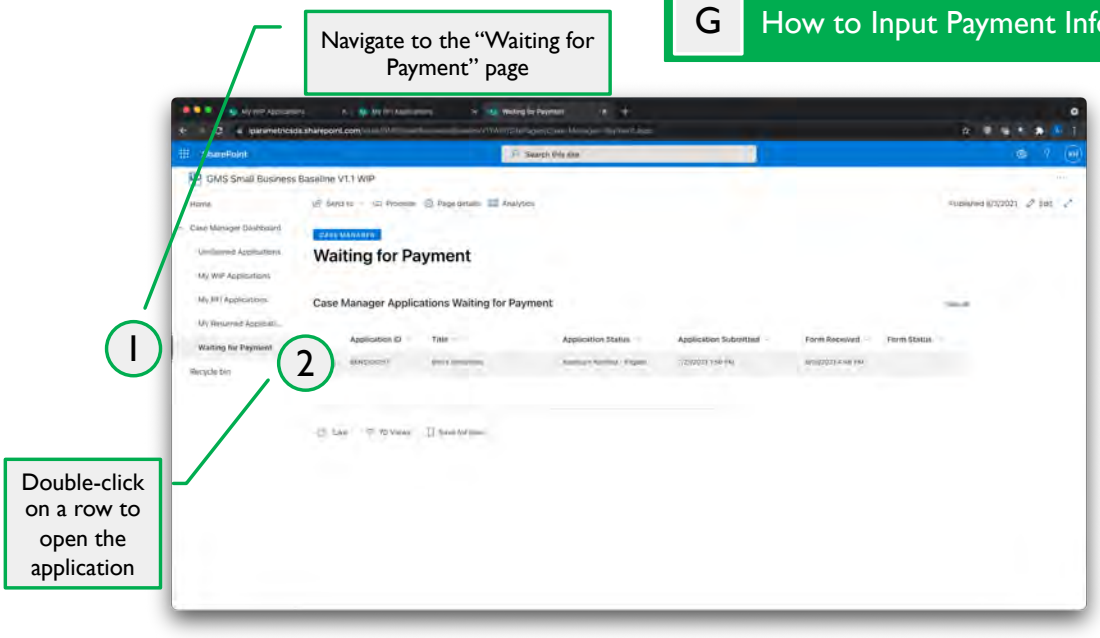


Change the "Request for Information Status" to "Active"

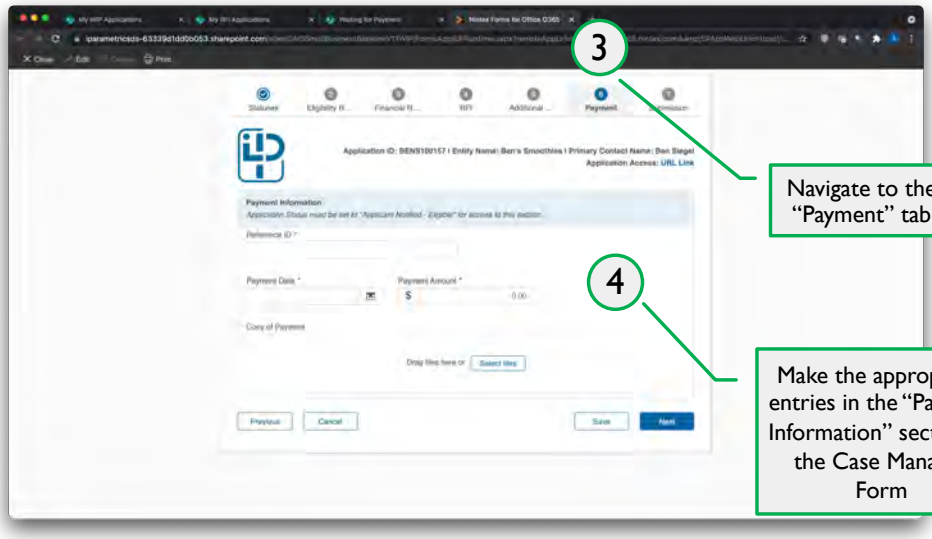
G How to Input Payment Information

The System does not directly handle the payments to awarded applicants, but all payment information still needs to be recorded in the System. As a case manager, you will be responsible for entering the payment information into the System for your claimed applications. This module will walk you through how to input payment information using the Case Manager Form.

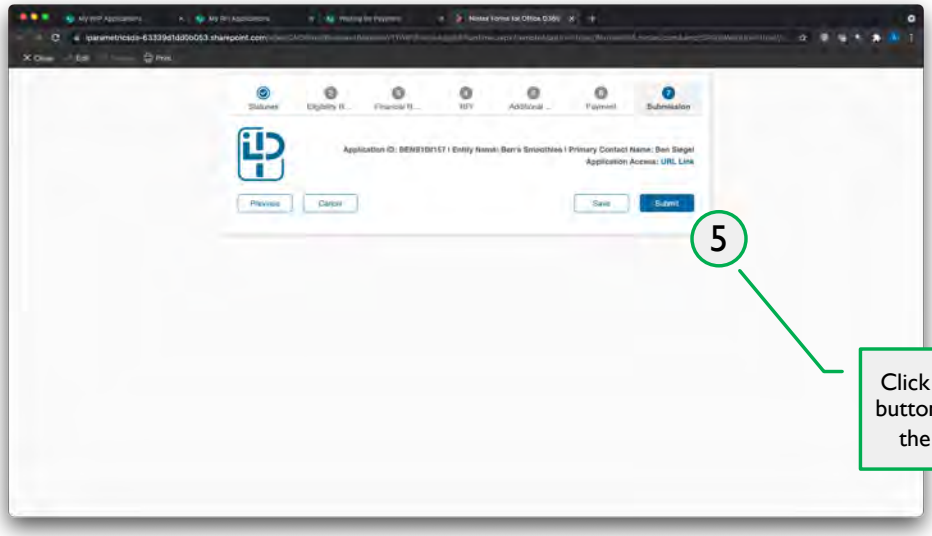
G How to Input Payment Information



G How to Input Payment Information



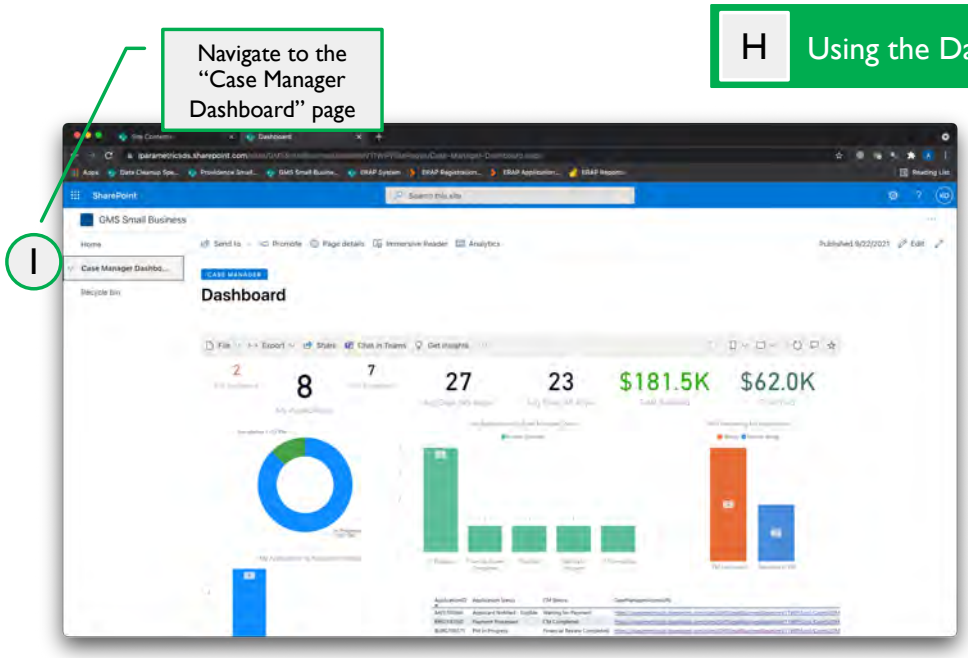
G How to Input Payment Information



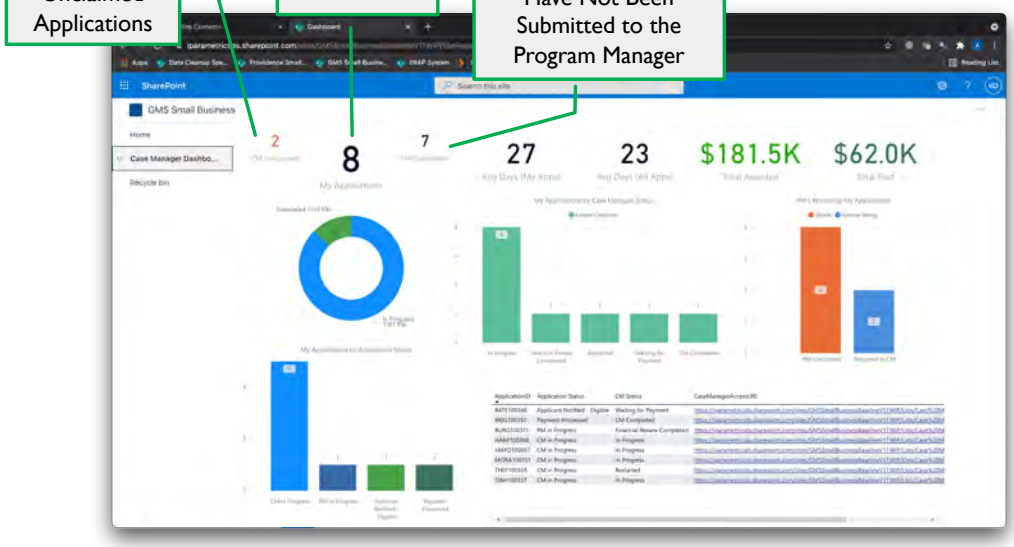
H Using the Dashboard

The Program may be expecting a significant number of applications, and as a case manager, your workload can become difficult to handle if you aren't organized and diligent. The System includes a dashboard that can help you monitor your workload and track where your applications are in the review process. The dashboard can help you prioritize your work and understand what actions you need to take. This module will walk you through how to access and navigate the dashboard.

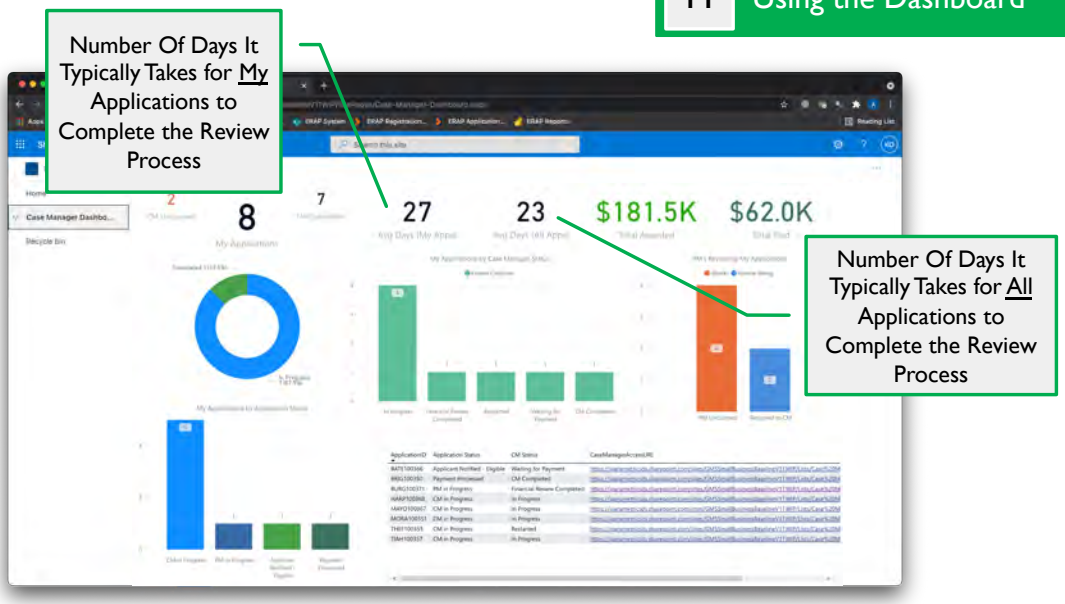
H Using the Dashboard



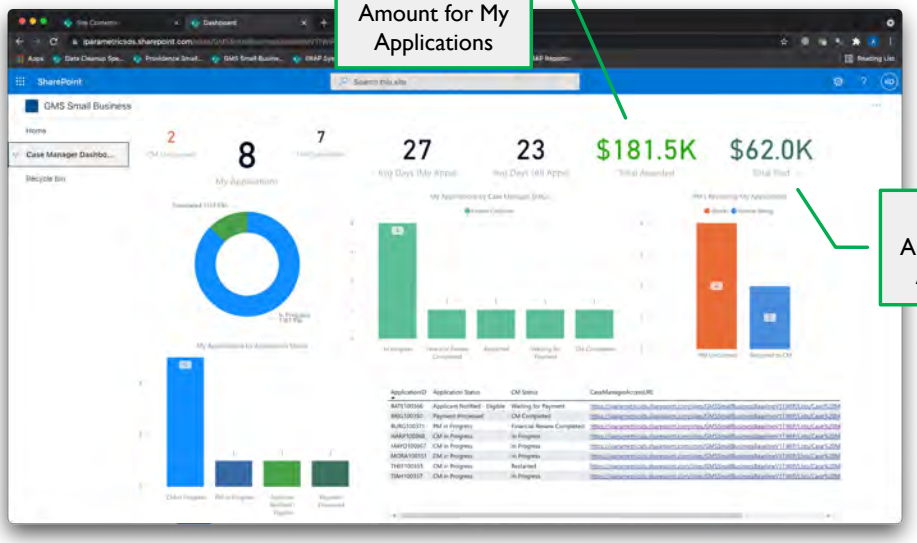
H Using the Dashboard



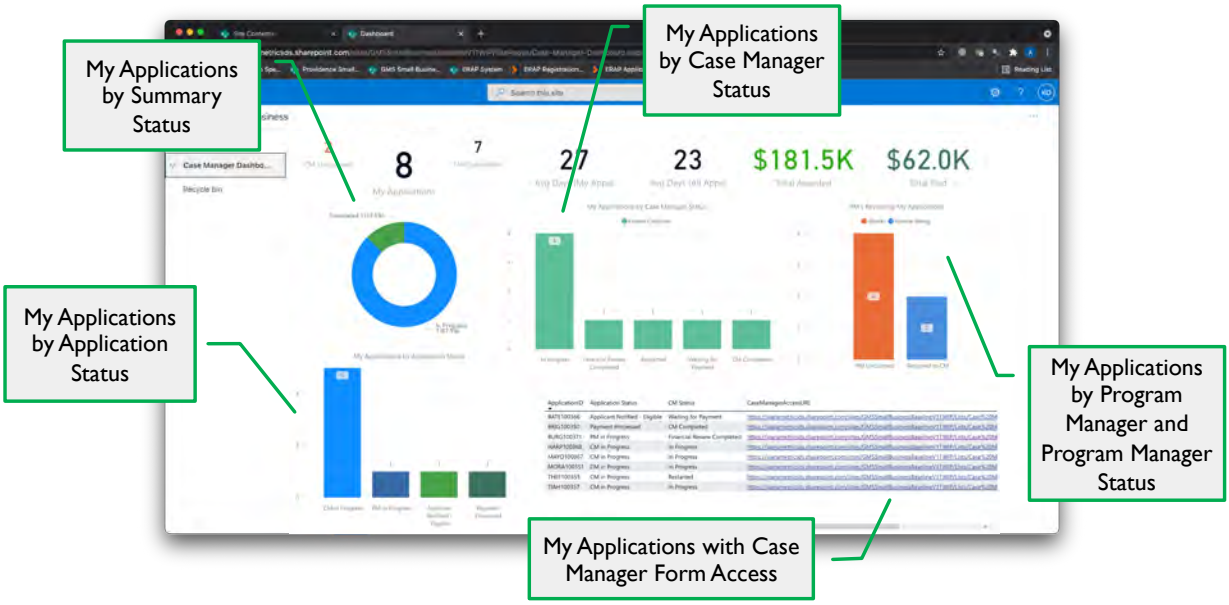
H Using the Dashboard



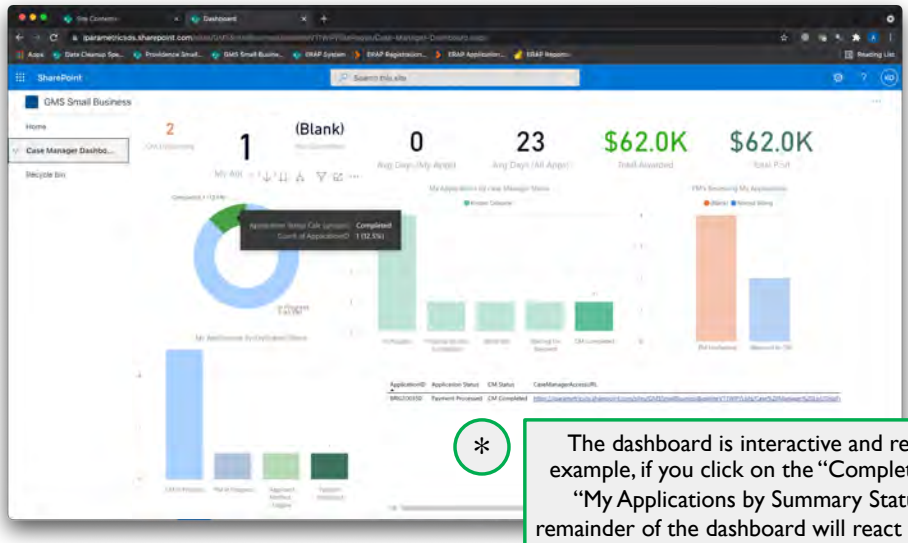
H Using the Dashboard



H Using the Dashboard



H Using the Dashboard



*

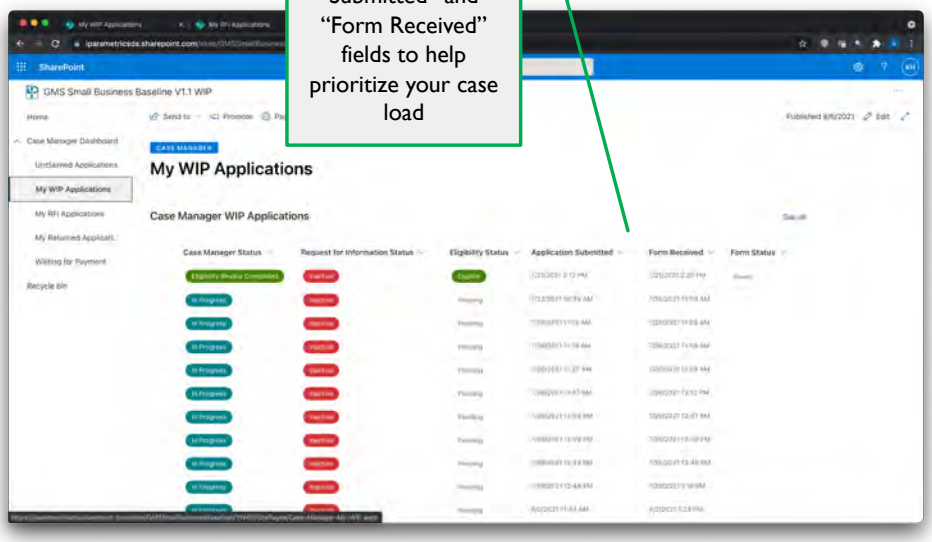
The dashboard is interactive and responsive - for example, if you click on the "Completed" slice of the "My Applications by Summary Status" chart, the remainder of the dashboard will react to your selection (as shown here)

I Best Practices

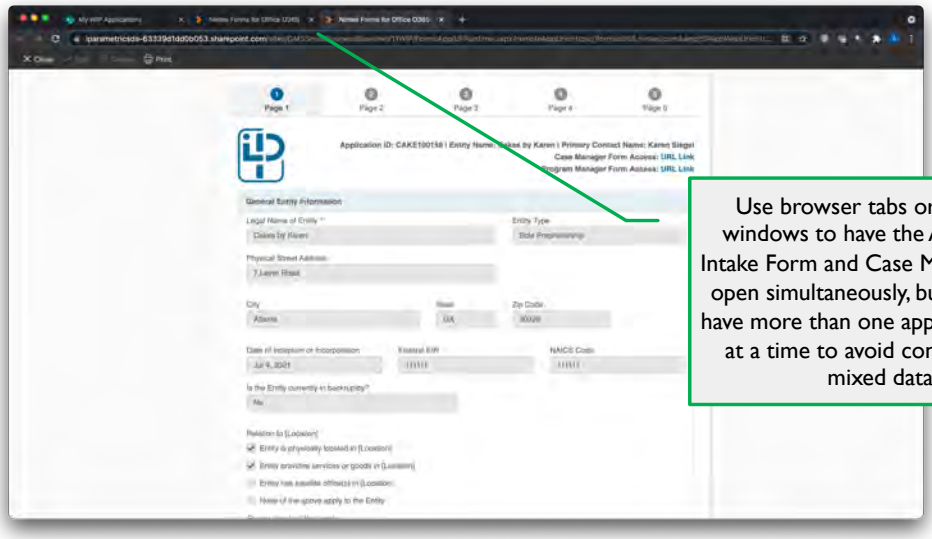
As a case manager, it is important to work diligently and accurately. This module will walk you through some best practices to help you review your applications efficiently and keep your workload backlog to a minimum.

I Best Practices

Use the "Application Submitted" and "Form Received" fields to help prioritize your case load

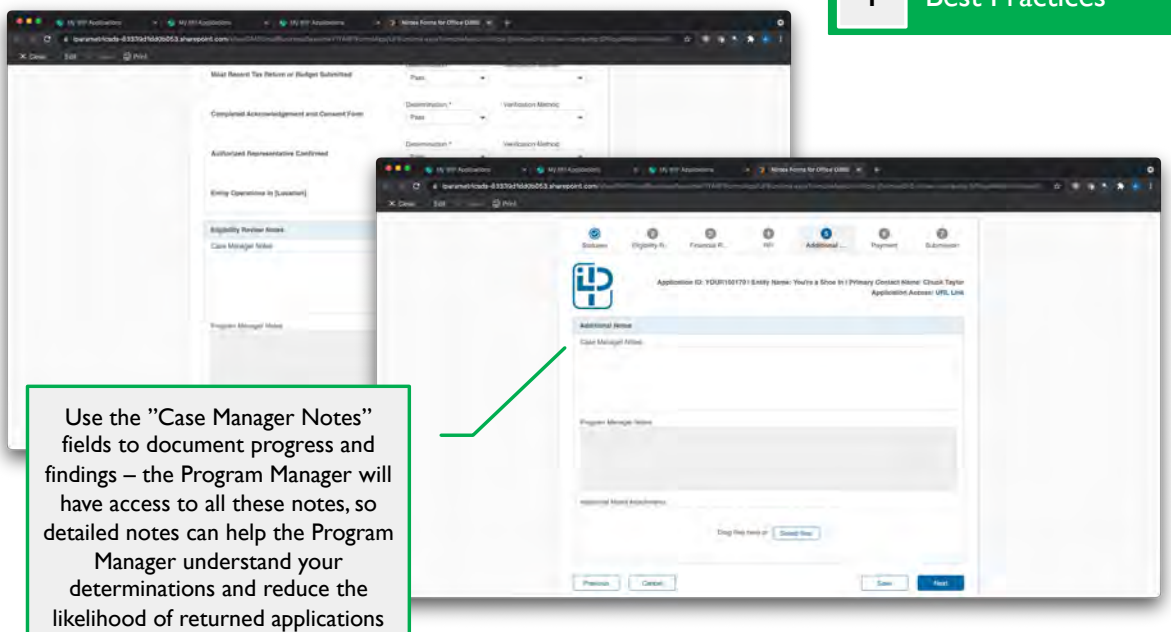


I Best Practices



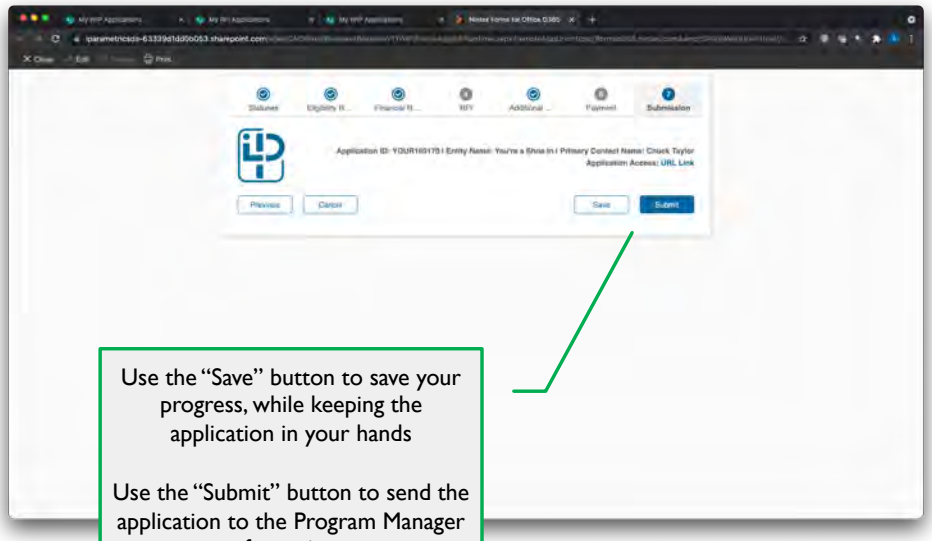
Use browser tabs or separate windows to have the Application Intake Form and Case Manager Form open simultaneously, but try not to have more than one application open at a time to avoid confusion and mixed data

I Best Practices



Use the ”Case Manager Notes” fields to document progress and findings – the Program Manager will have access to all these notes, so detailed notes can help the Program Manager understand your determinations and reduce the likelihood of returned applications

I Best Practices



Use the "Save" button to save your progress, while keeping the application in your hands

Use the "Submit" button to send the application to the Program Manager for action