**PRD for Risk Assessment Mapping Tool (RAMP)**

Author

IDRT

Project Manager

Kayode Atoba

IDRT Team

Kayode Atoba, Laura Stearns, Wesley Highfield

TDIS Team

……

Status of PRD:

Submitted on 9/13/2024

Background

Preparing the risk assessment component of local and state hazard mitigation plans can be a daunting task for many communities due to several factors. These challenges include the extensive datasets required, the need for experienced geospatial analysts, and the significant funds and time investment needed for conducting the risk assessment. Typically, this risk assessment constitutes a substantial portion of hazard mitigation plans, often conveyed through maps, tables, figures, and accompanying narratives. Consequently, local communities with limited resources frequently hesitate to undertake hazard mitigation planning due to these demanding requirements and complexities. The project manager is Kayode Atoba.

IDRT completed the risk assessment of the newly approved Texas State Hazard Mitigation Plan (SHMP). These datasets are now available for download and use for analytics, planning and decision-making purposes through the SHMP tool created by IDRT. Although local communities can now easily access SHMP data, several users still need help on how to interact with the dataset with their own software and mapping programs.

To address this issue, IDRT proposes to expand the existing SHMP tool into a risk assessment mapping and planning (RAMP) tool. This tool will enable access to datasets used for hazard mitigation plans at the city or county level. With the proposed RAMP tool, officials, especially those with limited resources, can easily download data, maps, tables, and figures that would be useful for hazard mitigation planning for their county or city.

Objectives

• Provide access to data and risk products for all hazards at the city or county level of geography.

• Create an interactive web mapping and dashboard platform where dataset layers can be toggled on and off for viewing.

• Enable users to download a pdf or jpg view of a map created in the interactive web platform.

• Update and improve the UI/UX of the current SHMP tool to meet TDEM requirements.

• Enable users to download raw data and clean data of all risk assessment products.

Constraints

• Time: TDEM wants the tool ready by March 2025 and launch it at the Conference in April/May 2025.

• Scalability: Data storage and cataloging of large datasets at the state level scale

Personas

• IDRT Researchers and TDIS developers

• State decision makers: TDEM

• City and County Liaison Officers, EOMs, and Consultants for HMP

• Researchers for mapping, data download and analysis.

Scope

Hazard Selection and Mapping

Use all available data products needed for Local hazard plans to select all historic hazards that have impacted the county or community. This includes all hazards data that can be mapped or queried at a point scale. Datasets in table formats are also included. Example datasets include Tornado and Hail tracks, Dam locations, historic flood depth, wildland urban interface, historic fire points, etc. Use FEMA CFR Guidance to ensure all requirements for HMPs are met (e.g., location, risk, exposure, impact etc.). Webtool should also include viewers/downloads for large dataset such as building footprints, and other underlying datasets to be downloaded at a smaller scale.

User Stories

• As a *city or county planner*, I need a user-friendly dashboard environment where I can create my own maps so I can insert them into my local hazard mitigation. This should be through an interactive webtool or web map that has a drop-down menu for which hazard I’m planning to map, what Code of federal regulation (CFR) I want to address (e.g. probability, exposure, risk, etc.), and whether I want a table or map as an output. Once I select a hazard type and CFR, I should be able to download a finished product such as the raw dataset in the map viewer and/or a pdf of the map viewer without using GIS software outside the tool created.

• As an *IDRT analyst,* I want to be able to upload and update the underlying datasets on a regular basis. I need to optimize data streaming from various sources to ensure efficient and seamless data integration for accurate calculations. I want to be able to use Databricks (or any other acceptable mechanism) to query data and underlying dataset for automated mapping and analysis.

Data Sources

All existing SHMP underlying dataset from different state and federal agencies. We will make a concerted effort to add datasets with higher resolutions including those with points and line features that can make city-level risk assessment possible. Alist of the dataset to be used can be found in this data inventory link.

Capabilities

In this phase of the tool, there are 2 main capability types. The interactive mapping dashboard consists of a map and dashboard environment for all users. The data download dashboard enable users to download the underlying datasets seen in the mapping dashboard.

**RAMP Interactive Mapping Dashboard**

As a city or county OEM or planners, I want to be able to:

• Sign in and out.

• Toggle base layers on and off.

• Select geography or area of interest.

• Select a county or city of interest.

• Select and visualize hazard of interest.

• Identify if Hazard is of interest to geographical area.

• Select a CFR to fulfill.

• Select options for location, extent, hazard, damage, probability, etc.

• Create Map, Table or charts from selected hazards and CFR.

• Toggle over dashboard to see charts and figures.

• Select styles for mapping and figures generated.

• Download a map, dataset or source code.

• Ability to download multiple maps in .jpg or .pdf format

• Include autogenerated citation on maps

• These maps and figures should have an option of summary statistics such as sums, average counts, etc. depending on the mapping performed.

**RAMP Data Download Dashboard**

As a city or county OEM or planners, I want to be able to:

• Perform the same features in the mapping dashboard above

• Download the cleaned data and metadata for the data shown in the mapping dashboard.

• Dataset to be downloaded include csv, shapefiles, raster's and other formats that can be further used in another GIS environment if a user chose not to use the RAMP generated maps.

• Allow users to complete a feedback form for incorrect/missing data

• Add helpdesk e-mail to the landing page

Appendix

Appendix A: Sample Wireframe for proposed RAMP Tool (Mapping)

Appendix A: Sample Wireframe for proposed RAMP Tool (Data)

Appendix A: Sample Wireframe for proposed RAMP Tool (Reporting)

Appendix B: CFR Requirements for Local Hazard Mitigation Risk Assessment

**CFR**

**Theme**

**Sub-theme**

**Description**

B1-a

Natural hazards

Hazard Type

This includes any source of harm or difficulty created by meteorological, environmental or geological event.

B1-b

Location

Planning area/Regions,

Administrative Boundary e.g. county, city. Affected assets outside the boundary

Information on the location and jurisdiction of the identified hazard

B1-c

Extent

Scope of impact. frequency/intensity of effect

Providing details about the dimension of effect/impact of the hazard in the planning area

B1-d

Previous occurrence

Past events. Major disaster declarations

Any information analyzing past occurrences of hazards based on historical occurrences

B1-e

Future probability

Likelihood of future events

Effect of future conditions

Type, location and range of anticipated events

Information that provides the likelihood of a hazard occurring or reoccurring

B1-f

Risk

Risk information. Varying levels of Risk

Specification of the different and varying degrees of risks posed by the identified hazard

B2-a

Vulnerability

Summary of the hazard

the identification and description of all assets that are prone and susceptible to loss and damages from different hazards

Assets:

Current and future assets. Structures Exposed, People: Consequence and effect. Systems. Natural, historic, and cultural resources

State or government assets exposed to hazard and their potential impact

B2-b

Impacts

Potential impacts. Changes in climate and population patterns. Land use change and development

information about the consequences or effects of the identified hazards on vulnerable assets

B2-c

Repetitive loss (RL)

Severe repetitive loss (SRL)

Estimated loss (types and numbers)

Repetitive and severe repetitive loss properties

Properties located in SFHA

details about all repetitively flooded NFIP-insured structures and properties at high risk of flooding not captured by NFIP

Appendix C: Example Maps, Tables and figures for Wildfire Hazard

**Type**

**Title**

**Description**

Map

Wildland Urban Interface in and around Harris County

Identification of the wildfire urban interface areas within Harris County

Map

Estimated Wildfire impact

A map to show the impact of wildfire

Map

Total acres burned by wildfire

From 2005 - 2021 by Texas A&M Fire service

Map

Historic wildfire perimeters

By year 2000 - 2022

Table

Structures damaged or destroyed by wildfires

By year 2000 - 2020

Map

Burn probability

shows the rate of probable burnt area from low to high

Table

Total damage due to wildfire

From the year 2000 - 2021

Figure

Fire intensity scale

level of fire intensity

Table

Wildfire Historical Occurrences in Harris County (2005 – 2016)

Outlines the historical occurrences of wildfires in the Harris County planning area

Map

Wildfire Historical Occurrence Information for Harris County

It shows the historical occurrence records

Map

Wildfire Threat

The Wildland Fire Susceptibility Index defines the likelihood of an acre burning

Table

Loss Estimates for Fire Hazard Severity Zones

Estimate to show the probability/extent of wildfire damage

Table

Harris County Population Exposure to the Wildfire Hazard

The population exposure estimates by risk area

Table

Harris County Property Exposure to the Wildfire Hazard

The property exposure estimates by risk area

Bar Chart

Critical Facilities Mapped Wildfire Ignition Density Zones Countywide

Shows the breakdown of exposure by ignition density zone and facility type

Table

Intensity/frequency or scope of the hazard

a table to outline the frequency and scope of wildfire in the planning area

Table/Map

Assets or people vulnerable to the hazard

a table or map to indicate vulnerability to wildfire

Table/Map

Potential impacts of the hazard

a table or map to show the potential impact of wildfire

Appendix D: Sample pdf map that can be downloaded from interactive web dashboard

Appendix F: Sample Summary Statistics for All Hazards