Power Outage Decision Matrix
CEE 26

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

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What we did: Our team developed an interactive decision matrix interface to allow leadership to respond to power outages on campus with a greater level of control & efficiency.

Introduction & Background

-Currently UMD has no framework that recommends actions leadership should take in the event of a power outage, which could result in danger, lack of organization, and panic in the event of an outage.
- The UMD campus has seen 7 power outages since they were tracked, starting in February of 2020.

Project Approach

1. *Literature Review*
   a. *For ADA accommodations and actions needed for decision making*
2. *Faculty and Student Survey Collection*
3. *Formulated Matrix*
   a. *Parameters: Outage duration, Building type, Building Age, FQI*
4. *User Interface*
5. *QA/QC Experimental Trials*

Assumptions

-The matrix is designed to not consider backup generators.
-Only focused on Power Outages.
-A few UMD campus buildings were deemed out of scope due to security & social welfare concerns.

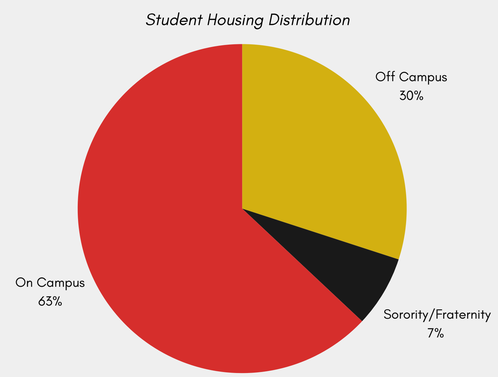
Matrix Organization

-X axis: the buildings are grouped by functionality (e.g. Residential Halls, Dining Halls, Libraries, etc.)
-Y axis: outage duration

Basic Matrix Instructions

1) Leadership will receive information about time and location of outage.
2) Select the correct building group on the home page
3) Enter the start time and estimated end time of the outage in the "Time of Power Outage" tab
4) Select the correct building in the "Building Identification" tab
5) Review the results in the "action plan" tab and "general notes" tab
6) Follow action steps as necessary

Survey results

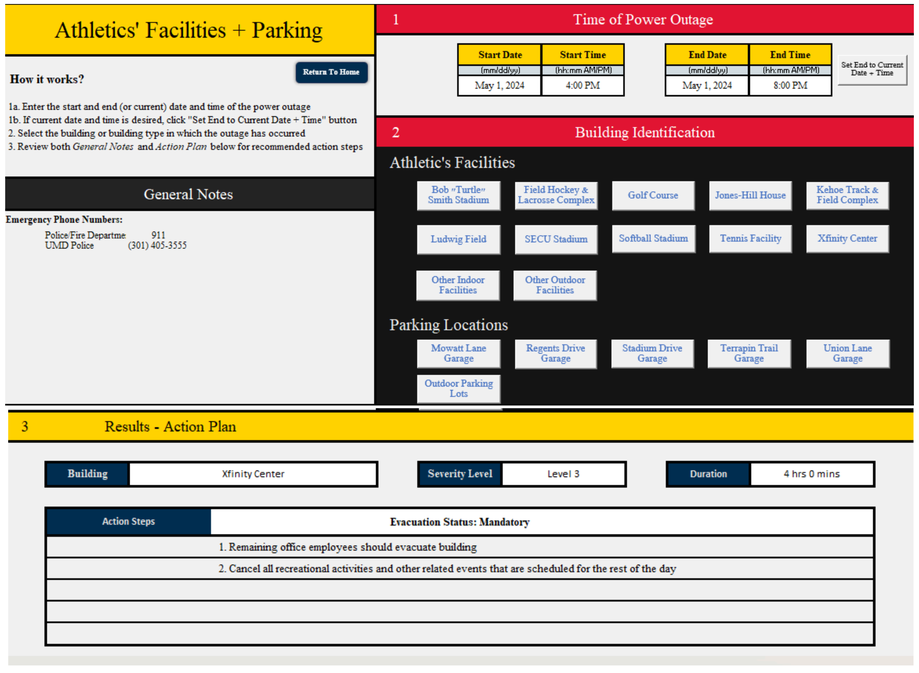


Faculty Most Used Buildings
1. Tawes
2. Stamp
3. Symons
4. Benjamin
5. ESJ/Public Health

Students Most Used Buildings:
1. ESJ
2. Stamp
3. McKeldin
4. BioPsych
5. Tawes

*On a scale from 1 to 5, Faculty say their confidence about knowing what to do in the event of a power outage is a 3.20**

*On a scale from 1 to 5, Students say their confidence about knowing what to do in the event of a power outage is a 3.57**



Future Work

- *Make the interface fully accessible in the app store to have easy access on your phone.*
- *Develop a student version that allows them to receive faster updates.*
- *Include live weather data on the app to allow faculty to be prepared in evacuation circumstances.*
- *Include backup generator capacity for long-term events.*

Experimental Trials & Results

-After finishing our matrix interface, we conducted a set of experimental trials on faculty in order to make sure our interface was user-friendly , and to get feedback on what we can improve.
-We did this by giving each subject an outage scenario and timing them on how long it takes them to determine the corresponding action.

Result times: The average time of the 4 trials conducted was 2:19 mins.
Result Scores: We asked the participants to rate the difficulty of the matrix using a 1-10 scale (10 being easiest). Average was an 8.5.

"[The matrix] was very simple and easy to use" - OEMBC Faculty Member
"[The matrix] was very straightforward for using it for my first time." - OEMBC Faculty Member

Changes Made based on Feedback:
- *Changed color scheme to UMD colors*
- *Added numbers to boxes to show the steps next to the input boxes*
- *Changed the colors of input boxes to make the inputs more intuitive*
- *Added visual indication of selection*
- *Incorporated a Building Quality Index*
- *Added a pathway for action cells to be visible and changed if the need arises, directly into the interface*
- *Added instructions about enabling macros*
- *Added a note about calling emergency phone numbers in extenuating circumstances*