Oregon State University

POLICY ANALYSIS LABORATORY

A QUALITATIVE ANALYSIS OF ZONE-BASED EVACUATION PLATFORMS

Provided for the
Oregon Fire Chiefs Association

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Background

The Oregon Fire Chiefs Association (OFCA) engaged Oregon State University's Policy Analysis Laboratory (OPAL) to conduct an evaluation of existing users of the product "Zonehaven", an evacuation management web-based platform for public safety. Zonehaven's website notes its product aims to improve a community's evacuation process by taking decision action, supporting the community, accessing real-time information and increasing operational efficiency[1]. In 2021, the OFCA initiated a two-county pilot project, using Zonehaven in the field in both Deschutes and Jackson Counties in Oregon. OPAL was contracted to evaluate the prior experience of users of Zonehaven in several California communities and one Oregon community. The evaluation examined the perspectives of local fire and police officials on the use of Zonehaven, specifically during a wildfire.

Method and Method of Analysis

OPAL researchers used a qualitative research design grounded in narrative inquiry to explore the practical perspectives and challenges inherent in the use of Zonehaven during a wildfire emergency. The goal of the project was to inform the OFCA of the perspectives of fire and police officials who have experience using Zonehaven (or other means) to evacuate residents during a wildfire. This analysis aimed to answer the question:

> How has Zonehaven impacted the experience of implementing evacuation orders during a wildfire emergency?

A purposeful sample of fire and police professionals who have experience with Zonehaven, or making evacuation decisions during a wildfire, was used to identify individuals to

[1] https://www.zonehaven.com/why/

interview for this analysis. A purposeful sample is a non-probability sample that is used to identify people who are best suited to inform the researcher about the experiences being explored in the research[2].

Following a list of scripted questions, researchers engaged interviewees regarding their thoughts and experiences related to wildfire, making evacuation decisions, implementing evacuation orders, and the use of the Zonehaven platform (Appendix A). The questions were open-ended and intended to stimulate thoughtful responses aimed at informing the research question.

Data was collected and coded into themes, first through open coding and then by axial coding. Open coding allows the researcher to classify and label concepts in the data while axial coding is the reanalysis of the open codes aimed to identify the most important concepts in the data[3].

Results

The research team conducted ten interviews from seven different communities in both California and Oregon. The participants varied in disciplines, police, fire, and emergency management, as well as in ranks and years of experience. The interviewees all had experience with wildfire, and most had experience with Zonehaven (where others had used different evacuation software platforms).

The analysis was organized into three overarching themes when examining the Zonehaven (or other evacuation tools used) platform: informing evacuation decisions, speed of notifications, and speed of evacuations. The participants in these interviews, in general, had not

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[2] Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches.* Sage publications.

[3] Babbie, E. R. (2020). *The practice of social research.* Cengage learning.

used the simulation tool to aid in the evacuation decision-making process. Instead, the study participants relied on their current practices to forecast the trajectory of the incident. The simulation tool is used for scenario planning, such as running fire and flood models aimed to help decision-makers forecast future happenings during an incident[4].

> *"What would take hours in the past, we were able to call for evacuations… in minutes, after we have Zonehaven"*
> *- Deputy Fire Chief*

Therefore, in this sample of participants, the zone-based evacuation software packages were not found to have sped up making the decisions on when to evacuate a given zone or community but rather were more useful in speeding up the time to deliver notifications once the decision to evacuate a zone was made.

Without the use of the platform to aid in the evacuation process, evacuation notifications were mapped out using a just-in-time defined evacuation polygon. Defining and Drawing this polygon was time-consuming compared to using a predetermined zone when time is critical during an evacuation.

Interviewees identified that the zone-based platform offered three additional benefits. First, a public-facing and web-based map to show the evacuation zones for the community. Second, software to aid in the evacuation process when staffing levels are low, and third, intelligence on the number of buildings in the zone to prepare for the evacuees. No specific drawbacks were identified as a theme of the platform; however, two areas were identified as a caution about the implementation of an evacuation platform, not specific to Zonehaven. The cautions were to ensure (a) connectivity with the dispatch center for the community and (b) that communities who were early in their implementation chose not to use the "know your zone"

[4] https://www.zonehaven.com/evac/

marketing campaign for fear if they did not retain the Zonehaven platform, then the public would become confused during an emergency later.

Conclusion

> *"We decided we're always going to activate Zonehaven zones for alerts, warnings, and evacuations and then just stick with it. So that's what we did, and it worked fairly well, I think quite well in some ways" - Emergency Manager*

The public safety professionals interviewed were eager to share their experiences broadly and to discuss wildfire evacuations, decisions regarding evacuation, and the use of Zonehaven or other technology-based evacuation solutions. In general, the consensus of those interviewed in this analysis found that the evacuation tools used, mostly Zonehaven, were extremely helpful in executing the decision to initiate and make notifications of an evacuation decision. There is a feature within the Zonehaven platform specifically that uses predictive modeling to aid in informing the evacuation decisions. Those interviewed did not have access to that feature, and therefore, could not speak to how it might help inform the decision to evacuate. Likewise, the experts interviewed were mostly in the early implementation stages of Zonehaven, and had not marketed the "Know Your Zone" campaign but consistently felt that the campaign would aid the community when evacuated during an emergency.

An important insight emerged from the public safety professionals' use of zone-based evacuations that is worth noting – the use of small zones, or "sub-zones." Their recommendation was based on experience attempting to evacuate smaller "pockets" of neighborhoods, often for emergencies other than wildfires.

> *"But I would say that moving to the Zonehaven platform was an exponential increase in our effectiveness and communicating with the public" Lieutenant with Sheriff's Office*

This analysis determined that zone-based evacuation practices through technology platforms such as Zonehaven, were a favorable model

for use during emergencies. The speed of the execution of evacuations was improved using a zone-based evacuation tool and credited largely to the speed of the notification process once an evacuation decision was made. Respondents also found the use of zones and subzones as an effective model for pre-planning an efficient strategy to evacuate the community during an emergency. There was no evidence from the interviews to suggest the task of evacuating was aided beyond the quicker notifications, although participants acknowledged not utilizing all the features available in the zone-based evacuation software. The interviewees, who represented a variety of public safety disciplines, would not want to return to prior methods of evacuation execution and notifications and believed the time saved in executing a notification based on zones was directly responsible for the safety of people from within their communities.

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Appendix A

Questionnaire

Thank you for speaking with me today. My name is _____ and I am a graduate student in the School of Public Policy at Oregon State University. We are working with the Oregon Fire Chiefs Association to evaluate the experience of fire officials with the Zonehaven platform in making evacuation decisions. We are interested in understanding more about your role in making evacuation decisions. Such decisions as when and where to request evacuations, particularly when wildfire threatens a community.

I would like to talk to you today about your experience in the fire service, particularly with respect to wildfire response, your experience with ordering or executing evacuation orders, and your experience with notifications to the community of an evacuation order.

If you are ok with it, I would like to record our discussion today so I can be sure to reflect your answers appropriately. Your identity will remain anonymous, and you are welcome to skip any questions or stop the interview at any time. Do you have any questions for me before we start?

1) Please state your name, position, and entity you represent.

2) Can you tell me about your experience with wildfire response?
1) How many years of experience do you have with wildfire response?
2) What are the roles you have served when responding to a wildfire?

3) Can you tell me about your experience with command level decisions to evacuate homes?
1) Have you been responsible for ordering evacuations? Executing an evacuation order? Notifying the community of an evacuation order?

4) Can you tell me about your experience with and knowledge about the Zonehaven product?

5) Can you share with me your experience with evacuation decisions before the implementation of Zonehaven.
1) What information is sought in making an evacuation decision?
2) From what sources does that information come?
3) Can you describe the time and effort necessary to obtain that information?

6) Can you share with me your experience with evacuation decisions after the implementation of Zonehaven. What, if anything, was different?
1) Are there any upsides of Zonehaven?

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2) Are there any drawbacks of Zonehaven?

7) Thinking only of the efficacy of Zonehaven (not the cost/benefit or a value judgment), is it a tool you would recommend that incident commanders have in the "toolbox" when evaluating or making evacuation decisions?

8) Are there other tools you feel would be valuable in making evacuation decisions?

9) Is there anybody else, person or agency, you feel we should talk with to further our understanding of evacuation decisions?

10) This concludes the set of questions I have for you. Is there anything else you would like to add? Anything that we should take note of, that we did not ask you about here ?

Thank you for your time and participation.