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Analyzing Response Mitigation Communication Methods by Simulation Modeling

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Abstract

Responding to an emergency requires quick and accurate communication to identify best practices in case of an unexpected event. By modeling these methods, one can estimate the response communication time, accuracy, and effectiveness of a certain group. This modeling can be applied to any situation that requires communicating a message. The particular model can be edited to reflect such, specifically regarding communication rate by word of mouth in comparison to using an outside system.

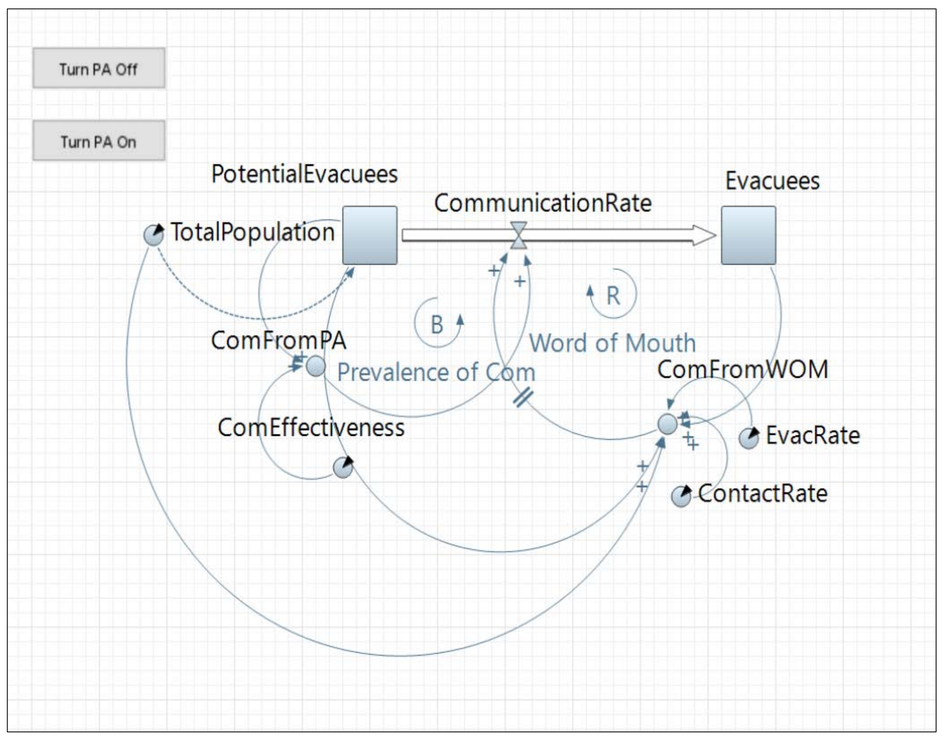

Figure 1. Reichart, K. (2018). Modified Bass Diffusion created in AnyLogic8® PLE.

Model Explanation

Essentially, the model shows the relationship between communication and understanding in a physical person.

Methods

Simulation Modeling

Choosing to use a simulation model allowed the researchers the opportunity to apply the same scenario in different trials.
The trials involved using different communication responses and combinations to determine best practices regarding communication.

AnyLogic® 8

AnyLogic® is a discrete event modeling system that offered the researchers the opportunity to bridge response communication with technology.

Bass Diffusion

A Bass Diffusion is a systems dynamics model traditionally applied to advertising. Applying this model to communication systems focused on the communication rate. Thus, one can manipulate accuracy, effectiveness, and the system depending on the event.

Results

The scenario chosen required an evacuation message to be issued. The evacuation is affected by both error and improved communication. The mitigation of the message was affected entering numbers into variables. These are modeled after expected rates based on previous research.
The message to evacuate is understood once the potential evacuee becomes an evacuee. This does not mean that the person has evacuated, just that the message is both sent and accurate.

Discussion

Testing will continue to compare error rates, different scenarios, and options for communication response. The research shows promise as an actual representation as physical communication. It is also innovative considering that physical communication systems (like word of mouth, public announcement systems, alert systems, etc.) are difficult to test outside of their location in multiple instance with crowds.

Additionally, the model in its current state does not offer a true representation of a full communication mitigation response as this is a theoretical model in that there is no agent being controlled, just the message. However, the message itself needs to be analyzed before addressing this issue.

Future Iterations

Improving the model will involve producing a pedestrian model (Figure 2) that applies the logic learned in the systems dynamics model to an agent.

This will allow the research to grow into continued testing with a more physical and agent controlled communication response. Depending on the scenario given, this testing can be as specific or general as possible.

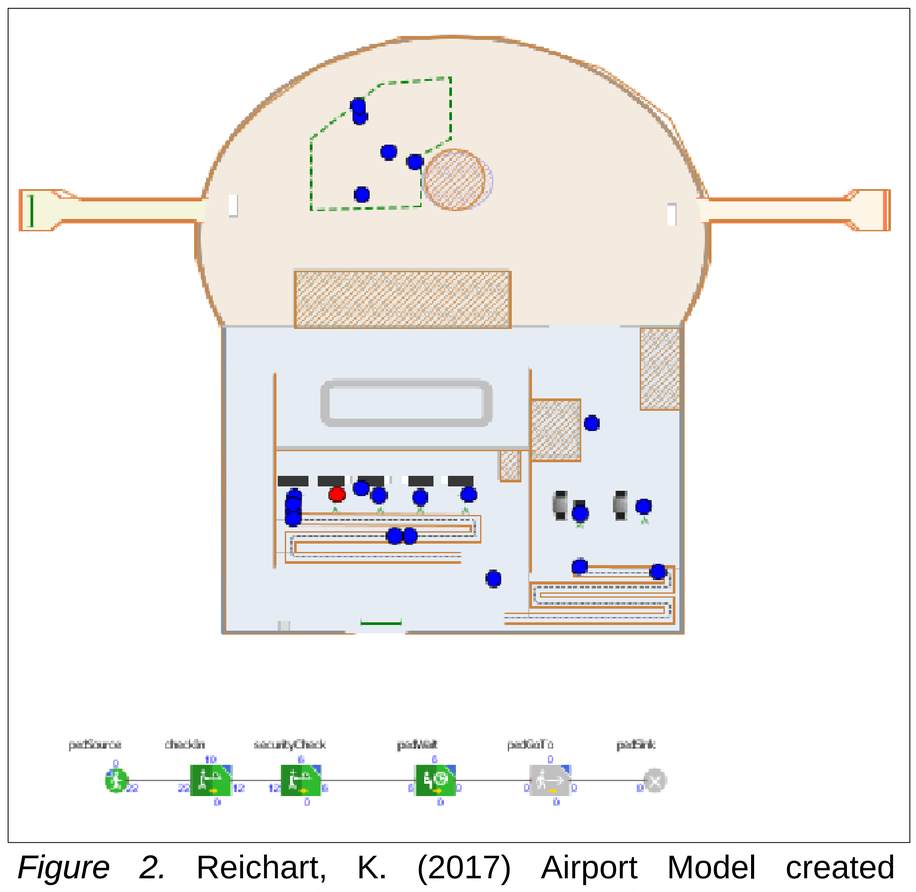

Figure 2. Reichart, K. (2017) Airport Model created in AnyLogic8® Professional based off tutorial provided.