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Assessing the Impact of Wait Times on Patient Mortality Outcomes in a Hypothetical Oil and Gas Industry Disaster Scenario: An Agent-Based Modeling Approach Using NetLogo

Nimisingha Jacob AMAKAMA (IMT Mines Ales), Gilles DUSSEURRE (IMT Mines Ales), Axelle CADIERE (University of Nimes), R. Wade SCHUETTE



Part 1: Background / Objective/ Motivation

Background: Emergency response in the oil and gas industry entails the efficient coordination and execution of human and material resources to lessen the effects of a disaster while concurrently protecting both life and critical assets.

Objective: Model, simulate and implement hospital systems interactions in emergency respond scenario in oil and gas industry, using Agent-based modelling and simulation.

Motivation: Challenges in emergency setting, including interaction, lack of real-time data sharing and analysis, and need for patients safety in a complex and dynamic environment, for:

- Enhancement of response coordination in emergency;
- Assessment of impacts of key factors in emergency response.

Part 2: Hypothetical Scenario

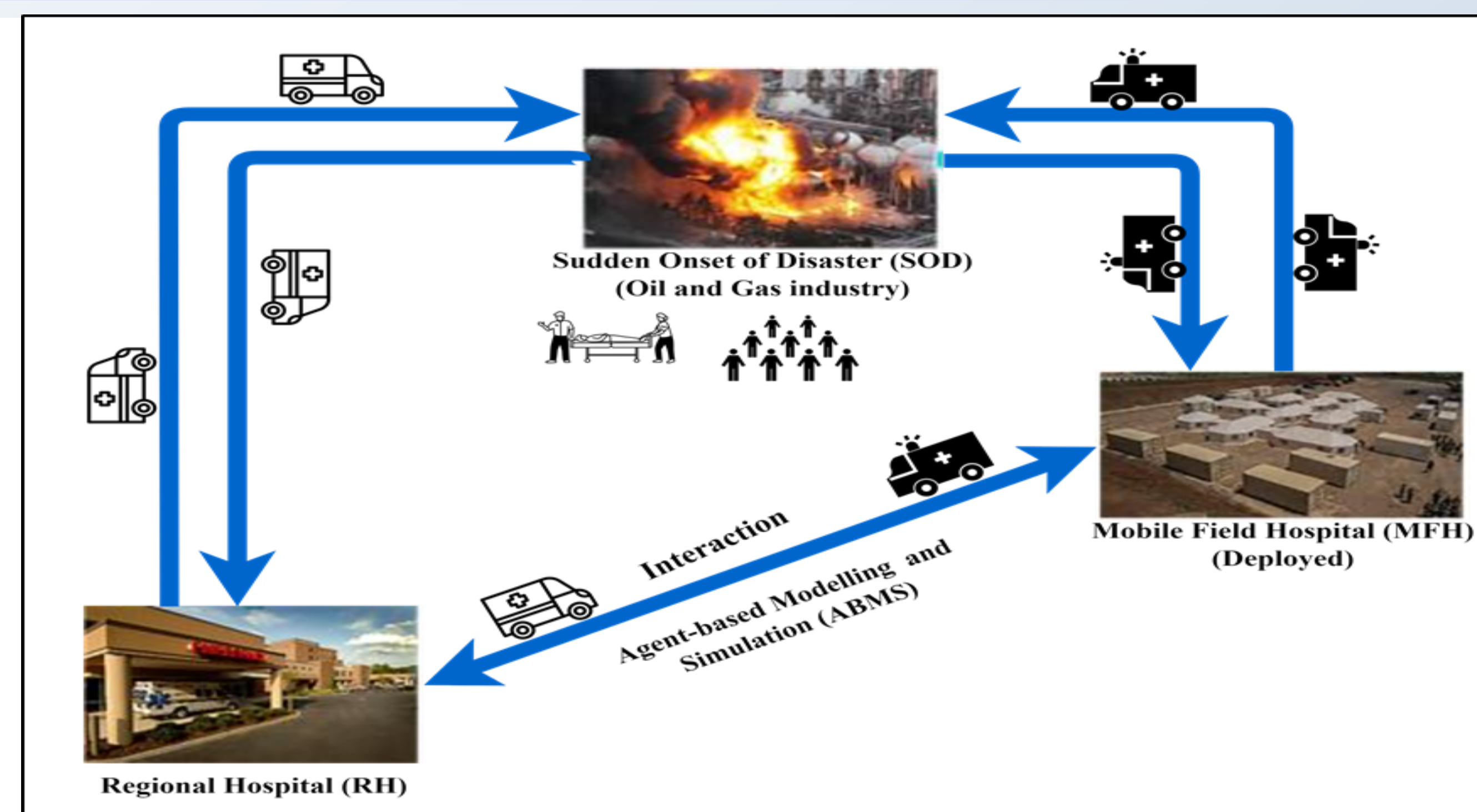


Fig.1: Hypothetical oil and gas industry emergency scenario (Amakama et al,2023)

Part 5: Results

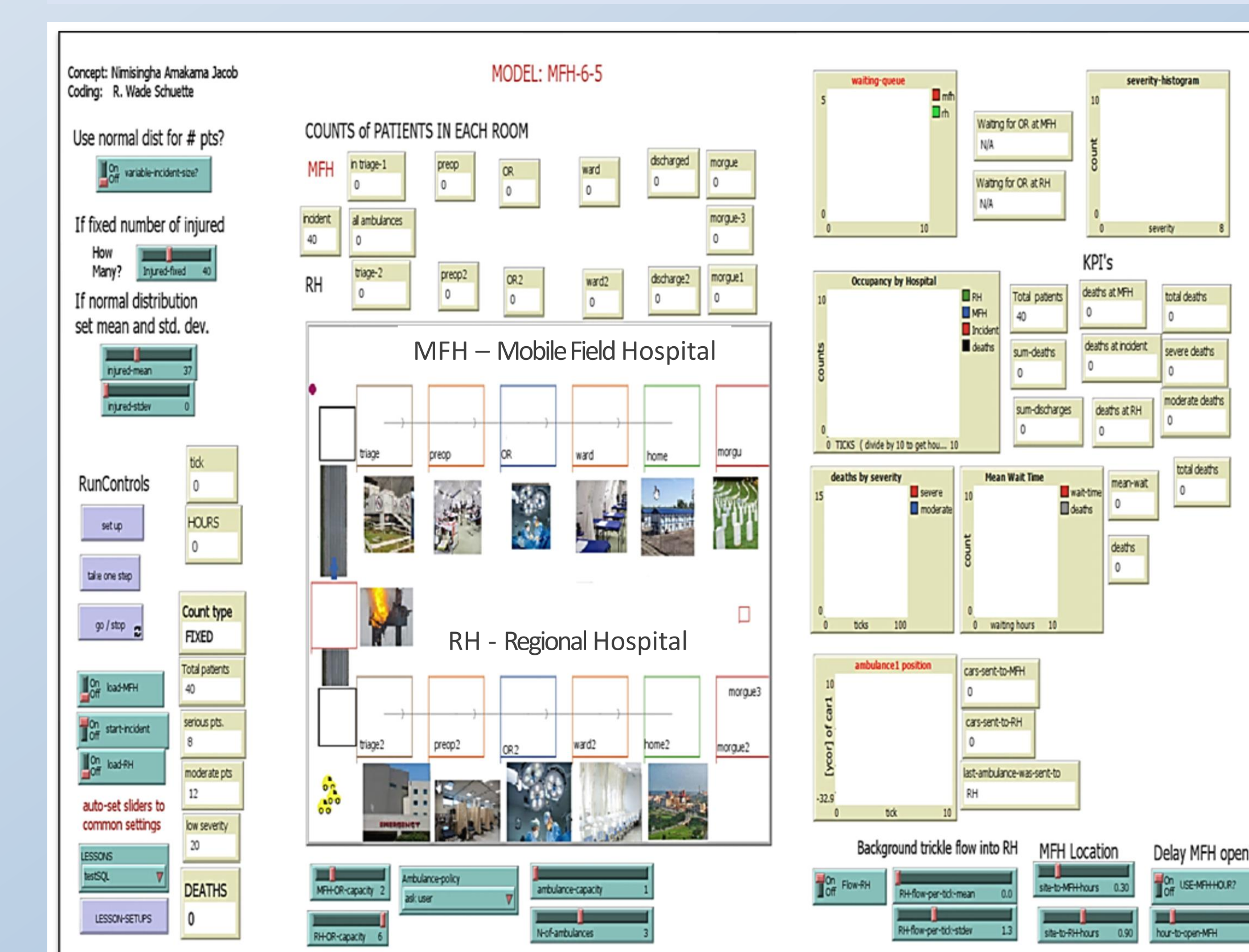


Fig.4: NetLogo (6.3.0) Modelling and Simulation Interface (Amakama et al,2023)

Part 3: Methodology

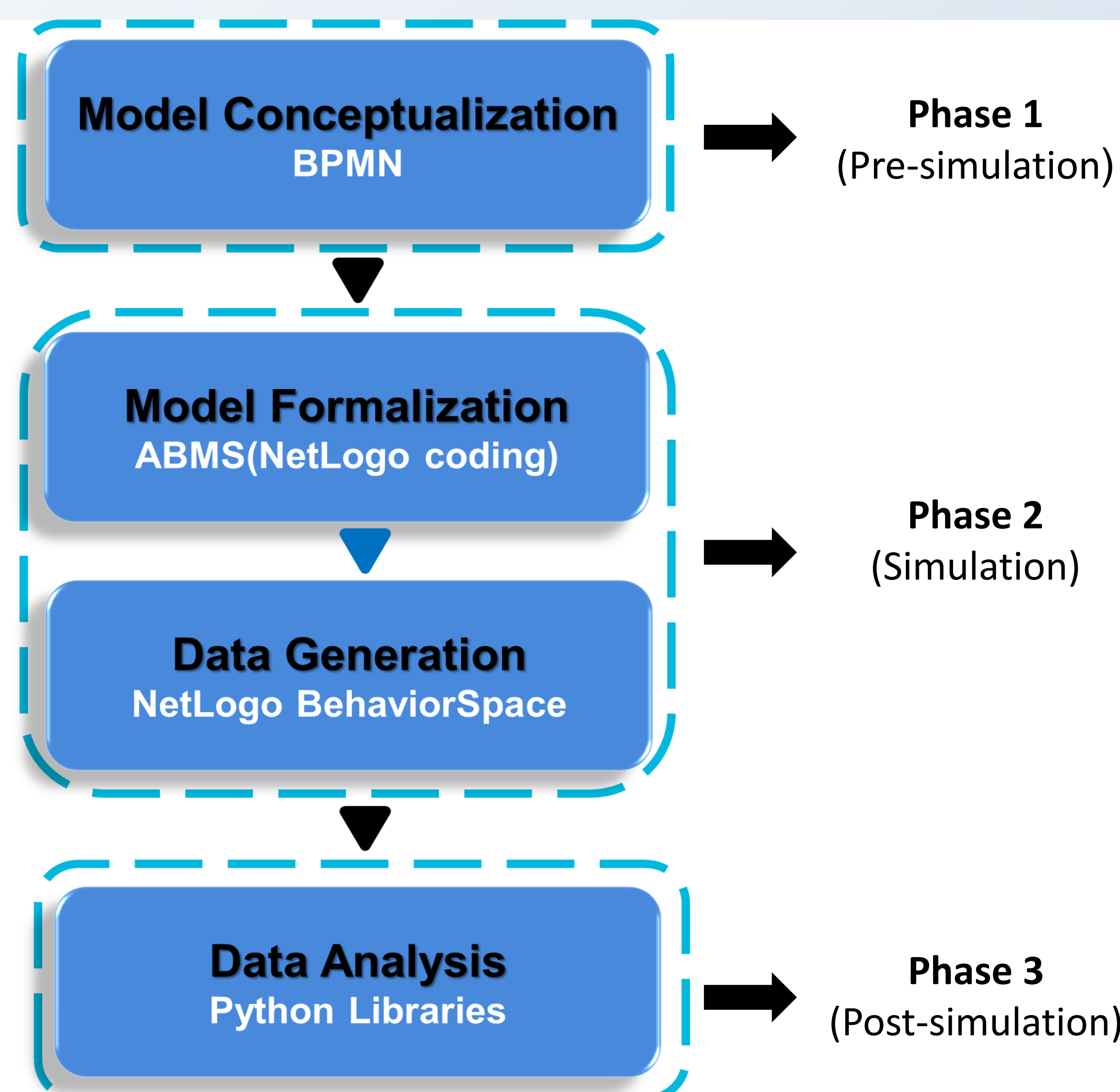


Fig.2: Methodology flow diagram

Part 4: Methodology

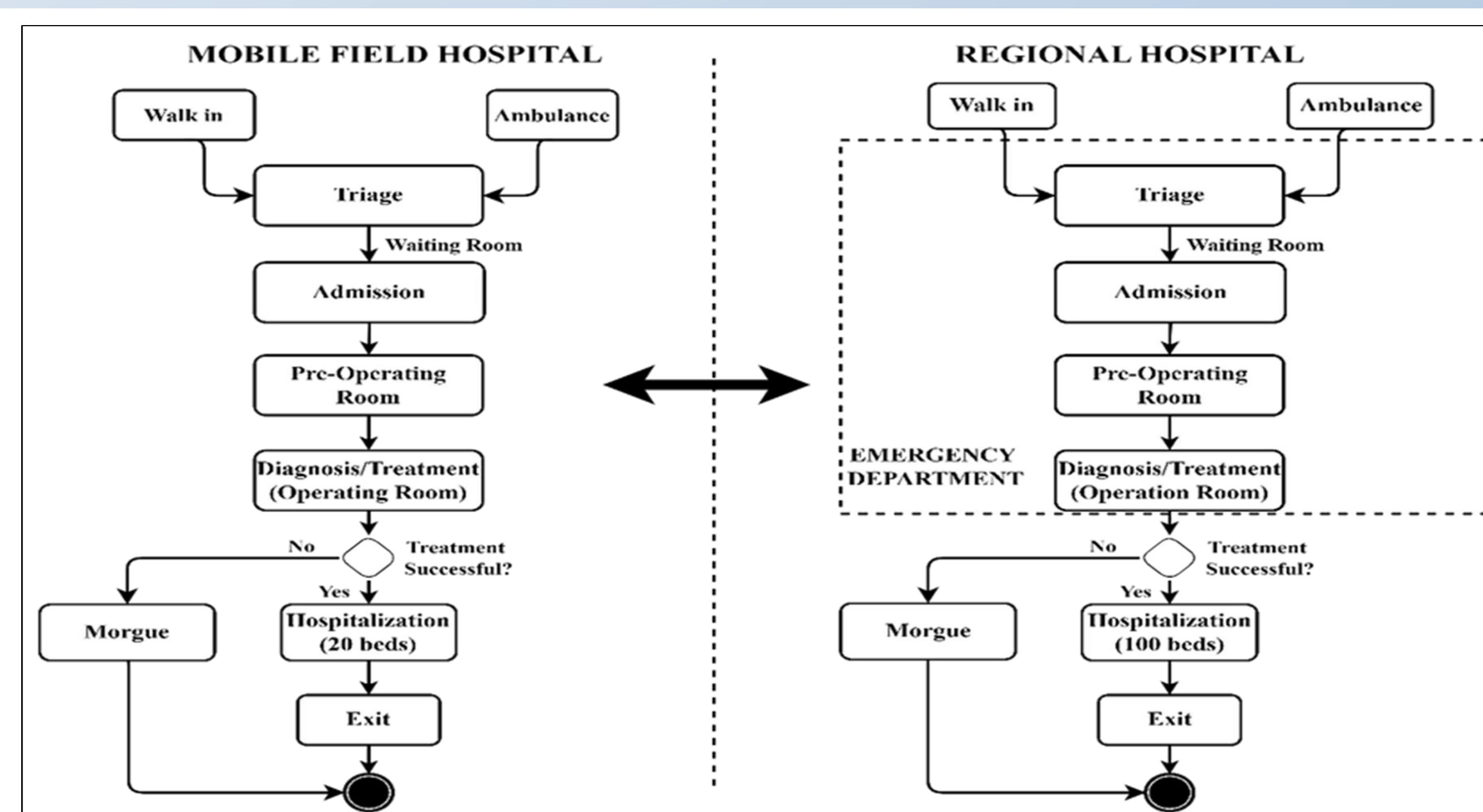


Fig.3: Simplified Interacting Healthcare Systems Conceptualization for Disaster Response (BPMN)

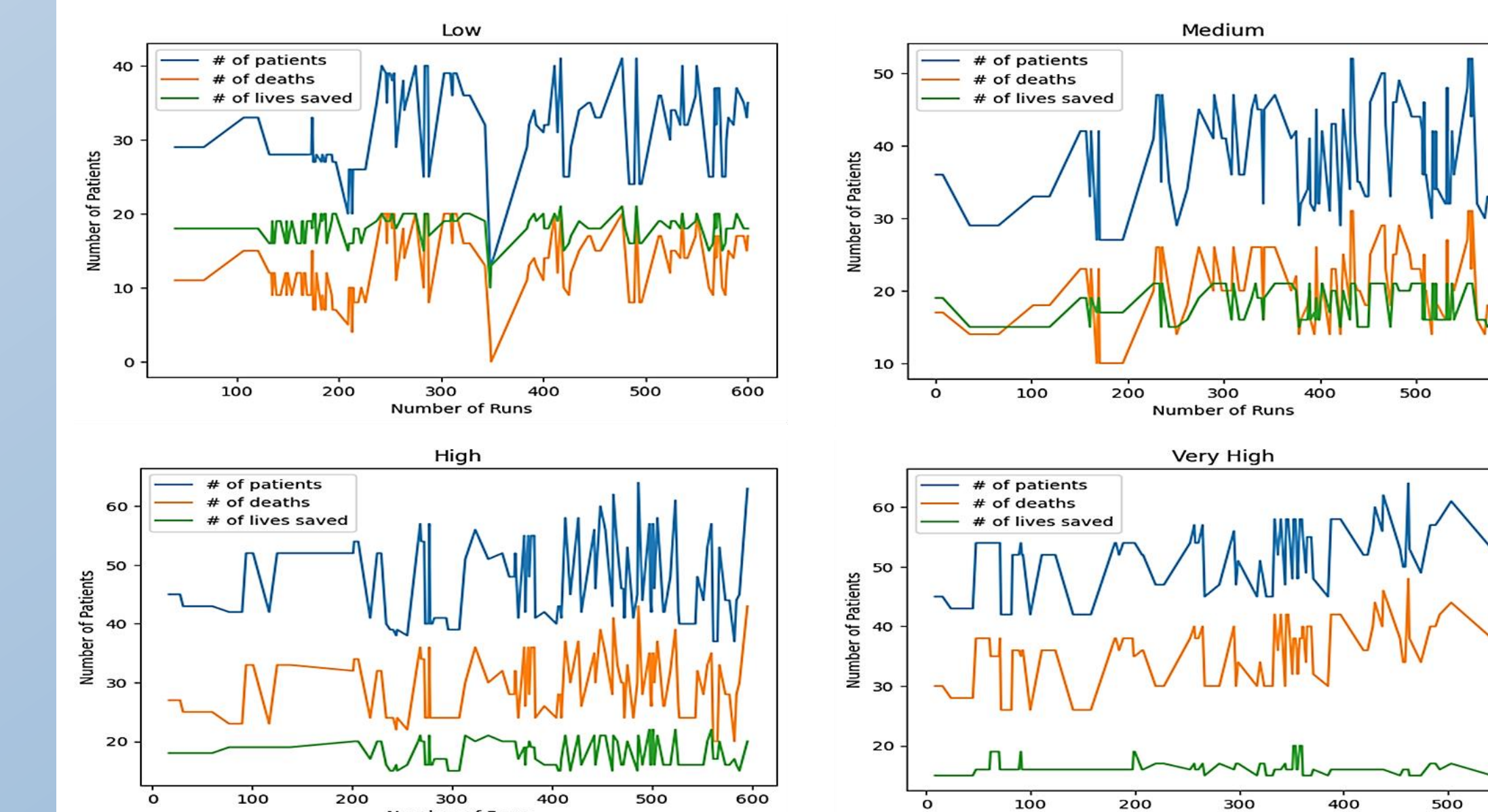


Fig.5: Effects of patient distribution and wait time on mortality outcomes

- Longer wait times and patient distribution results in increased mortality rates

Part 6: Conclusion

- The Modelling and Simulation study indicates a significant relationship between patient distribution, mean wait times and patient mortality outcomes. The findings highlight the need for improvement of industrial safety and healthcare processes to reduce mortality outcomes in emergency settings.

Reference: Amakama, N. J., Dusserre, G., Cadieré, A., Schuette, R. W., & Zacharewicz, G. (2023). "Modelling and Implementation of Interoperable Healthcare Systems Solution for Disaster Response in the Oil and Gas Industry Colloque IMT 2023: " Sécurité et Résilience, Apr 2023, Palaiseau, France. 2023. doi:http://dx.doi.org/10.5281/zenodo.7937270