



HAL
open science

Risk Management and Disaster Response In the Oil and Gas Industry: Modelling and Implementation of Interoperable Healthcare Systems Solution for Disaster Response in the Oil and Gas Industry

Nimisingha Jacob Amakama, Gilles Dusserre, Axelle Cadriere, R Wade Schuette, Grégory Zacharewicz

► To cite this version:

Nimisingha Jacob Amakama, Gilles Dusserre, Axelle Cadriere, R Wade Schuette, Grégory Zacharewicz. Risk Management and Disaster Response In the Oil and Gas Industry: 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, 10.5281/zenodo.7937270 . hal-04097903

HAL Id: hal-04097903

<https://imt-mines-ales.hal.science/hal-04097903>

Submitted on 15 May 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Authors

Nimisingha Jacob AMAKAMA
Gilles DUSSERRE
Axelle CADIÈRE
R.Wade SCHUETTE
Gregory ZACHAREWICZ

Partners



1. Overview

Disaster response in the oil and gas industry remains a critical challenge as a result of the history and complexity of notable incidences, highlighting the need for researches to improve preparedness and response.

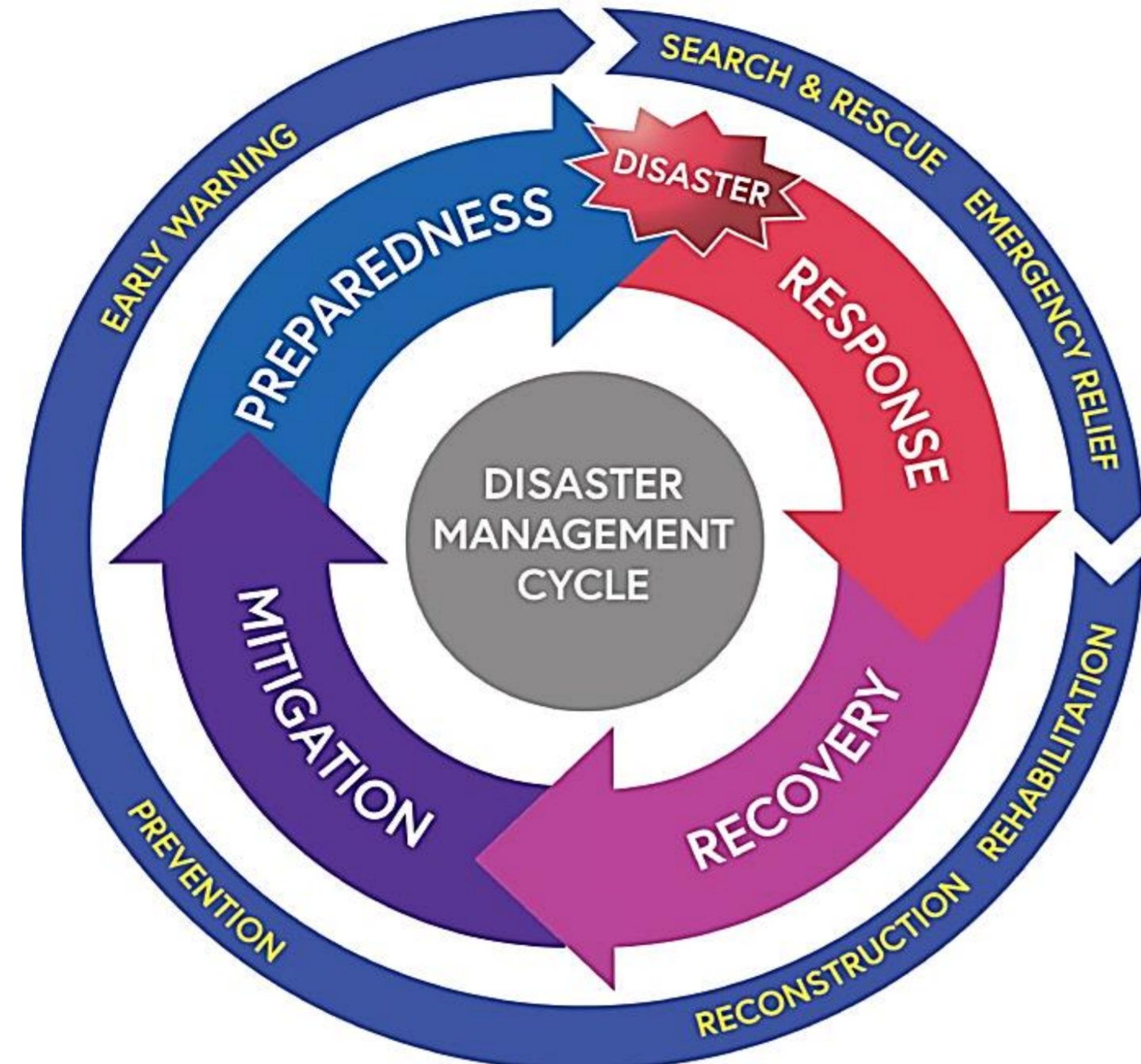


Fig.1: Disaster Management Cycle

2. Objectives

- ▶ Detail the system/sub-systems of interacting health systems via modelling language tool-BPMN
- ▶ Model, simulate and implement the interactions of the systems using Agent-based modelling
- ▶ Validate the “situation awareness” of the model via simulation-based Role-playing Game/Analysis.

3. Research Questions

- ▶ How is the interaction between hospital systems in a disaster response modelled? (Objectives.1&2)
- ▶ How can the concept of “situation awareness” be conceptualized, to assess the interaction between the healthcare systems?

6. Results

- ▶ The modelling and simulation study demonstrated that the deployment and utilization of the MFH as a support healthcare system successfully reduced the mortality outcome (Fig.5 A+B) in the response intervention, thus, revealing the value and promise of NetLogo 6.3.0(ABMS) and RPG validation (Fig.6) combination techniques in disaster response applications.

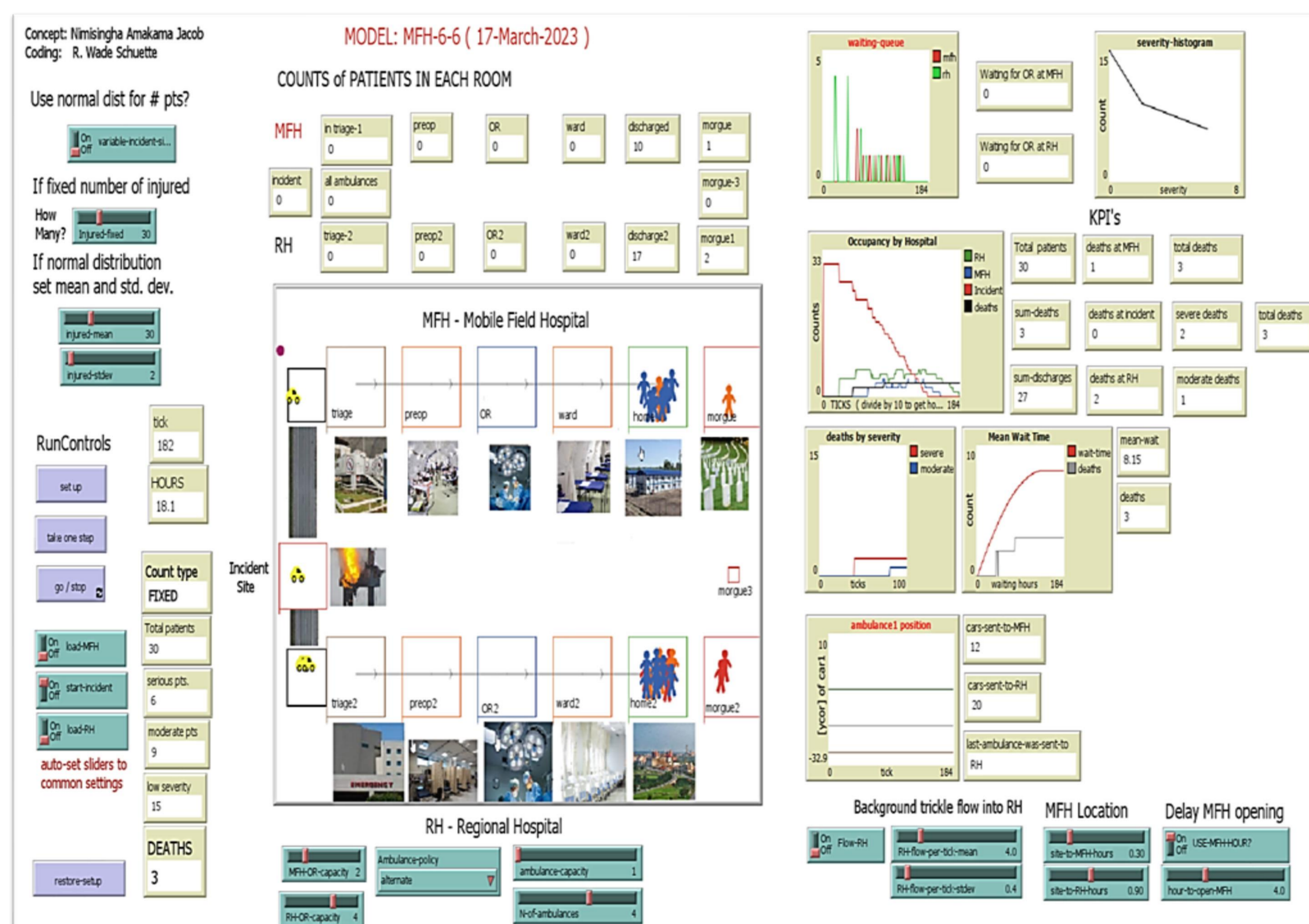


Fig.4: NetLogo (6.3.0) Modelling and Simulation Interface

4. Motivations

Healthcare systems face challenges, including interaction, a lack of real-time data sharing and analysis, and the need for patient safety and response efficiency in a complex and dynamic environment, thus, the need for:

- ▶ Enhancement of response coordination in emergency
- ▶ Assessment of impacts of key factors in disaster response
- ▶ Identification of gaps in disaster response plans.

5. Methodology

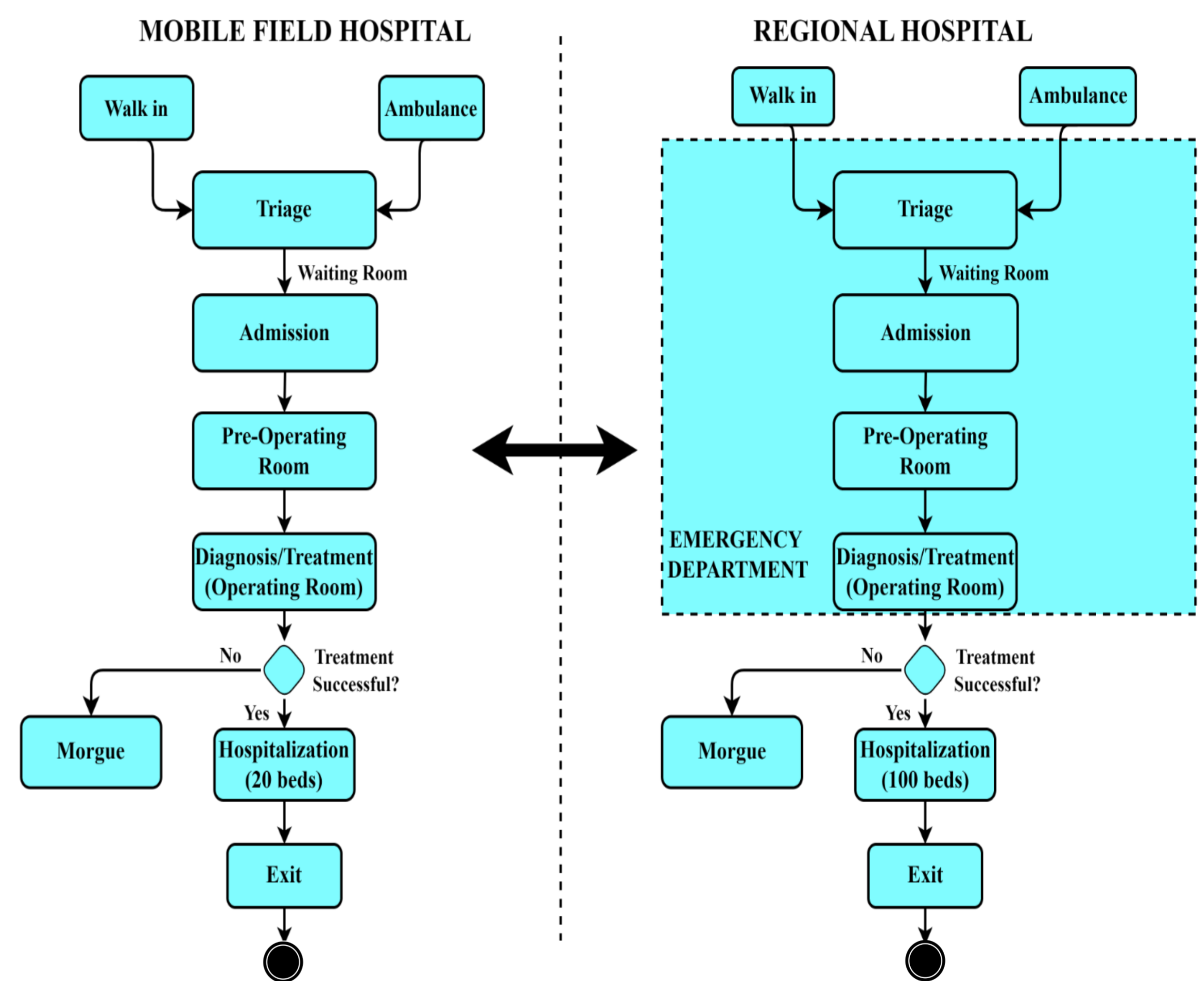


Fig.2: Simplified Interacting Healthcare Systems Conceptualization for Disaster Response (BPMN)



Fig.3: Methodology Block Diagram (PhD thesis)

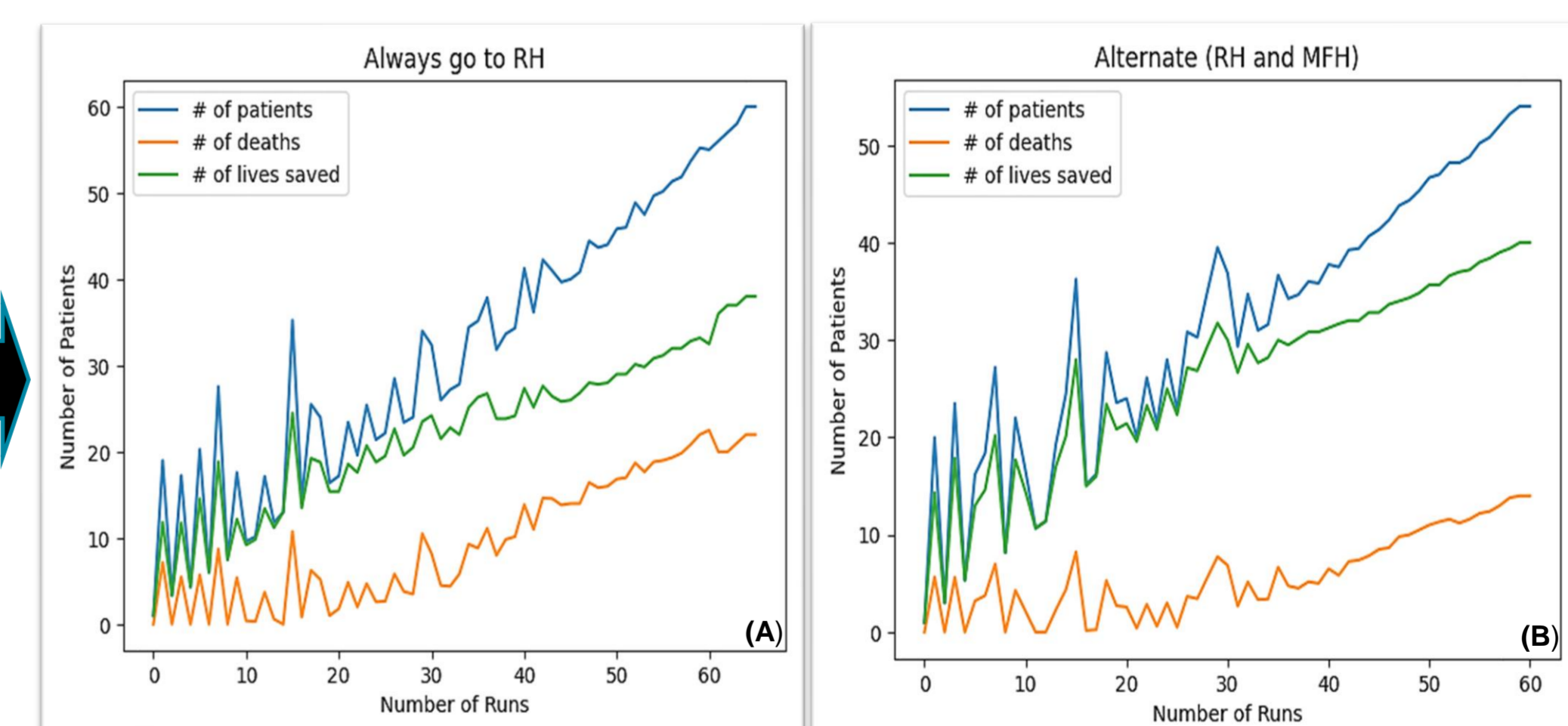


Fig.5: Mortality outcomes for a single (RH) and interacting healthcare systems (RH/MFH) intervention

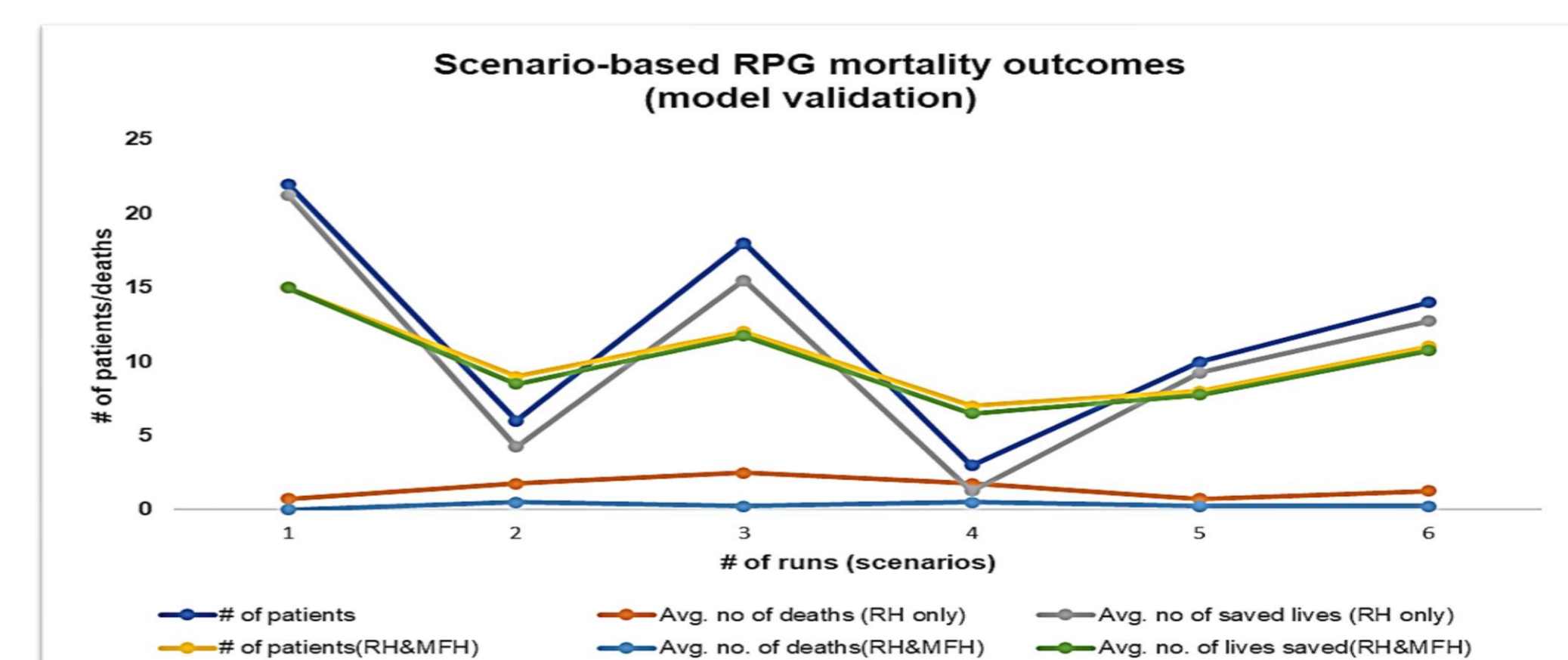


Fig.6: Scenario-based RPG mortality outcomes (Model Validation)