

Evacuation Bottleneck

Simulating a Panic on a Cruise Ship

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Outline

Introduction

Our Model

- Input

- Forces

- Filled Exits

Implementation

Results

- Passenger Distribution

- Panic Level

- Summary and Outlook

Outtakes

Our Research Object

- ▶ Costa Voyager
- ▶ Capacity: 836 passengers
- ▶ 8 Rescue Boats
- ▶ In distress at sea in 2005



Source: <http://www.shipspotting.com>,
Picture taken by Roy Batty

The Deck Plan

- ▶ Colormap
 - ▶ Allows any number of zones
- ▶ Scaling
- ▶ Greatly simplified



Source: <http://www.kreuzfahrtberater.de>

Configuration File

- ▶ Simulation parameters initialized from a file:
 - ▶ Deck configuration
 - ▶ Plotting options
 - ▶ Physical and behavioral parameters
- ▶ Simple syntax makes automated generation easy

Forces

- ▶ As described in Helbing's paper "Simulating dynamical features of escape panic"
- ▶ Three main forces act on agents:
 - ▶ Desired direction
 - ▶ Repulsion & friction between agents
 - ▶ Repulsion & friction from walls

Filled Exits

- ▶ Rescue boats modeled with limited capacities
- ▶ If a boat gets full, agents need to be informed
- ▶ Two implementation approaches:
 - ▶ Instantaneous update
 - ▶ Gradual circle-shaped spreading of information

► TODO

Distribution of the Agents to the Exits

- ▶ The distribution depends strongly on the geometry of the ship.
- ▶ There was no case where the agents really distributed over the exits
 - ▶ Weakness in the model
 - ▶ More realistic: go for the shortest individual evacuation time

- ▶ TODO: more plots and explanations

- ▶ TODO: tell how good and/or bad we did

- ▶ TODO: MATLAB – how we love it!