

## Graphical Big Data: From Simulation to Immersive Visualization

### Introduction

Simulation-based immersive learning serves as an effective mean for bridging in-classroom knowledge and real-world practice. Compared with classical lectures-based on PowerPoint slides and verbal interpretation, simulation-based immersive learning incorporates additional channels with graphical vision and interactive modes for delivering knowledge. Using simulation technologies in true-to-life settings, students have the freedom to build up their own knowledge base and develop important individual hands-on skills. We aim at investigating the implementation of simulation-based immersive learning and evaluating its benefits in courses offered in the university. We develop an interactive system within the platform to enable users to reinforce their knowledge through simple practices.

#### Benefits:

- Understanding complex industrial systems at low costs
- Learning the mechanism of reality (hospital/MTR) in a more interesting way

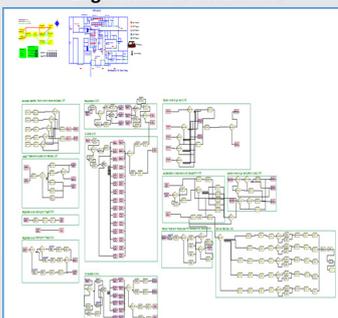
### ED workflow simulation

Combining our strengths with hospital operations optimization, health informatics, and data analytics, we provide an integrated solution for health care, with reduce health care operation complexities and costs.

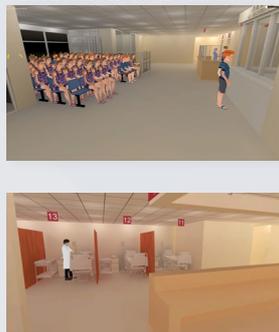
#### Project Objectives:

- To identify healthcare operational bottlenecks in emergency department (ED), which causes failure in meeting service pledge
- To determine optimal staffing level and resource allocation plan under different scenarios

Logic chart of simulation



Environment of 3D simulation



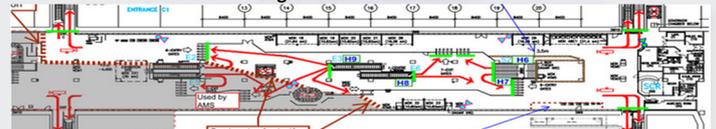
### Crowd flow simulation

To facilitate the understanding of relevant theories in risk management, we introduce the crowd safety operation as a real example, which is an immersive visualization by upgrading a 2-D agent-based simulation platform of the Hong Kong Mass Transit Railway (MTR) station evacuation into an immersive visualization.

#### Project Objectives:

- To understand a variety of consequences when an accident happens at the MTR stations
- To identify possible strategies to reduce the risk of injuries when emergencies happen

Logic chart of simulation



3D simulation platform



### Immersive Visualization

Immersive visualization conveys the sense that participants have of being immersed in a task or setting as they would if it were the real world. The past experience shows that participants in well-designed immersive environments easily suspend the disbelief and behave much as they perform in reality. Our simulation models have been converted to various immersive visualization implementations.

HTC Vive implementation



Gallery 360 implementation

