

# Medical Team Training in the Wide Area Virtual Environment

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MMVR 2007 - Evolving challenges in medical simulation

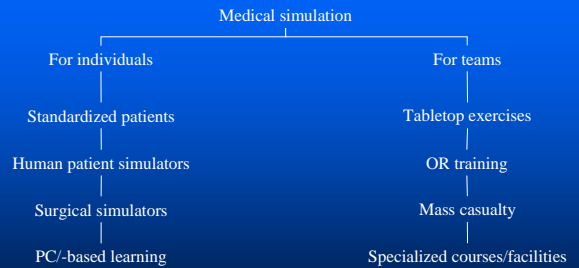
## Introduction

- Motivation and Background
- Vision
- Implementation

## Motivation

- Gaps in current simulation training
  - Procedures trained in isolation
  - Disconnect in learning/practice environment
  - Group size
- Group dynamics
  - Medicine is practiced as a team

## Taxonomy





**Tabletop Simulation**



Source: US Army Military District of Washington

**Operating Room**



**Large Scale Exercises**

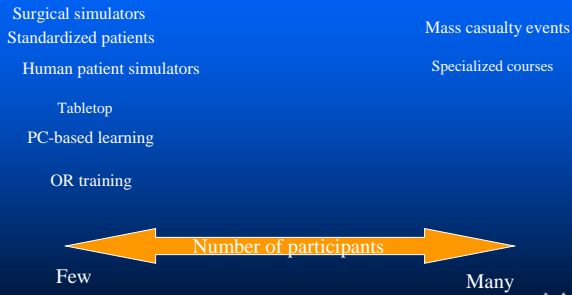


Source: The Lubbock Avalanche - Journal

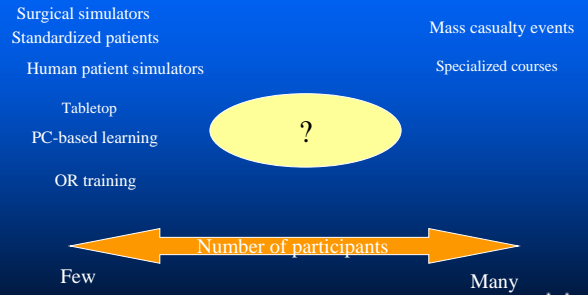


Source: Department of Defense

## Number of participants per session



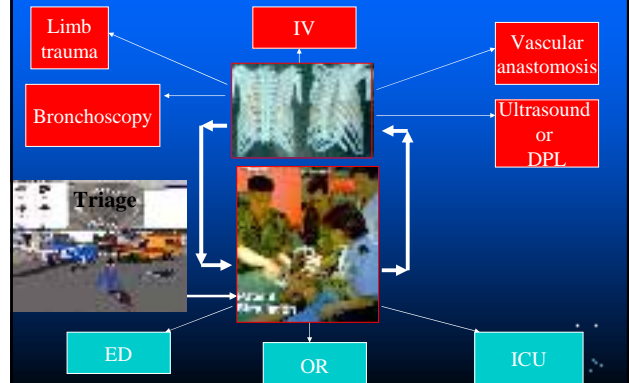
## What's missing



## Focus

- Train intermediate sized groups (10-20)
- Realism of large scale exercises
- Flexibility of a tabletop scenario
- Blend of
  - Virtual reality
  - Standardized patients/actors
  - Human patient simulators

## Integrated Training Scenario



## Target objectives

- Patient safety (OR)
- Medical response to IED
- CBRNE
- Mass casualty management

## Patient safety



Source: Association of Perioperative Registered Nurses

## Medical response to IED



## CBRNE

- Chemical
- Biological
- Radiological
- Nuclear
- Explosive



## CBRNE

- Beyond normal scope of emergency services
- Causes significant loss of life
  - 10's to 10's of thousands
- Financial, societal, and environmental consequences
- Non-meditated
- Pre-meditated



## Mass casualty management

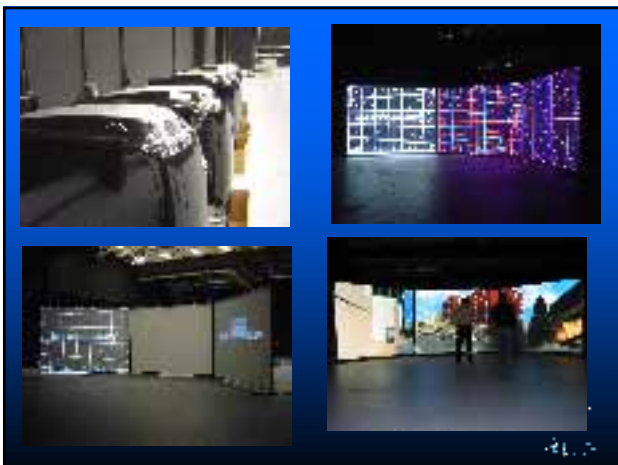


Source: US Army Space and Missile Defense Command



## Building the WAVE

- Hardware
- Software





## Hardware

- 3 vertical screens
  - 8 ft. high
  - 135 deg angle
- Polarization preserving material
  - Stereoscopic display

## Hardware

- 3 rendering clusters
  - 2 PC image generators
  - 2 DLP projectors
  - Circular polarization

## Hardware

- Alienware ALX Aurora
  - Dual core CPU
  - Dual GPU (in SLI mode)
  - 2Gb RAM
- Drives one projector

## Hardware

- Off the shelf DLP projector
  - Remote control via IP

## Software

- Flatland
- Modified for distributed rendering
  - IP-based frame synchronization
  - Less than 10 ms jitter

## Building the WAVE

- Hardware
- Software
- Developing a scenario

## Developing a scenario

## Developing the environment

## Motion capture

## Developing the soundscape

- Explosions
- Gunfire
- Human voices



## Export to the WAVE

## Building the WAVE

- Hardware
- Software
- Developing a scenario
- Integrating other simulation assets

## Integration

- Patient actors
- Mannequins

## Putting it all together