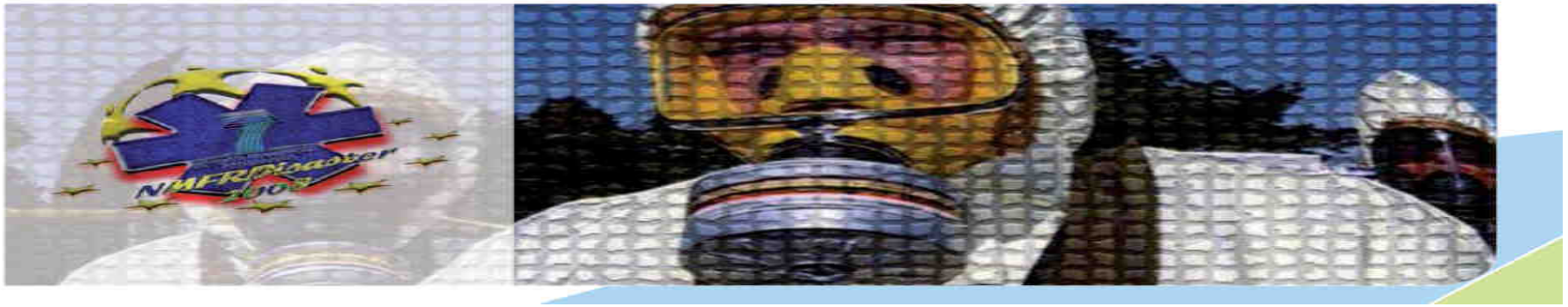
NMFRDisaster

Identifying the Needs of Medical First Responders in Disasters



Simulation in Disaster Medicine

Dott. PIER LUIGI INGRASSIA

CRIMEDIM

AMEDEO AVOGADRO

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INTRODUCTION

For most of the twentieth century medical education was about a mere accumulation of facts.

This encouraged a superficial learning style and promoted short-term recall instead of a deep understand of subjects

Leinstar S. Medical education and the changing face of healthcare delivery. Medical Teacher 2002: 24(1); 13 - 15

INTRODUCTION

In discipline like Disaster Medicine, where the main goal is the patients' care, learners are supposed to use a combination of knowledge and professional skills and attitudes.

The ultimate goal of the medical discipline is enhanced performance, not increased knowledge.

Leinstar S. Medical education and the changing face of healthcare delivery. Medical Teacher 2002: 24(1); 13 - 15

INTRODUCTION

Competency-based education has progressively emerged in medical setting.

It has been found to be equally effective in both didactic and self-learning approaches.

Schlomer RS et al. Teaching strategies and knowledge retention. Journal of Nursing Staff Development 1997: 13(5); 249-253

INTRODUCTION

"competence requires knowledge, appropriate attitudes and observable mechanical or intellectual skills which, together account for the ability to deliver a specified professional service"

WHO, 1988

World Health Organisation. Learning to work together for health. Report of a WHO study group on multi-professional education for health personnel: a team approach. 1988. WHO Switzerland.

INTRODUCTION

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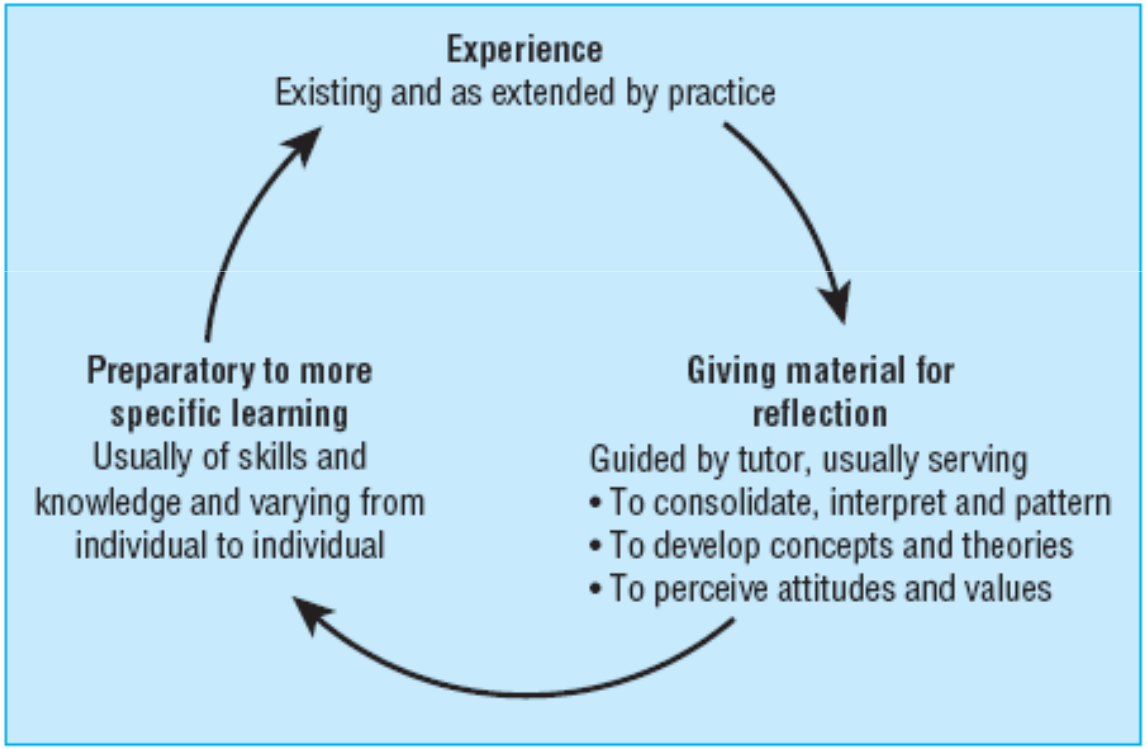
Collaborative problem solving

problem solving activities that involve interactions among a group of individuals in which no single individual possesses all the resources and no single individual is likely to solve the problem or accomplish the task objectives without at least some input from others in the group.

O'Neil HF et al. Issues in the computer-based assessment of collaborative problem solving. Assessment in Education 2003: 10(3); 361 - 73

INTRODUCTION

Physicians, like other adults, fare better with experiential learning such as participatory learning



Newman P. *Valuing learners' experience and supporting further Growth: educational models to help experienced adult learners in medicine*. BMJ 2002:325;200-202

INTRODUCTION

"I am always willing to learn, however, I do not always like to be taught"

INTRODUCTION

The disaster environment is complicated and stressful. It is characterized by situational uncertainty, time compression and high demand of qualified cares.

INTRODUCTION

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MCI/Disaster simulations have been the fundamental tools for education and improvement of response capacity

DEFINITION

Simulation

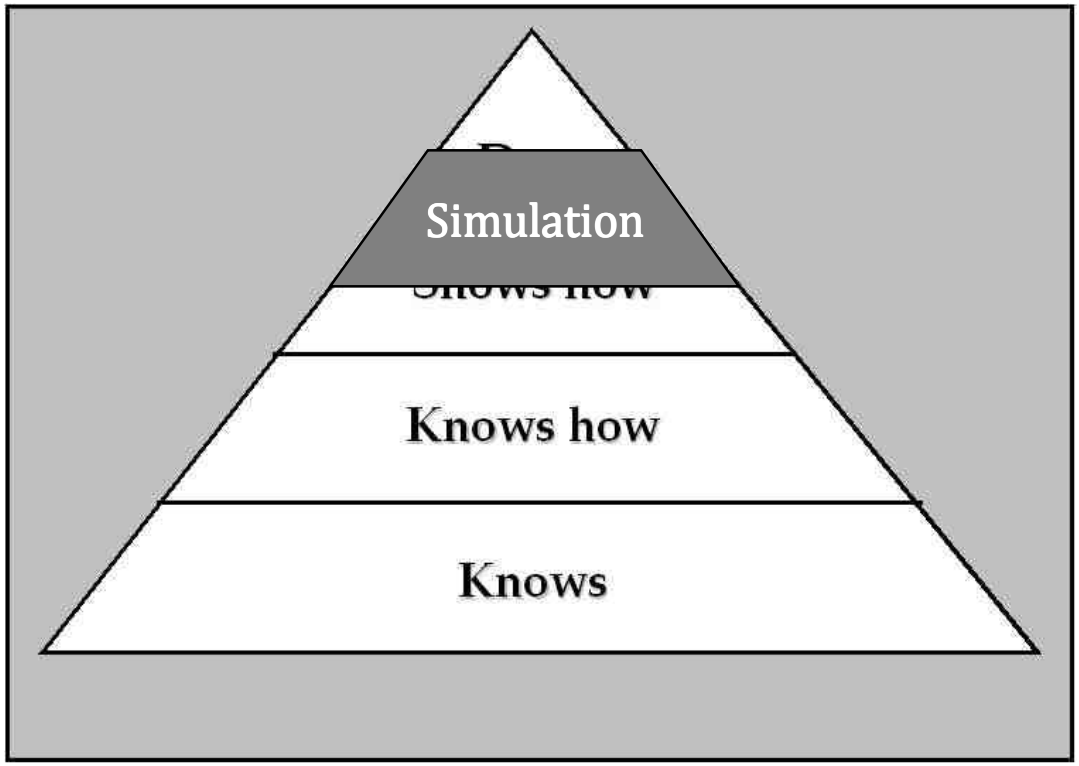
a **realistic environment** in which trainees perform a **meaningful task** and experience **appropriate consequences as feedback** for their behavior in that environment.

- ✓ It provides a useful, meaningful context for a task or problem-solving situation, complex enough to be believable, but not so complex as to be unmanageable
- ✓It requires trainees to apply skills or integrate knowledge
- ✓In response to trainees' actions and decisions, the environment must respond with plausible, real, believable reactions or consequences

Burstein JL. *The Myths of Disaster Education*. Ann Emerg Med. 2006;47:50-52

DEFINITION

Piramide di Miller per le competenze cliniche



Noricini JJ. ABC of learning and teaching in medicine. British Medical Journal 2003:326; 753 -755 c

INTRODUCTION

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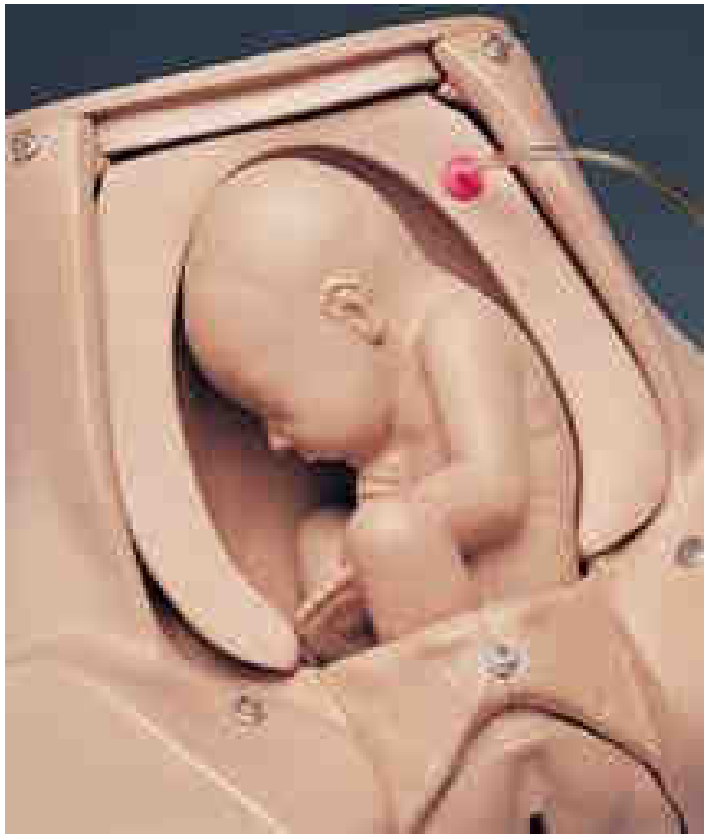
Simulation has been used since the early days of modern medicine.



LITERATURE SUPPORT

Simulation technology can help with not only the enhancement of motor skills, but also the retention of cognitive knowledge*

Retention of knowledge and skills is much higher when an interactive simulation system is used **

* Issenberg Sb, et al. *Simulation and new learning technologies*. Medical Teacher 2001: 23(1); 16-23

**Satish U, et al. *Strategic management simulation is a novel way to measure resident competencies*. American Journal of Surgery 2001: 181; 557 – 61

LITERATURE SUPPORT

The technology can produce a cognitive surplus as consequence of the use of the technological instrument itself

Knowledge as co-product of computer using

Salomon G. Cognitive effects with and of computer technology. Communication Research 1990:17(1); 26 - 45

LITERATURE SUPPORT

Dec 14, 2006

DUBAI

Real size exercise on Nov 27, 2006

Jan 18, 2007

Feb 25,2007

Fonte: Dr. Zulfiqar's thesis (EMDM VII edition), 2007

LITERATURE SUPPORT

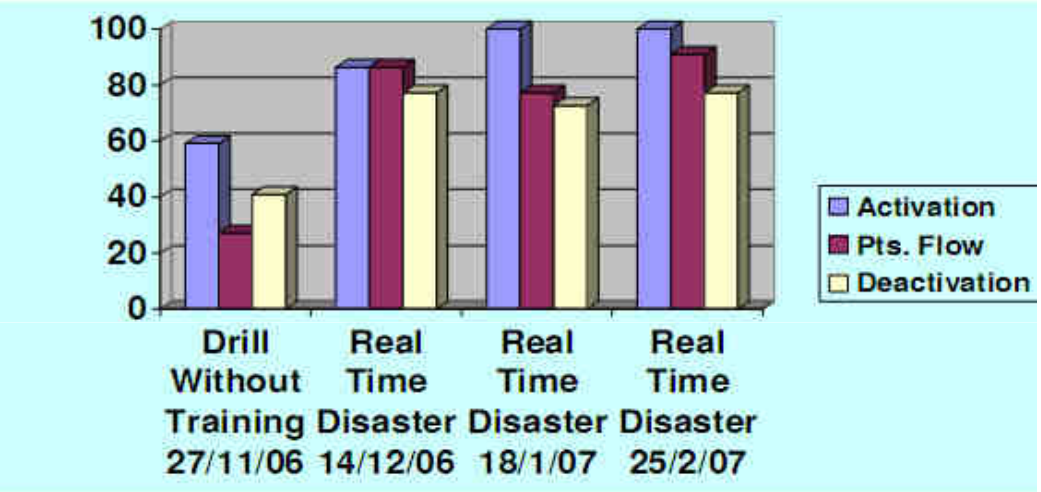
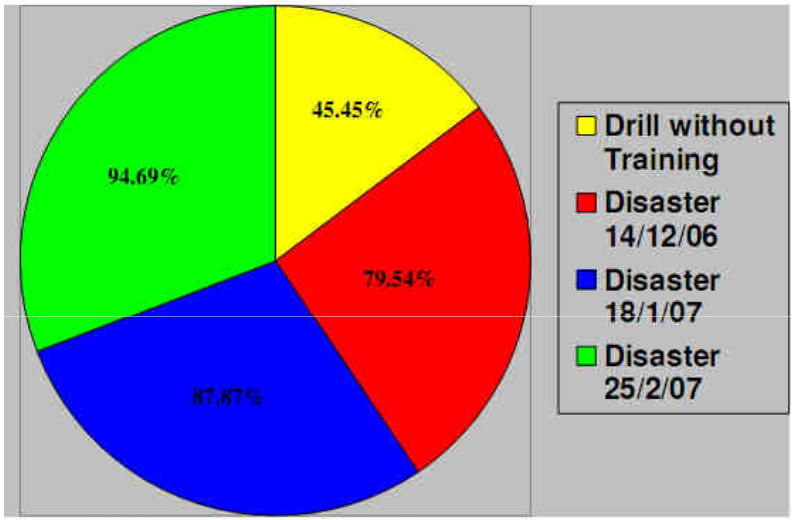


Figure 7: Three SOPs of Hospital Disaster Plan – putting together



Effectiveness of Training – Overall

Fonte: Dr. Zulfiqar's thesis (EMDM VII edition), 2007

CLASSIFICATION

- **"virtual" simulation**

where real people use simulated equipment in a simulated world (or "virtual environment")

- **"live" simulation**

where real people use simulated (or "dummy") equipment in the real world

VIRTUAL SIMULATION

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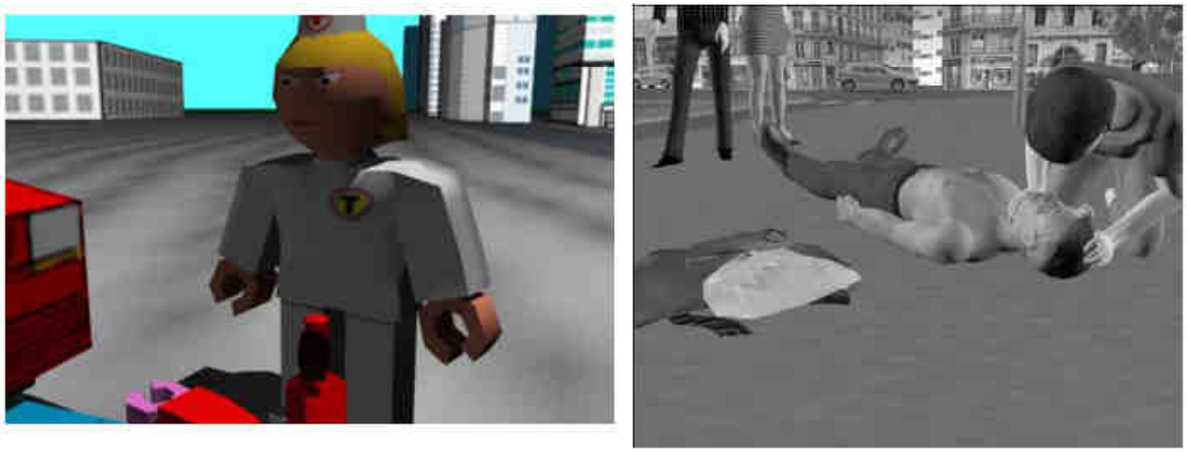
Collaborative Virtual Environments (CVEs)*

human-computer and human-human interactions occur in a virtual scenario

- *Users are virtually embodied into "Avatars"*



Avatars: toy-like versus photorealistic

* Melissa Markaridian Selverian, Ha Sung Hwang, In Search of Presence: A Systematic Evaluation of Evolving VLEs, Presence, Vol. 12, No. 5, October 2003, 512-522

VIRTUAL SIMULATION

Collaborative Virtual Environments (CVEs)*

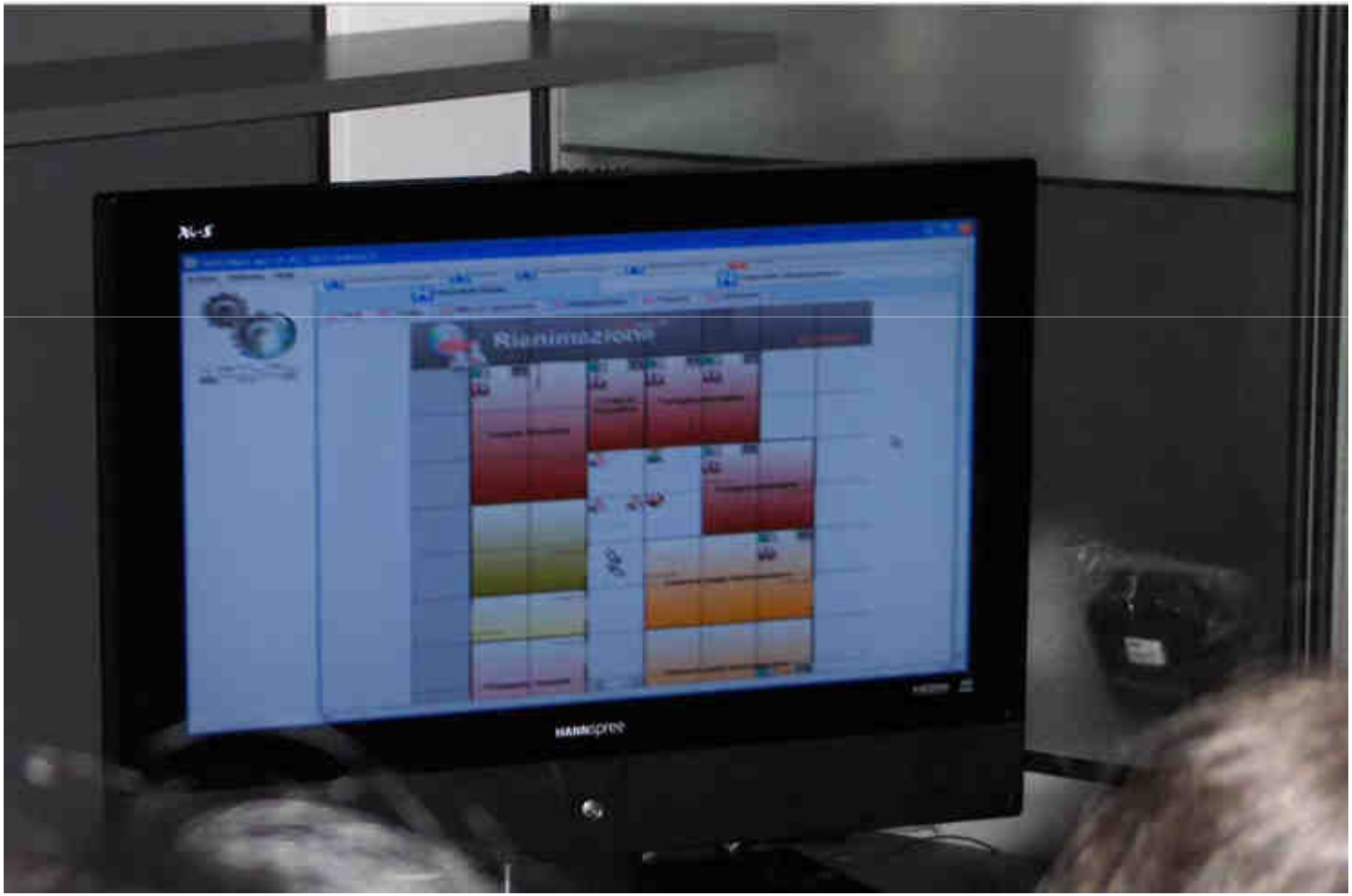
human-computer and human-human interactions occur in a virtual scenario

- *Users are virtually embodied into "Avatars"*
- *key element in CVEs is Social Interaction*

* Melissa Markaridian Selverian, Ha Sung Hwang, In Search of Presence: A Systematic Evaluation of Evolving VLEs, Presence, Vol. 12, No. 5, October 2003, 512-522

VIRTUAL SIMULATION

where real people use simulated equipment in a simulated world (or "virtual environment")



Education and Culture

Leonardo da Vinci

Vrije Universiteit Brussel

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I SEE

Interactive Simulation Exercise for Emergencies

e-semble

October 2004 – September 2007

Empresa Pública de Emergencias Sanitarias

CONSEJERÍA DE SALUD

ISEE PROJECT

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It aims to develop a training instrument to train a number of medical disaster management competencies linked to training objectives and to events embedded in a simulated training scenario.

ISEE PROJECT

An extensive study of the literature and medical disaster plans identified 14 core competencies

- assessment of immediate needs
- alert procedures
- coordination procedures
- medical transportation
- medical resources management
- medical information management
- medical management at the site
- hospital management
- disposition of dead
- medical care at reception centres
- mental health for victims, relatives and rescuers
- public and environmental health
- social welfare
- protection and safety

ISEE PROJECT

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AMEDEO AVOGADRO

EUROPEAN SURVEY ON TRAINING OBJECTIVES IN DISASTER MEDICINE

Delooz H and Debacker M (Vrije Universiteit Brussel), G. Moens and K. Johannik (IDEWE) and the I SEE Partnership.

ISEE Partnership:
VUB (Michel Debacker, coordinator, Herman Delooz)
EPES (Eladio Gil Pinero, Luis Pedregal, Louis Roberto Jimenez Guadarrama)
CSCI (Barbara Tosi, Alessandro Varallo)
UPO (Francesco Della Corte, Pierluigi Ingrassia)
E-SEMBLE (Martijn Boosman, Daniel van Gelooven,)
SMUCR (Raed Arafat, Cristian Boeriu)
KMC (Thore Wikström).

ISEE PROJECT

Objectives of the survey

Primary

- which type of disaster
- which competencies to be included as training objectives

Secondary

- actual training situation in teaching institutions

ISEE PROJECT

Methodology

Questionnaire addressed to training centers (min. 5) in I SEE partner's countries (5) for target groups (6):

- medical coordinators
- physicians
- nurses
- ambulance personnel
- EMS dispatchers
- first responders

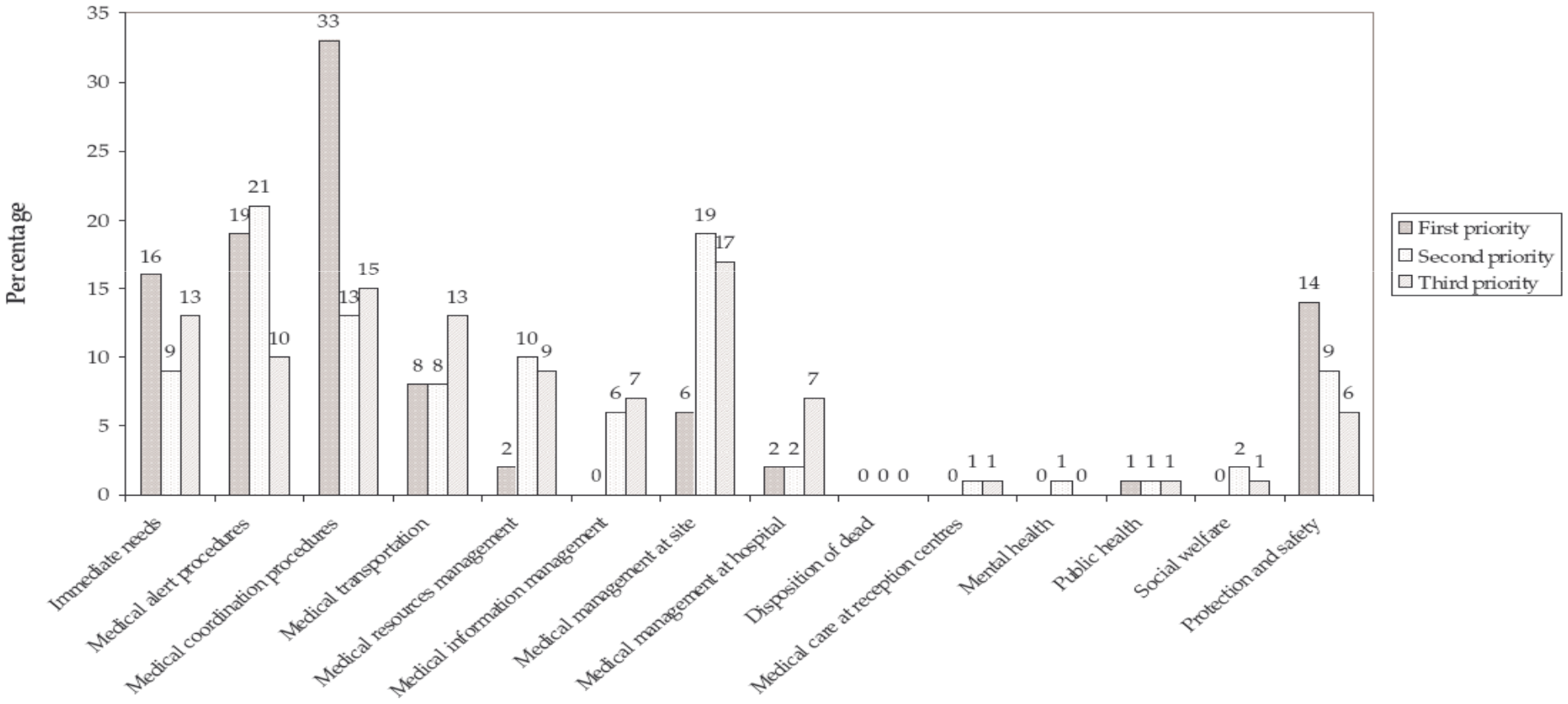
ISEE PROJECT

Please rank out of the following list the training objectives that should be included in the simulation exercise

- assessment of immediate needs
- alert procedures
- coordination procedures
- medical transportation
- medical resources management
- medical information management
- medical management at the site
- hospital management
- disposition of dead
- medical care at reception centres
- mental health for victims, relatives and rescuers
- public and environmental health
- social welfare
- protection and safety

ISEE PROJECT

Please rank out of the following list the training objectives that should be included in the simulation exercise



ISEE PROJECT

Results

Competencies to be included in the pilot training exercise.

The highest priority was given to
- medical coordination procedures (33%)
- medical alert procedures (19%)
- immediate needs evaluation (16%)
- protection and safety (14%)
- medical transportation (8%)

ISEE PROJECT

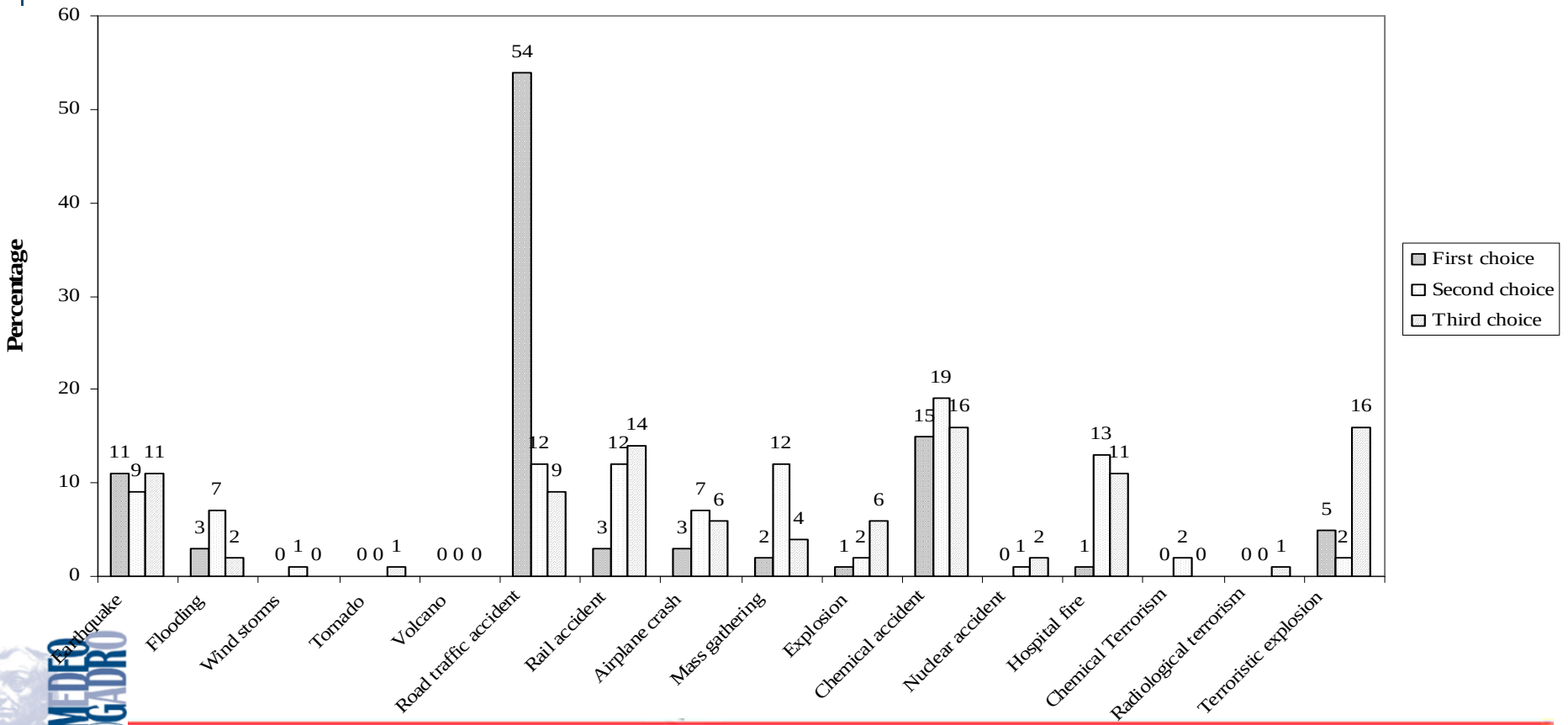
Please rank out of the following list from 1 to 3 the type of disaster you prefer to be included in the simulation exercise to be developed.

- Earthquake
- Flooding
- Wind-storms
- Tornado
- Volcanic eruption
- Mass gathering
- Major road traffic accident
- Rail accident
- Airplane accident on/near airport
- Explosion
- Chemical accident
- Nuclear accident
- Hospital fire
- Chemical terrorism
- Radiological terrorism
- Terrorist explosion

ISEE PROJECT

European Master in Disaster Medicine
EMDM-A Alumni Association

Please rank out of the following list from 1 to 3 the type of disaster you prefer to be included in the simulation exercise to be developed.



Conclusions

The European countries surveyed through the I SEE partnership, put the emphasis for disaster medicine training on a **mass casualty scenario**, rather than on a true disaster. Following this choice they want the exercise to concentrate mainly on the **pre-hospital aspects of medical care and management**.

ISEE PROJECT

Translation of the competencies into tasks needed to elicit observable behaviors.

Tasks

1. Efficient mobilization of adequate resources in a MCI.
2. Perform on-scene initial actions in an MCI.
3. Assess and monitor hazards and unsafe situations and develop measures to ensure personnel safety in a MCI.
4. Perform scene security and traffic control in a MCI in collaboration with police forces.
5. Manage and coordinate all medical personnel and resources responding to the MCI.
6. Manage in a MCI the ambulance staging area and move ambulances into loading area as needed.
7. .....

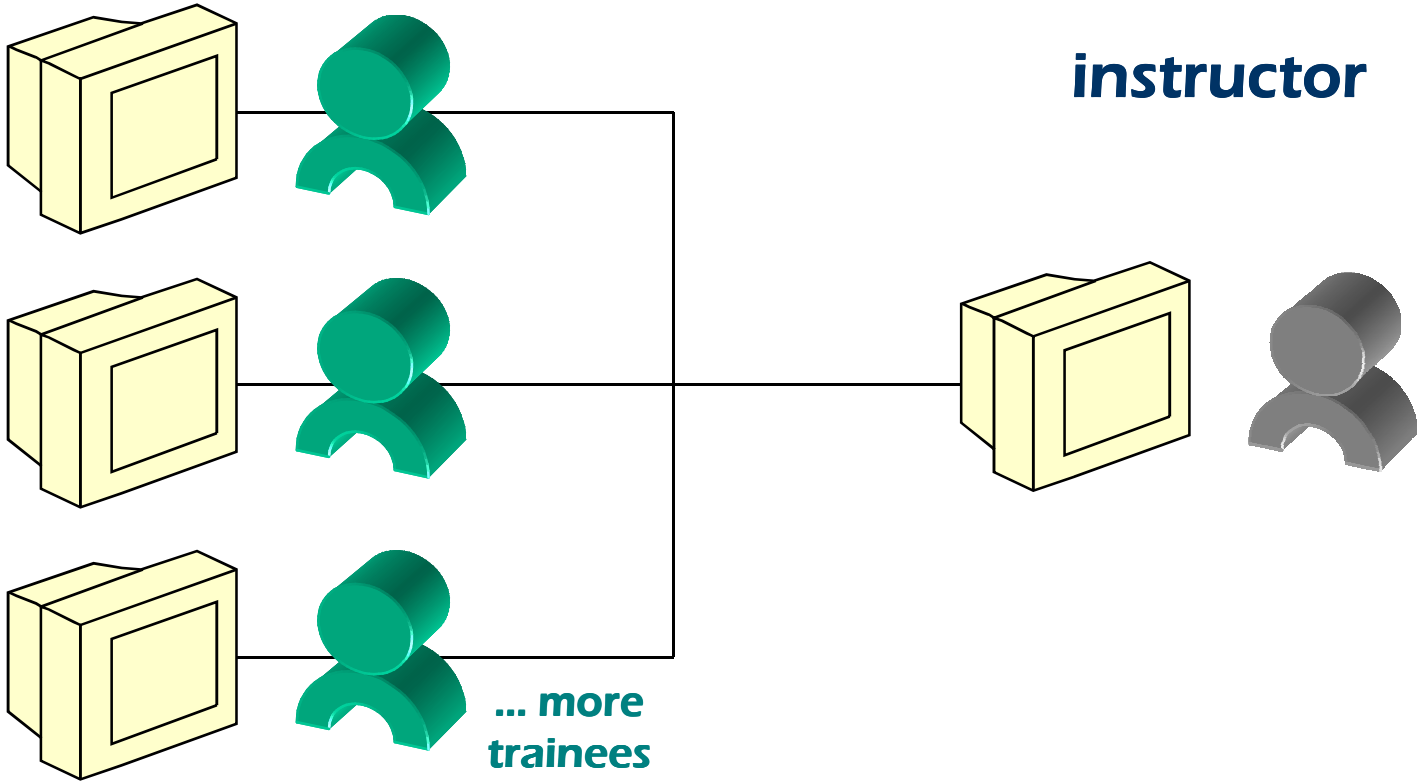
ISEE PROJECT

We developed a pre-hospital disaster management model which can be **customized** so that the model ties the competencies to a local plan and local responders.

Based on the list of observable behaviors in the simulation environment, we defined internal or simulation-based **performance measures** and observer-based rating scales associated to tasks in the scenario.

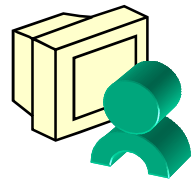
ISEE PROJECT

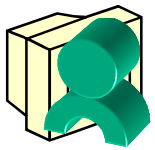
1. System design: layout

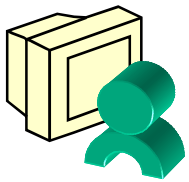


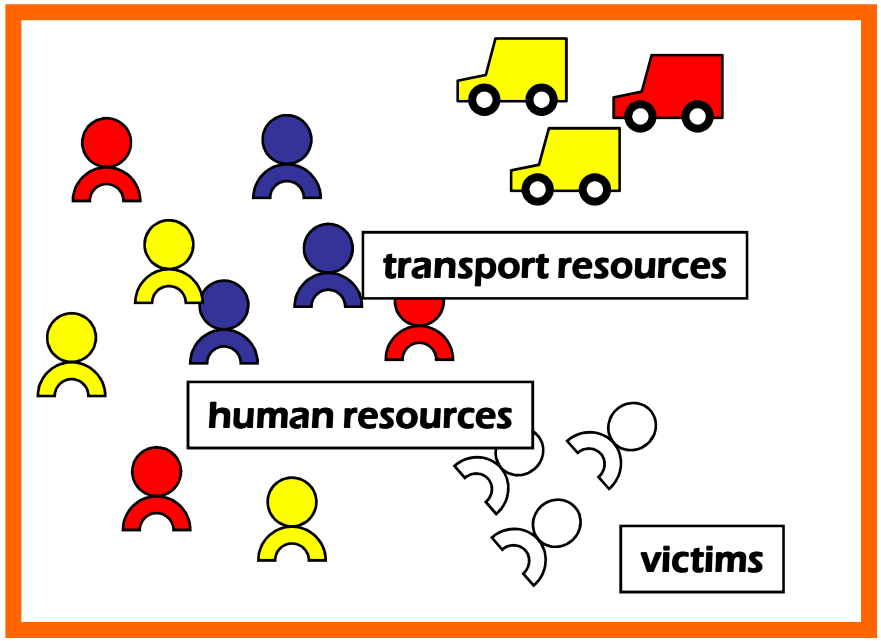
ISEE PROJECT

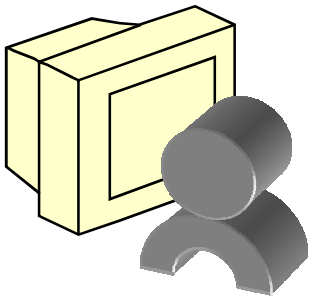
1. System design: resources







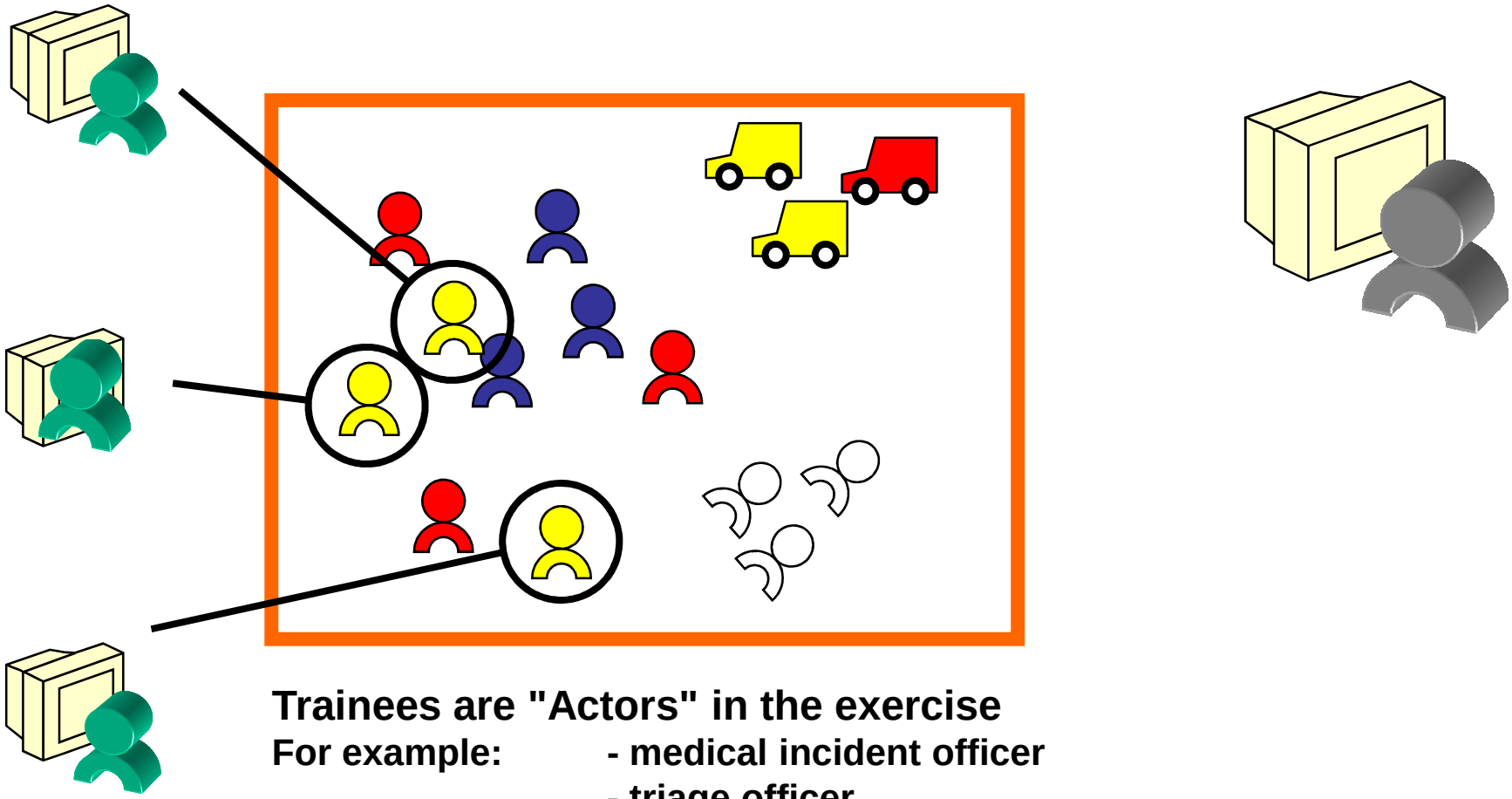




The simulation environment contains resources.

ISEE PROJECT

1. System design: resources

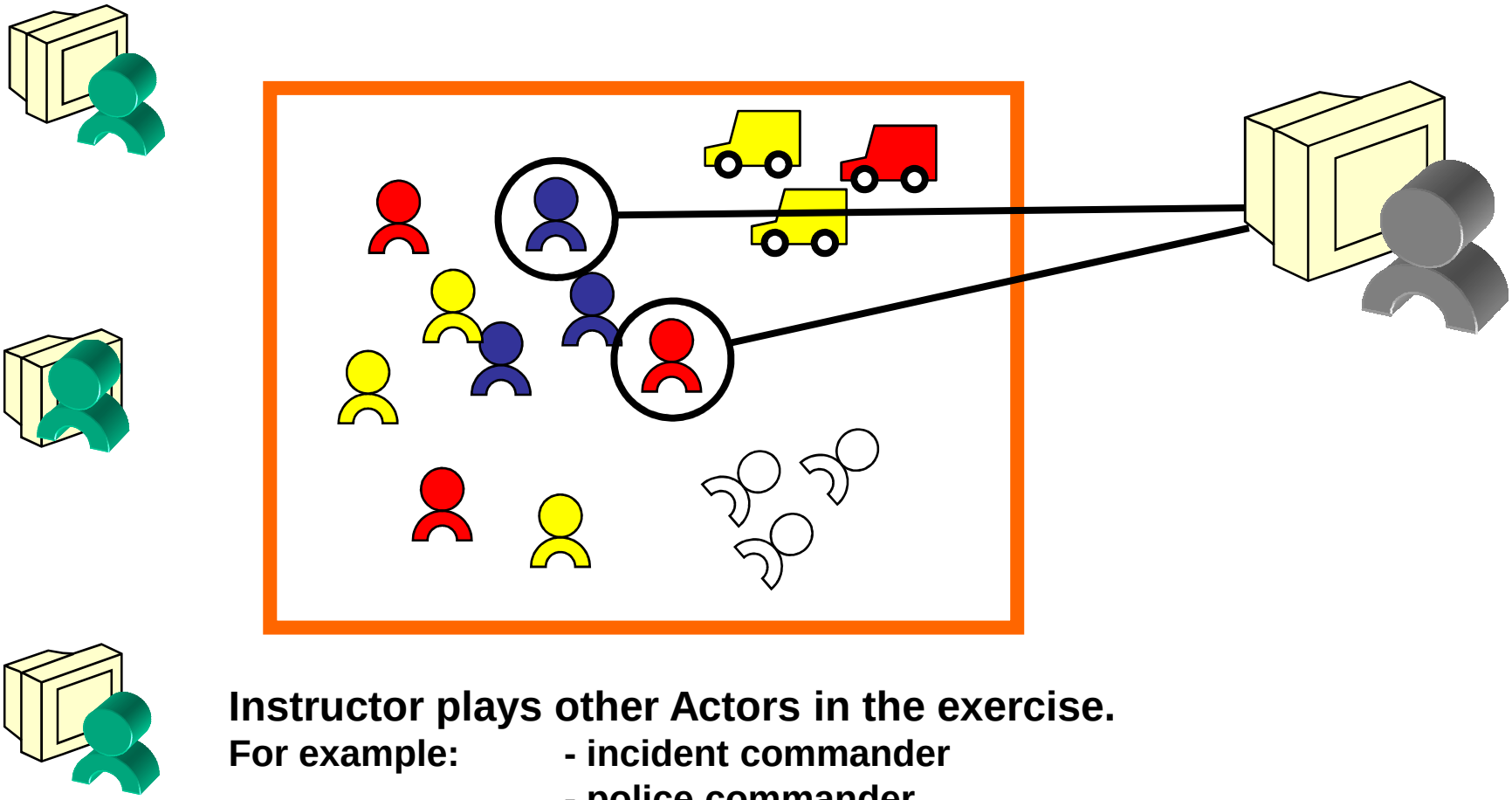


Trainees are "Actors" in the exercise

For example: **- medical incident officer**

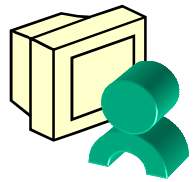
- triage officer

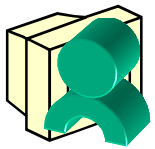
ISEE PROJECT

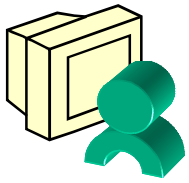


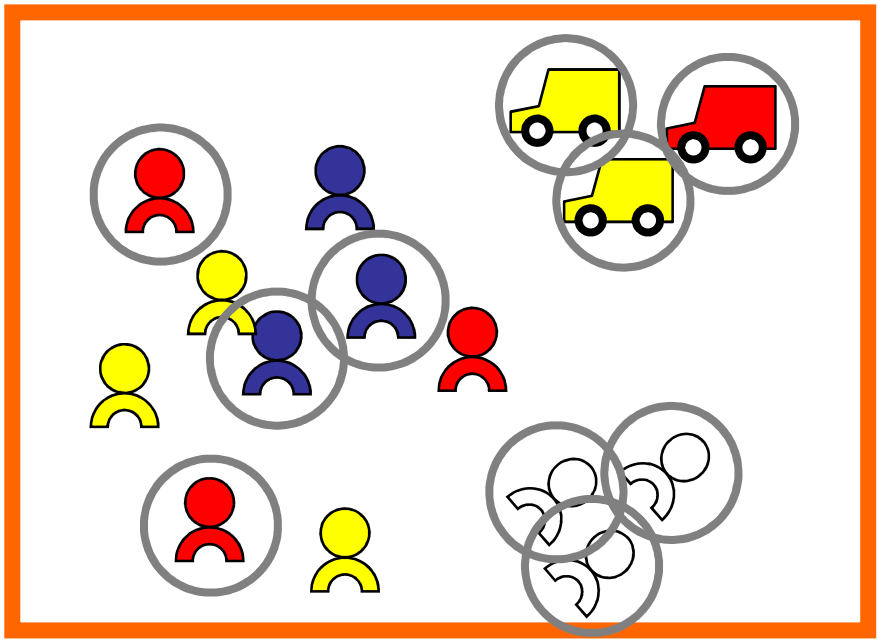
Instructor plays other Actors in the exercise.
For example: **- incident commander**
- police commander

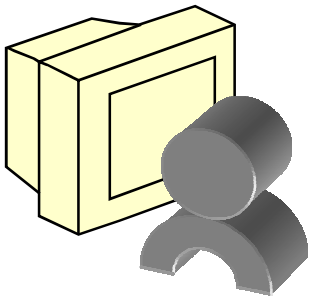
ISEE PROJECT









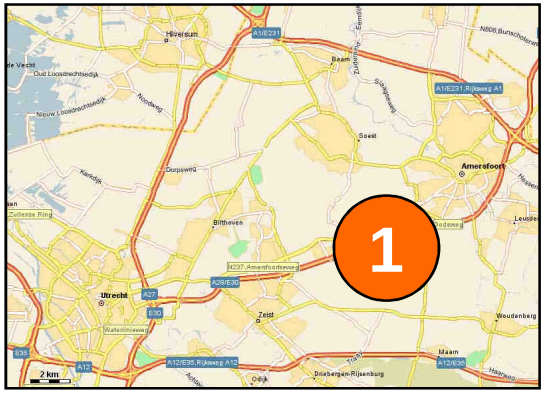


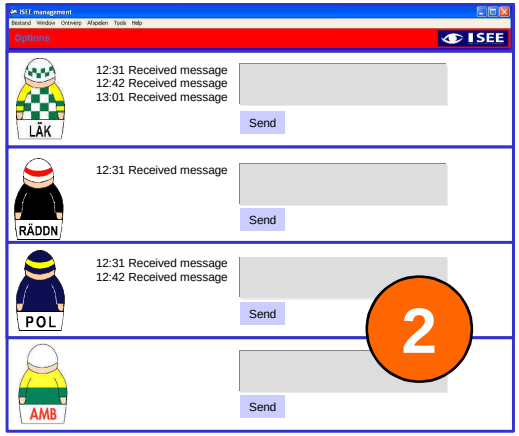
The rest of the resources are "virtual characters" which can be affected by:

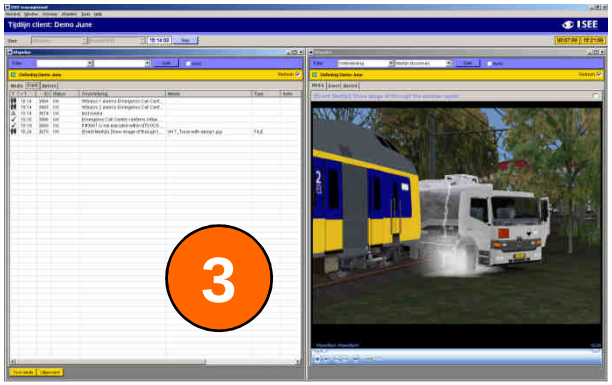
(1) the scenario
(2) trainees
(3) instructor

ISEE PROJECT

1. System design: user interface



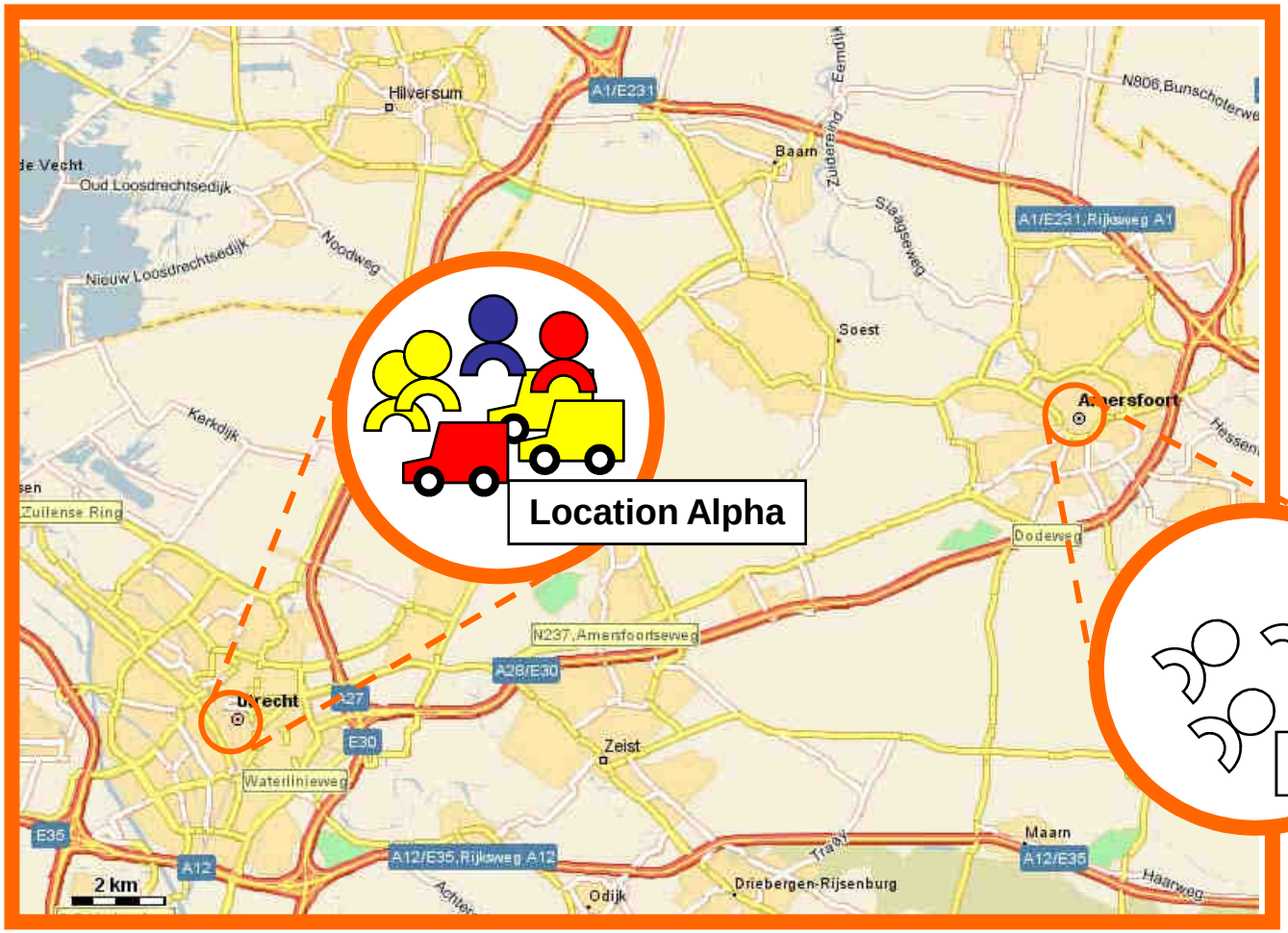




The student has 3 screens: (1) Maps, (2) Communication window and (3) Event Screen

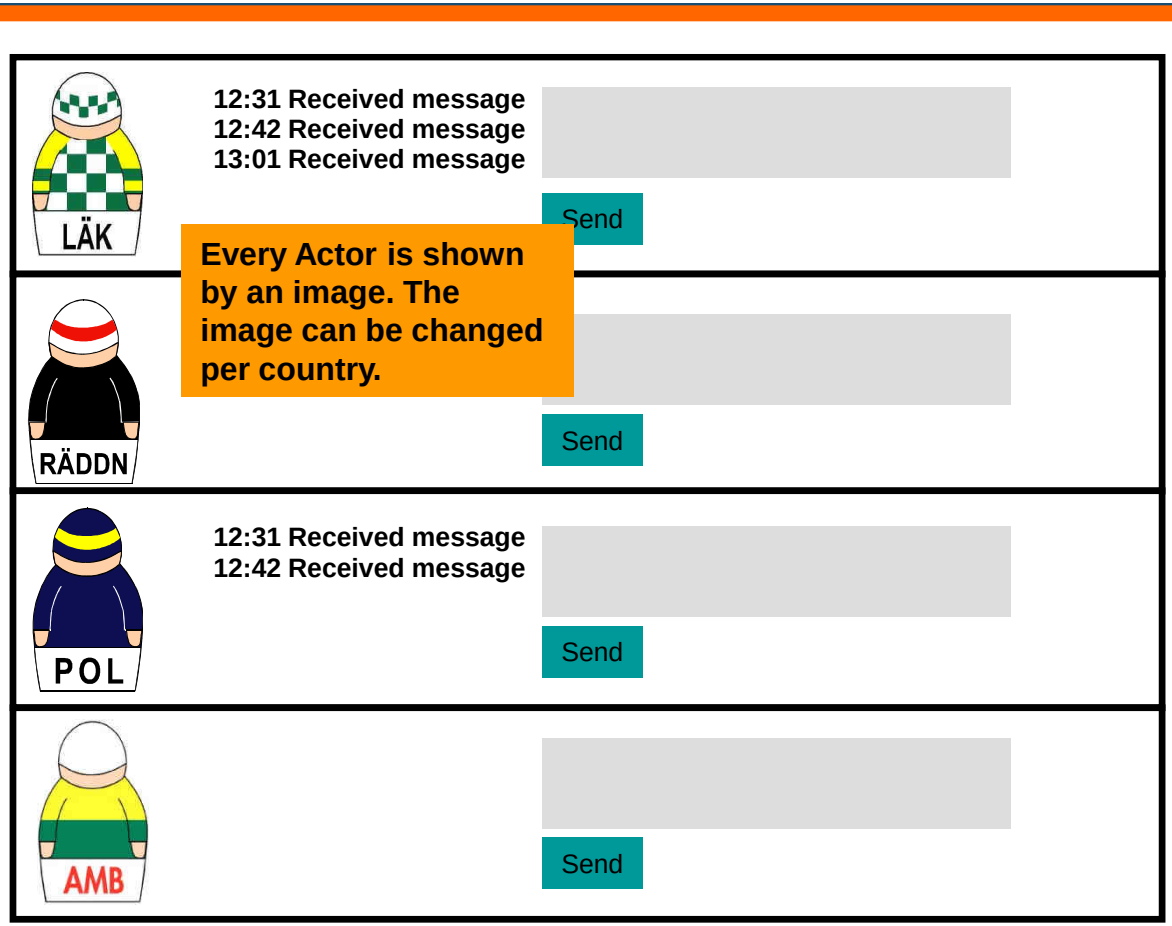
ISEE PROJECT

1. System design: maps



Resources are situated in locations in the simulation environment.

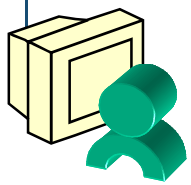
ISEE PROJECT

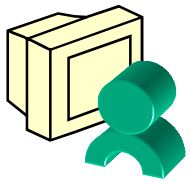


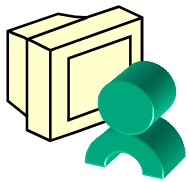
The trainees can send messages to other Actors in the exercise (played by trainees or the instructor).

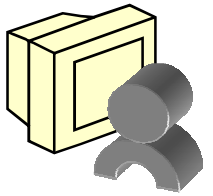
ISEE PROJECT

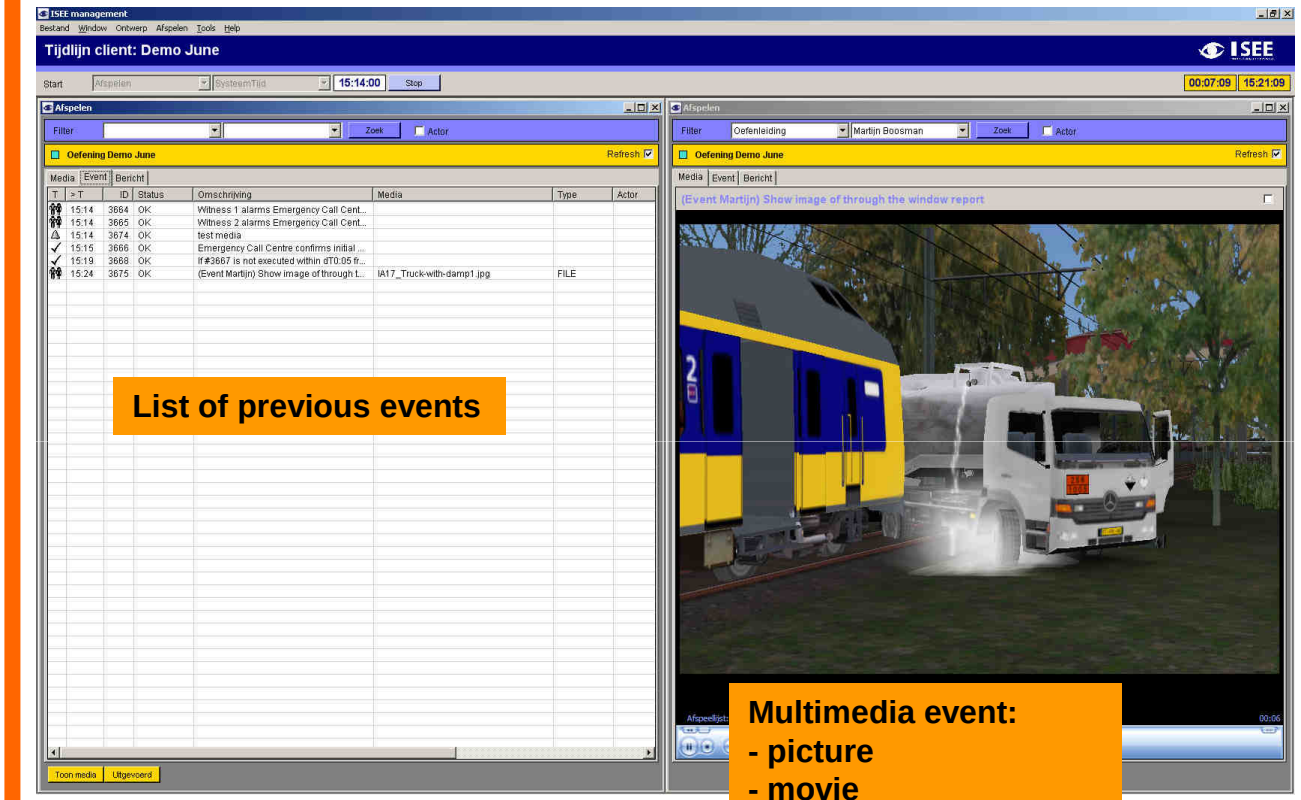
1. System design: event screen











The trainees receive events on the multimedia events screen.

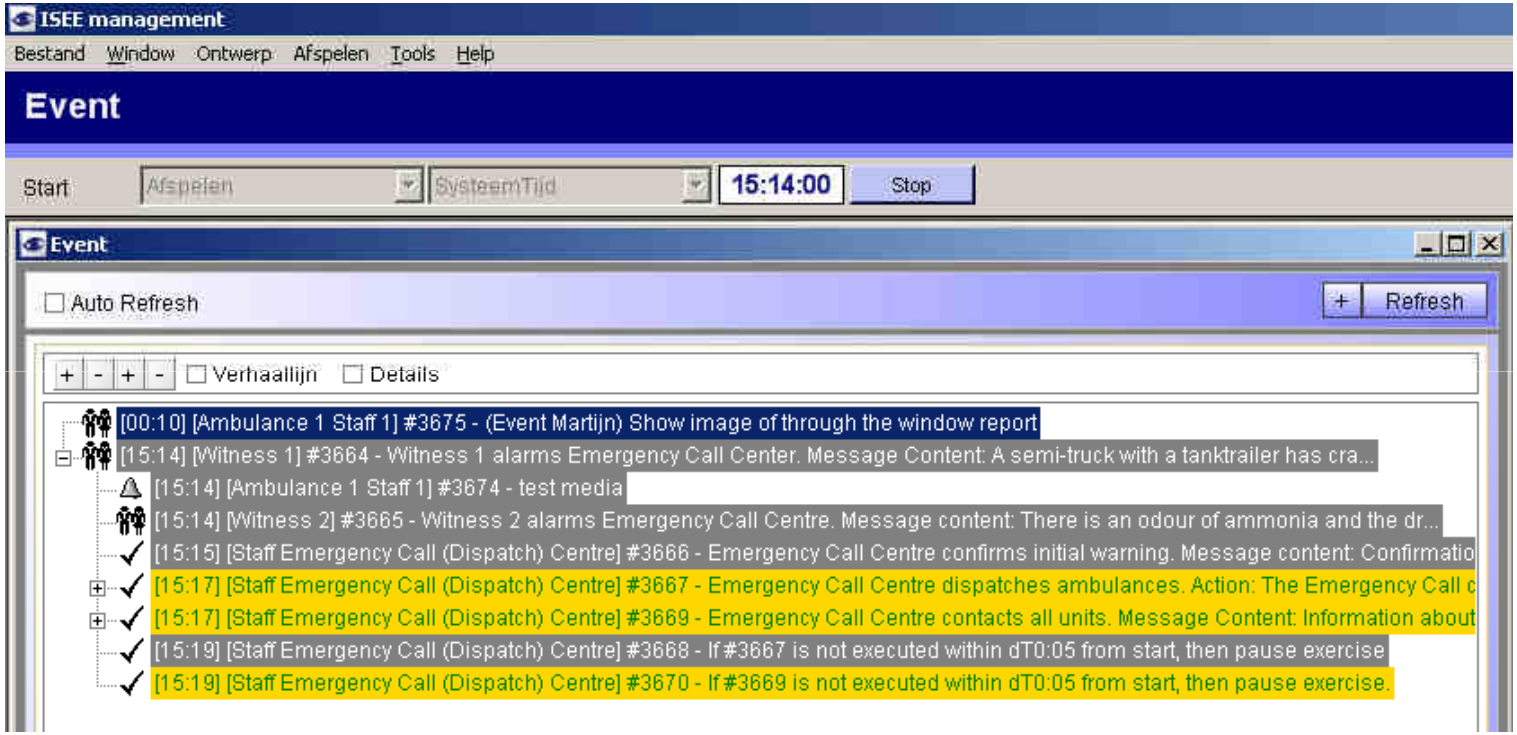
ISEE PROJECT

1. System design: event screen

Possibility to link virtual reality into the scenario.

ISEE PROJECT

1. System design: Istructor screen



The color bars show which events are scheduled and which events have been completed.

ISEE PROJECT

1. System design: Istructor screen

Time	From	To	Message
09:34	MIC	1AMB	Let me know when you have indication of chem …
09:35	1AMB	MIC	Chemical risk is probable says the fire cdr
09:38	DISP	1AMB	Please send met situation report asap

The instructor can monitor all chat communication taking place between the trainees.

ISEE PROJECT

I SEE logs every event

10-9-2005 **Bonfire** crisis sim

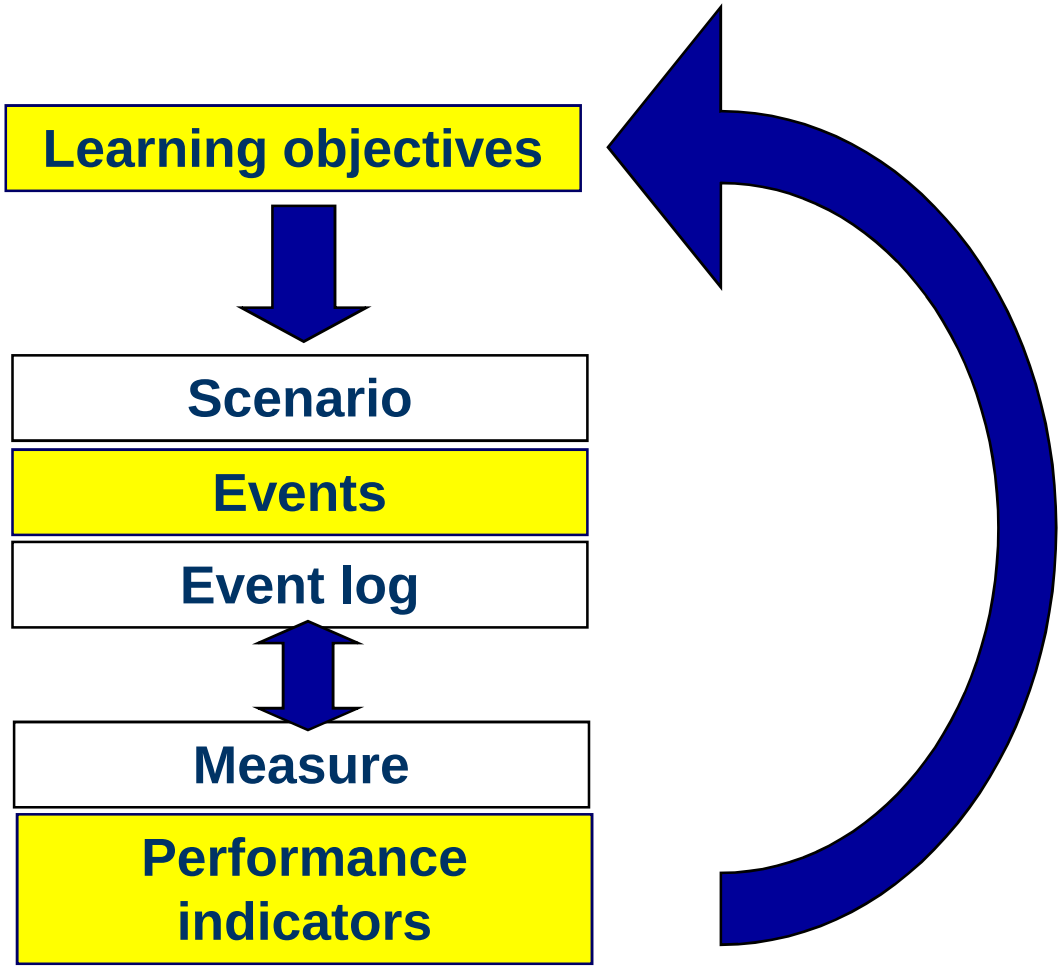
SESSION NO **3** STARTTIJD **06:00**

EVENTLOG

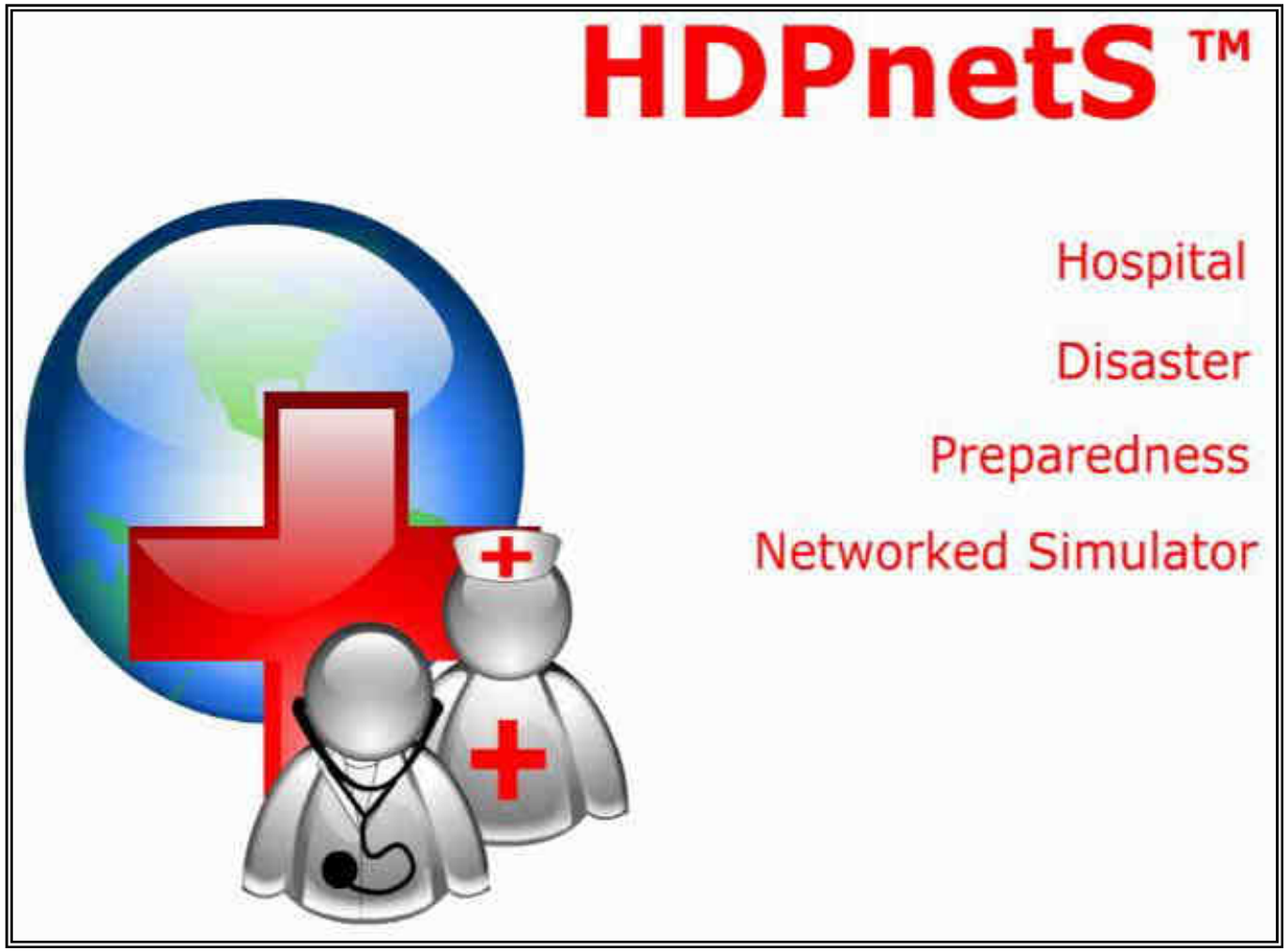
T Action	T Original	Status Changer	Status Change To	Verhaallijn	C	Event	Actor
11:14	11:00	Ruth Clabbers OLDH-RCL	OK	ArenA	V	Opening ArenA	ArenA
11:57	11:45	Wim Sijtsma (Sijtsma)	OK	ArenA		Aanvang concert ArenA	Responsecel AMS
12:00	11:45	Ruth Clabbers OLDH-RCL	OK	ArenA		Aanvang concert ArenA	Responsecel AMS
12:04	11:45	Dave Garbett ES-DGA	OK	ArenA	V	Start Concert	ArenA
12:33	12:30	Ruth Clabbers OLDH-RCL	OK	ArenA	V	Explosie Amfitheater van het stadion ArenA	ArenA
12:34	12:30	Dave Garbett ES-DGA	OK	ArenA	V	Explosie Amfitheater van het stadion ArenA	ArenA
12:38	12:33	Hans Bulters (Bulters)	OK	ArenA		IVD van de DVP wordt door VCK in kennis gesteld	Politie Mobiliteit
12:38	12:32	Hans Bulters (Bulters)	OK	ArenA		Melding explosie binnen in VCK	Politie Mobiliteit
12:40	12:35	Ruth Clabbers OLDH-RCL	OK	ArenA	V	Tweede explosie in de parkeergarage van de ArenA	ArenA
12:50	12:37	Wim Sijtsma (Sijtsma)	OK	ArenA		BEL 112 als burger vanuit het transferium een aanrijding met gelijktijdig de mededeling dat de lading van het betrokken busje er heel vreemd uitziet en dat de bestuurders zijn gevlucht richting Zuidelijke uitgang)	Responsecel AMS
12:54	12:31	Dave Garbett ES-DGA	OK	ArenA		Mensen bellen 112 rechtstreeks vanuit ArenA (zijn mensen die in het geregisseerde publiek zitten)	ArenA
12:56	12:40	Hans Bulters (Bulters)	OK	ArenA		Chef mobiliteit gewaarschuwd	Politie Mobiliteit

Printed by CrisisSim Manager STRIKT VERTROUWELIJK Page 1 of 3

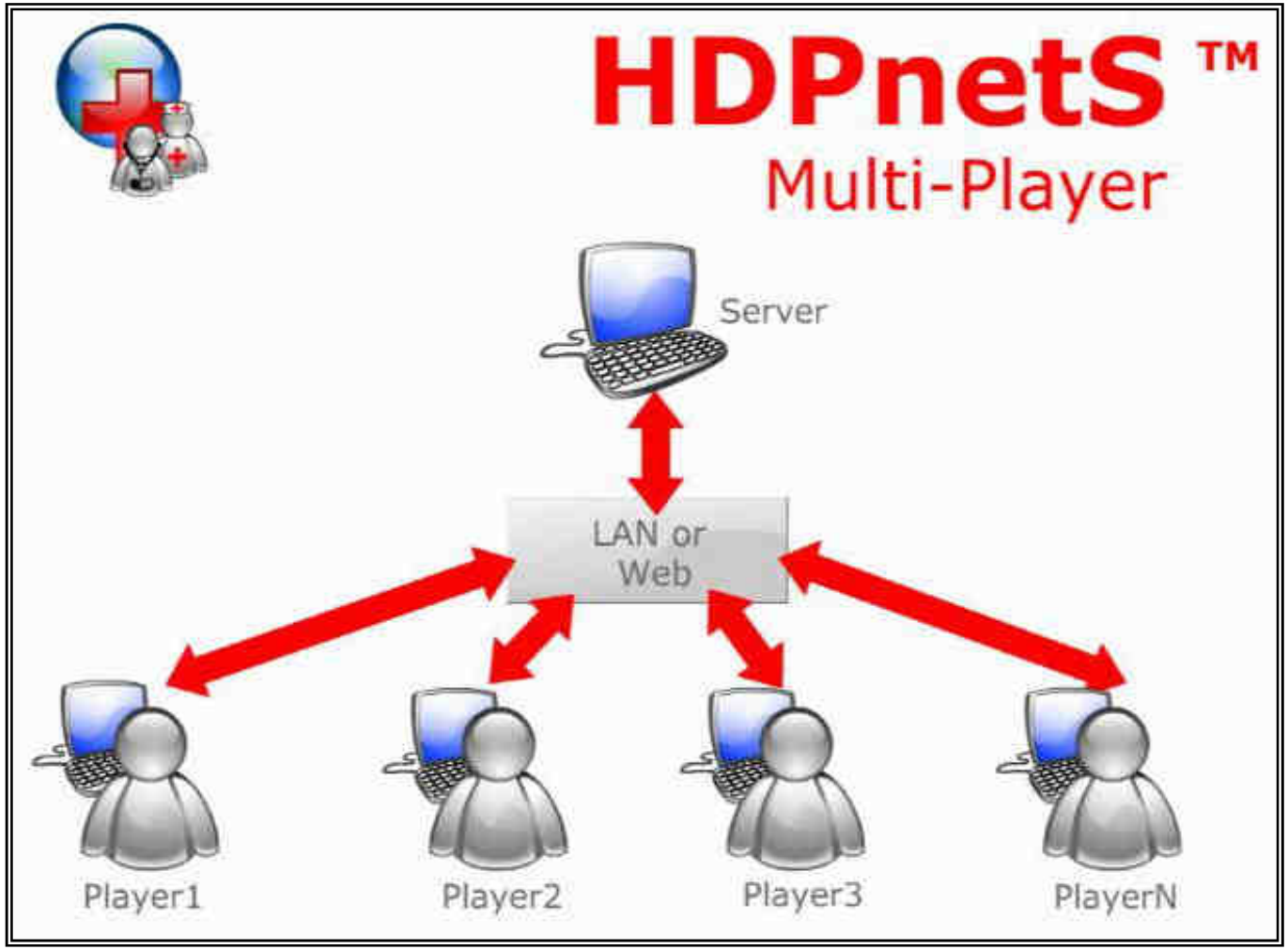
ISEE PROJECT



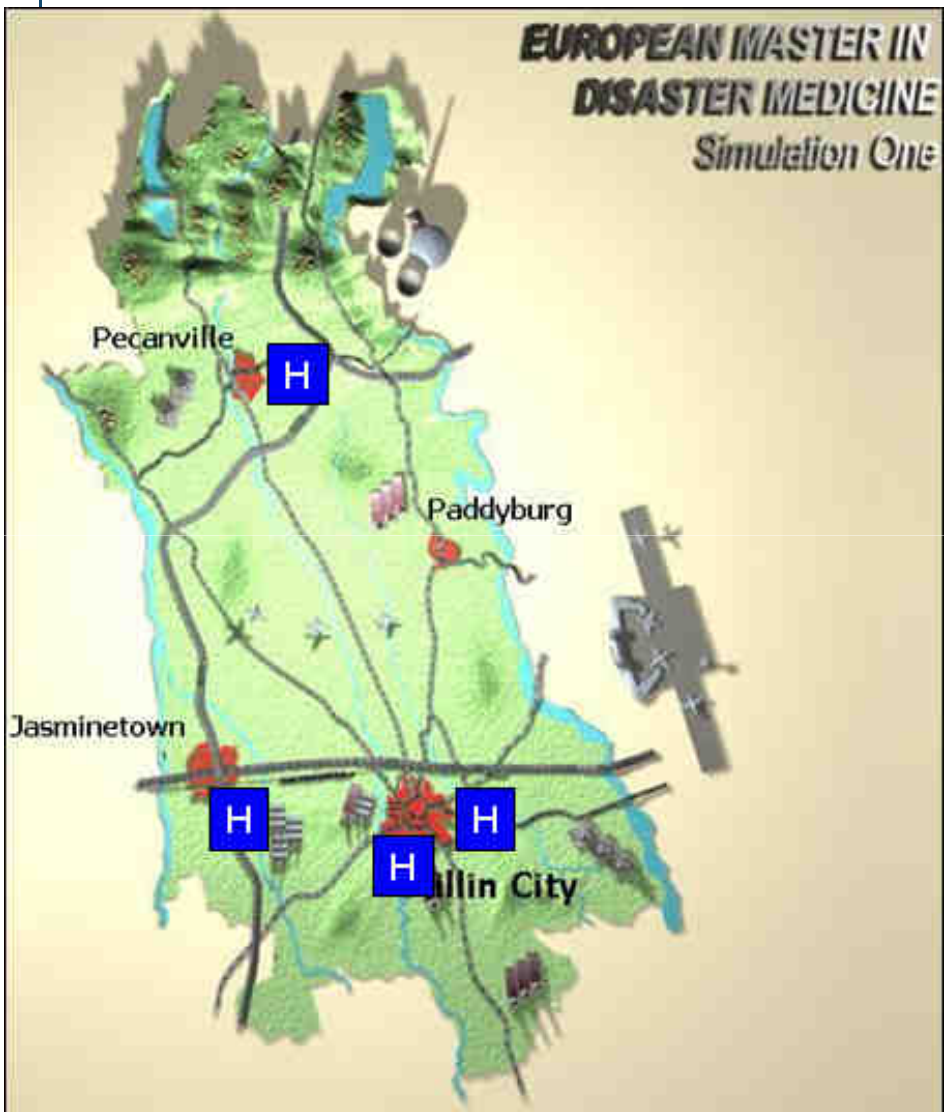
HDPnetS

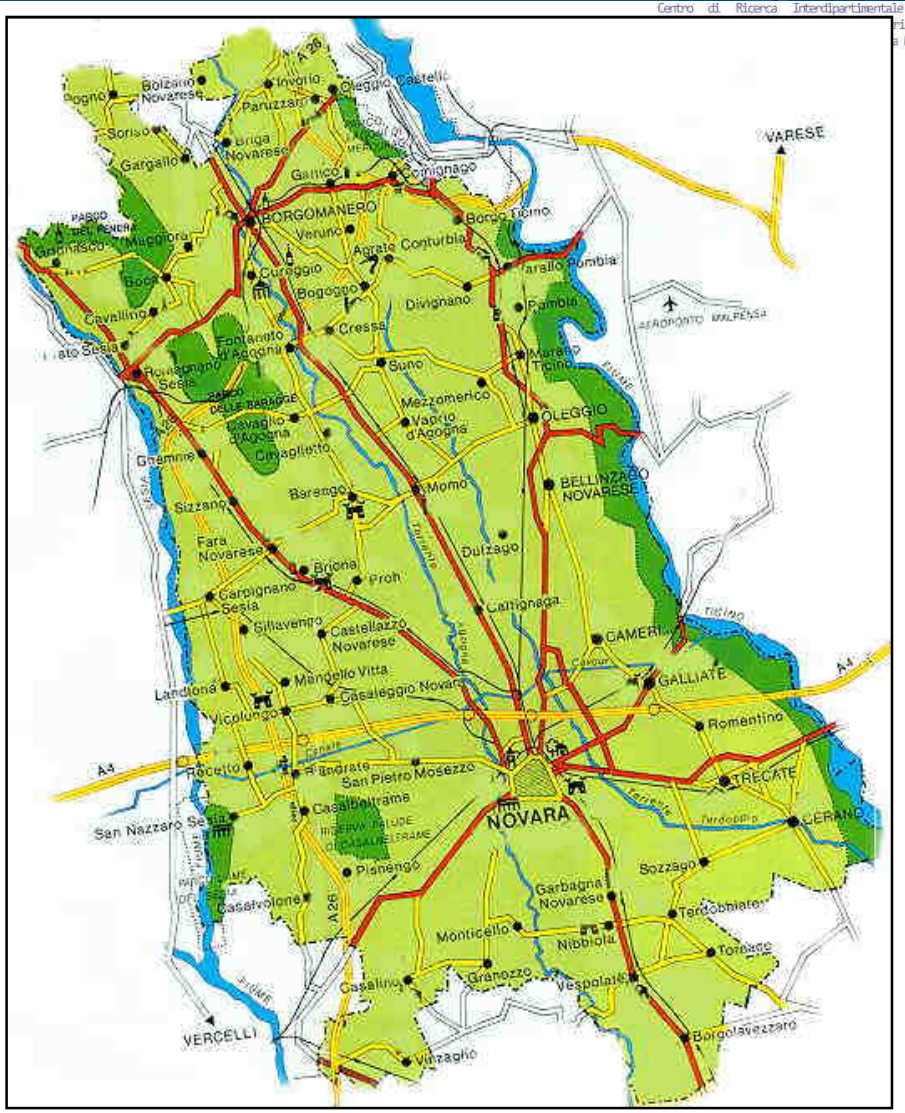

HDPnetS ™
Hospital
Disaster
Preparedness
Networked Simulator

HDPnetS


HDPnetS ™
Multi-Player
Server
LAN or Web
Player1
Player2
Player3
PlayerN

HDPnetS

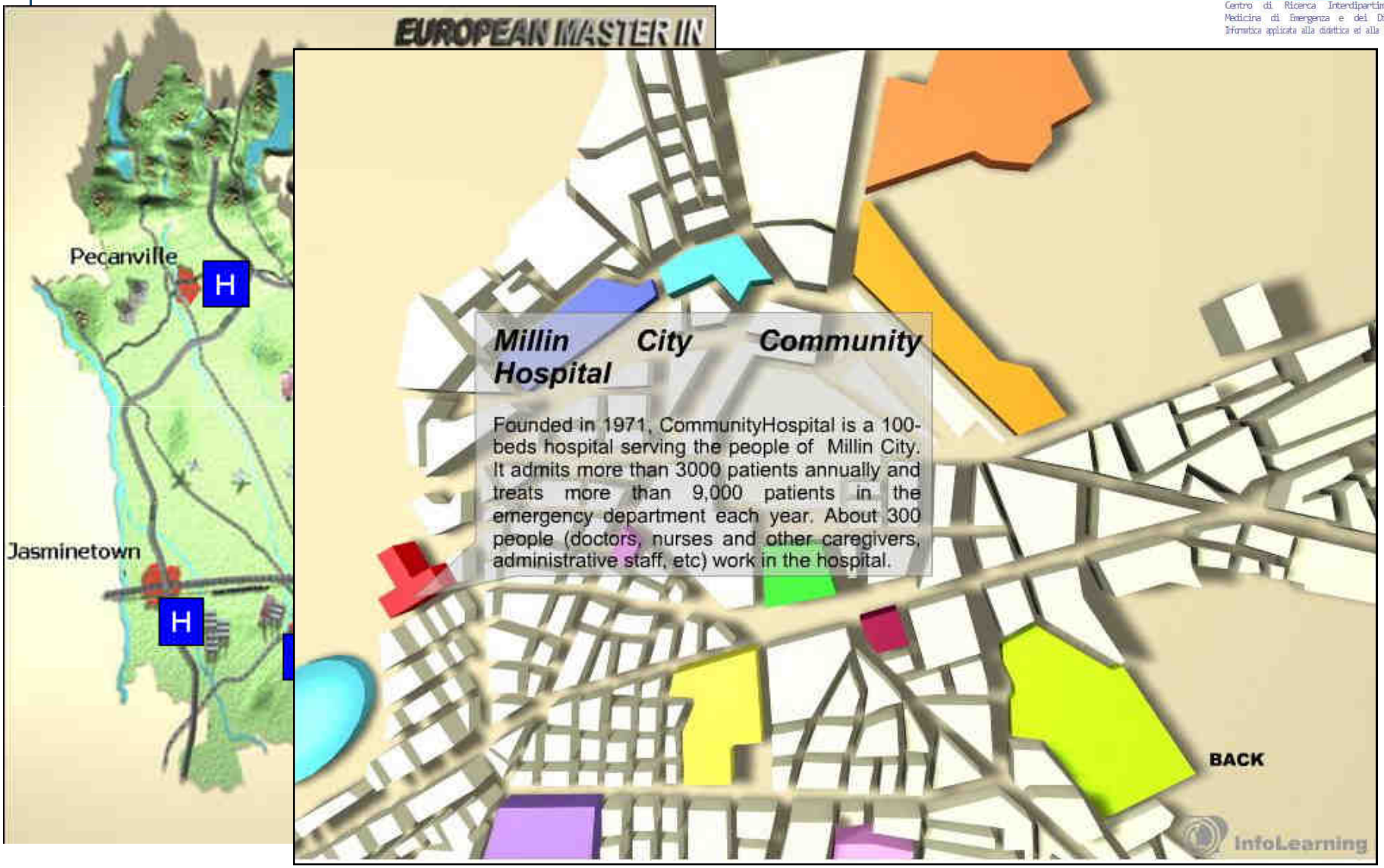

EUROPEAN MASTER IN
DISASTER MEDICINE
Simulation One
Pecanville
Paddyburg
Jasminetown
H
H
H
H

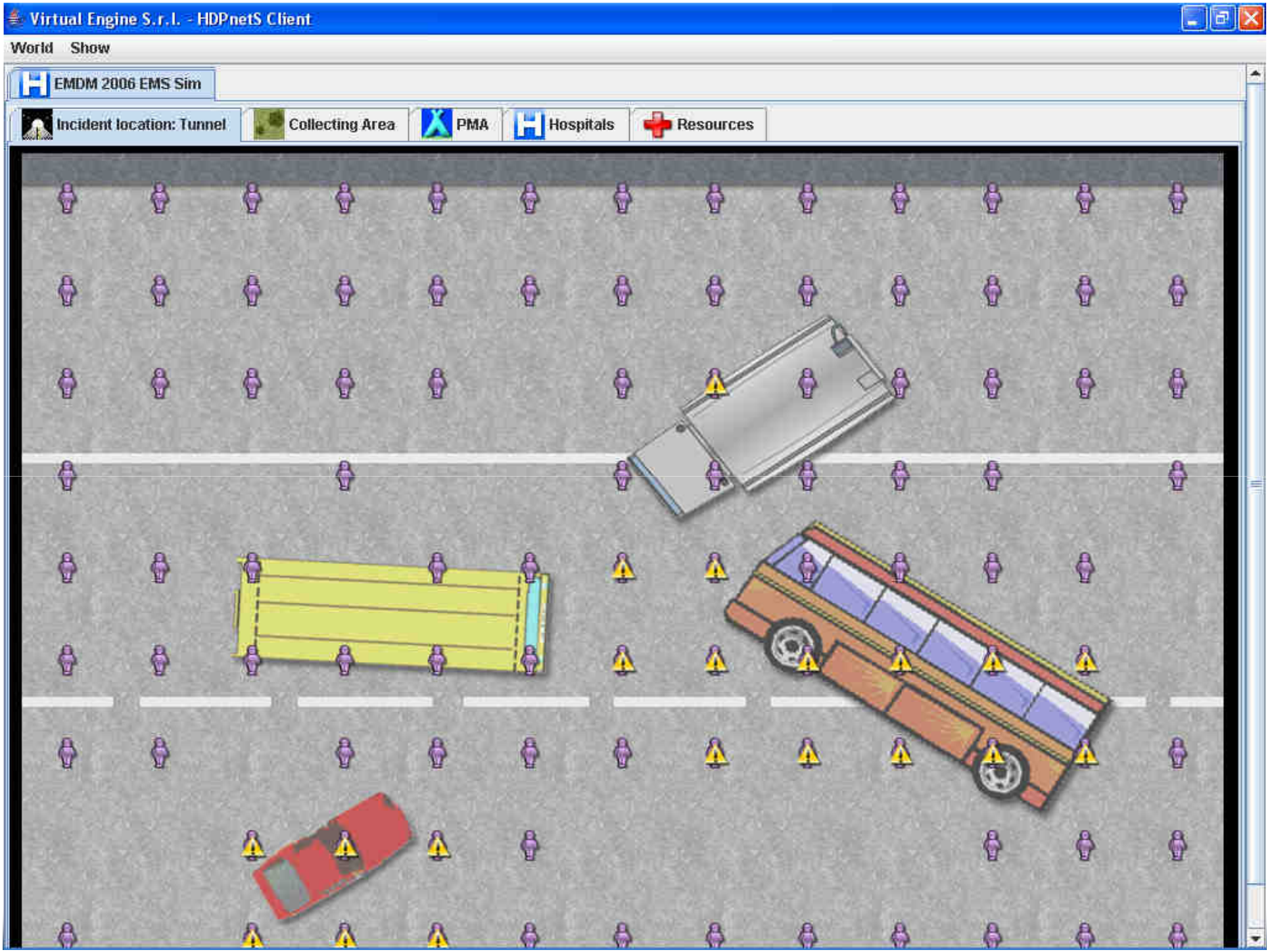

VARESE
BORGOMANERO
OLEGGIO
BELLINZAGO NOVARESE
NOVARA
TRECATE
GALLIATE
CERANO
VERCELLI
A4
A26

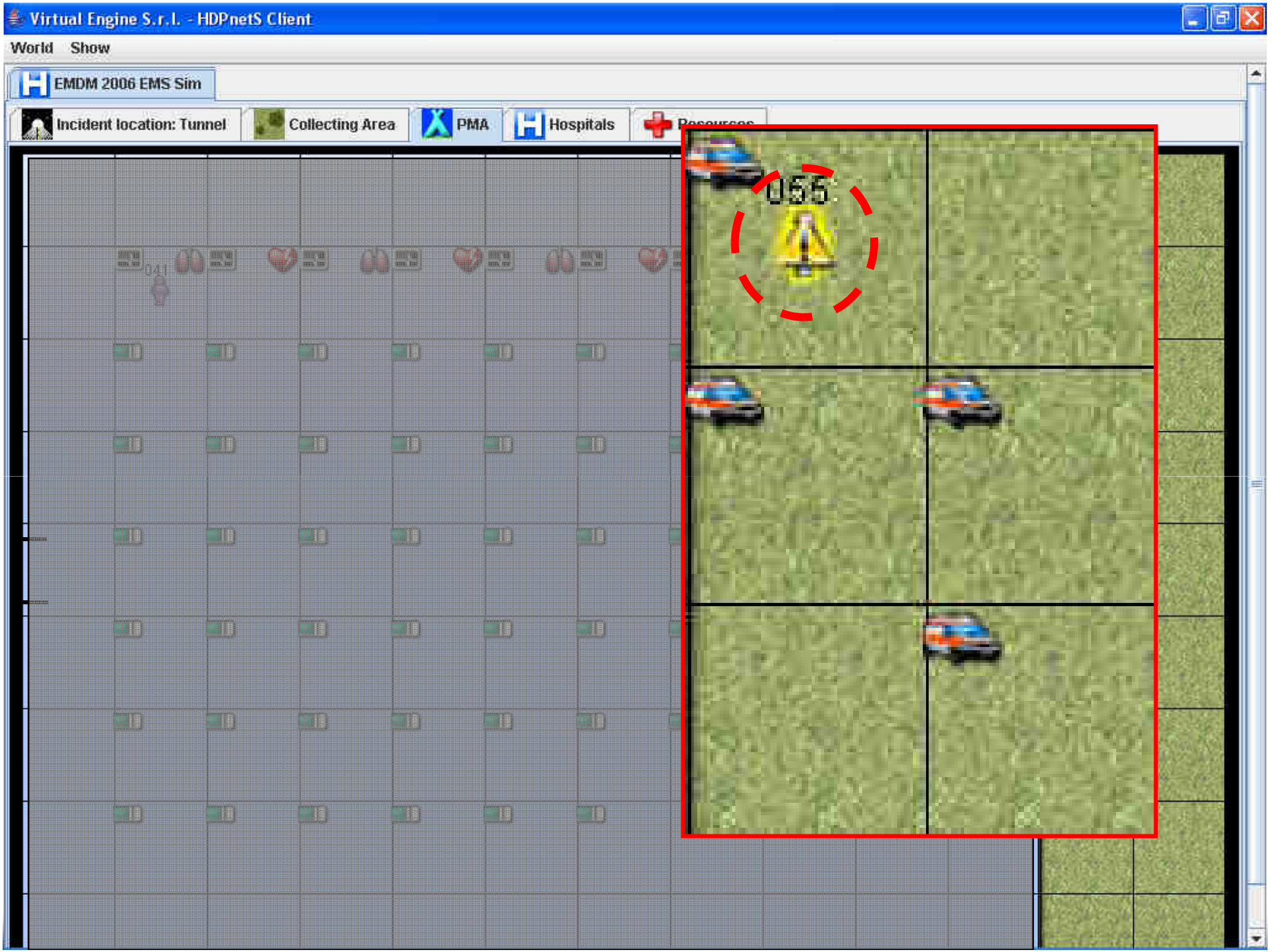
HDPnetS

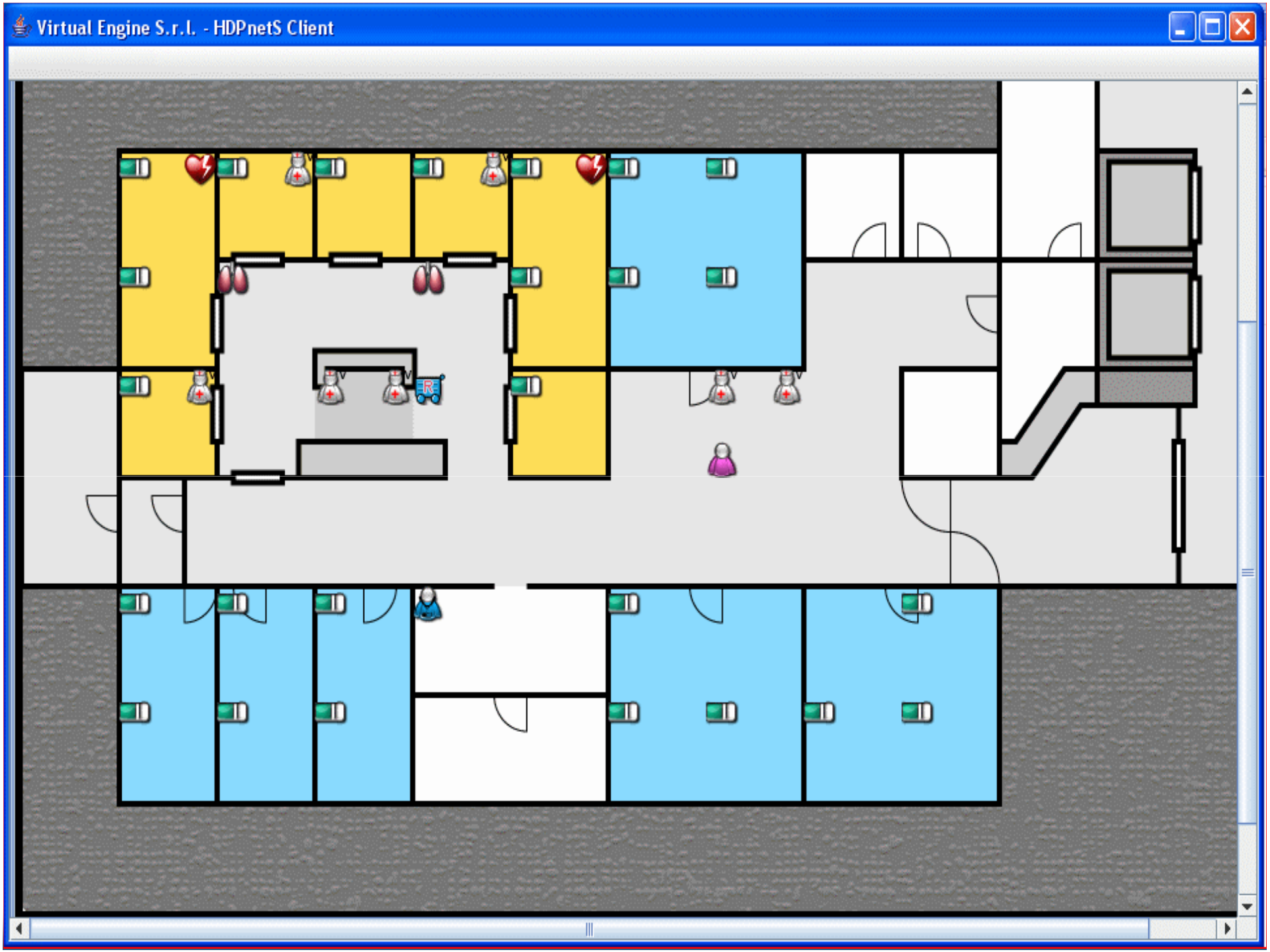

OVERVIEW:
RICELAND
DISPATCH CENTER
Now create a territory, real or invented
manage rescue team and vehicle

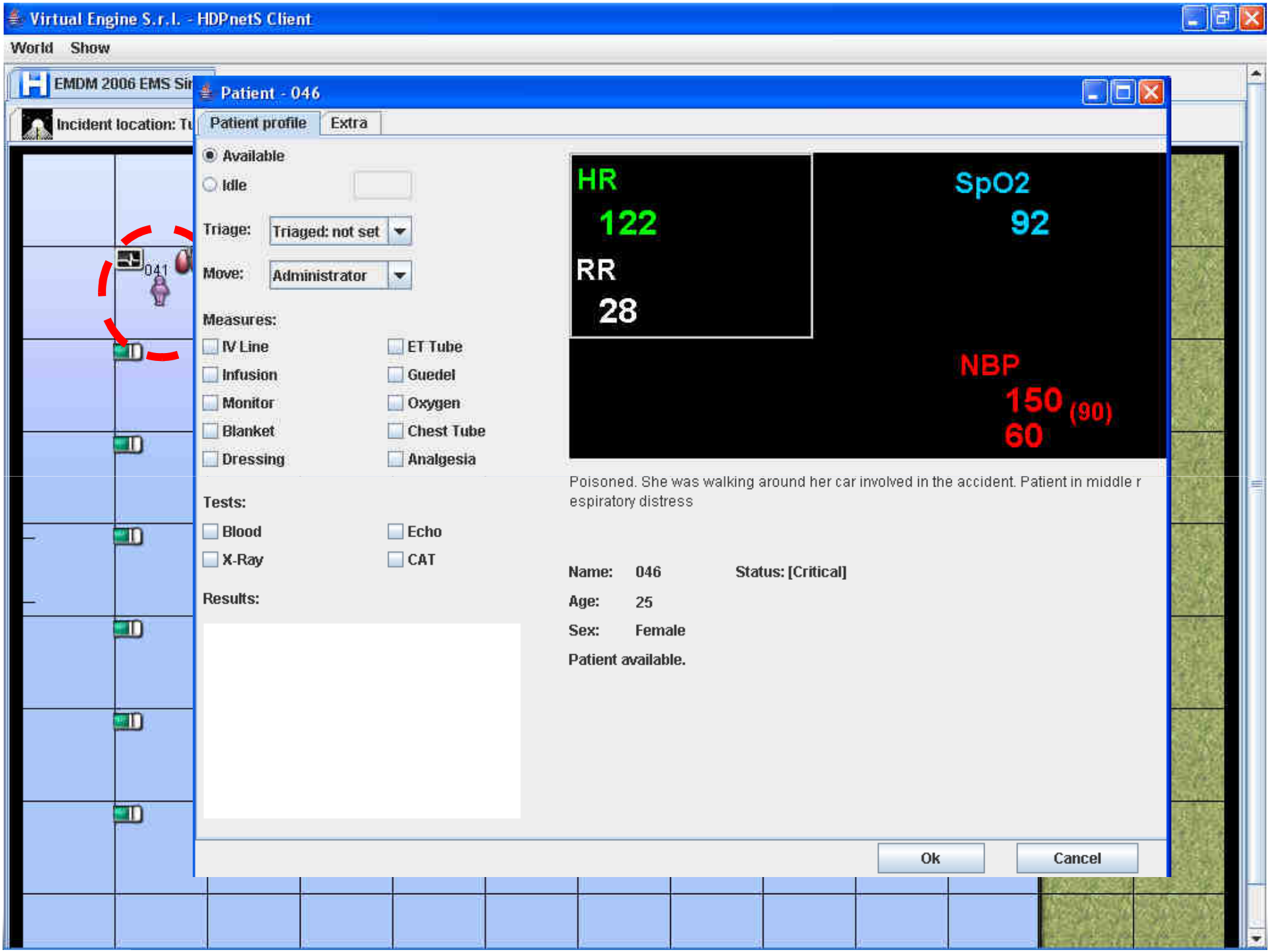
HDPnetS

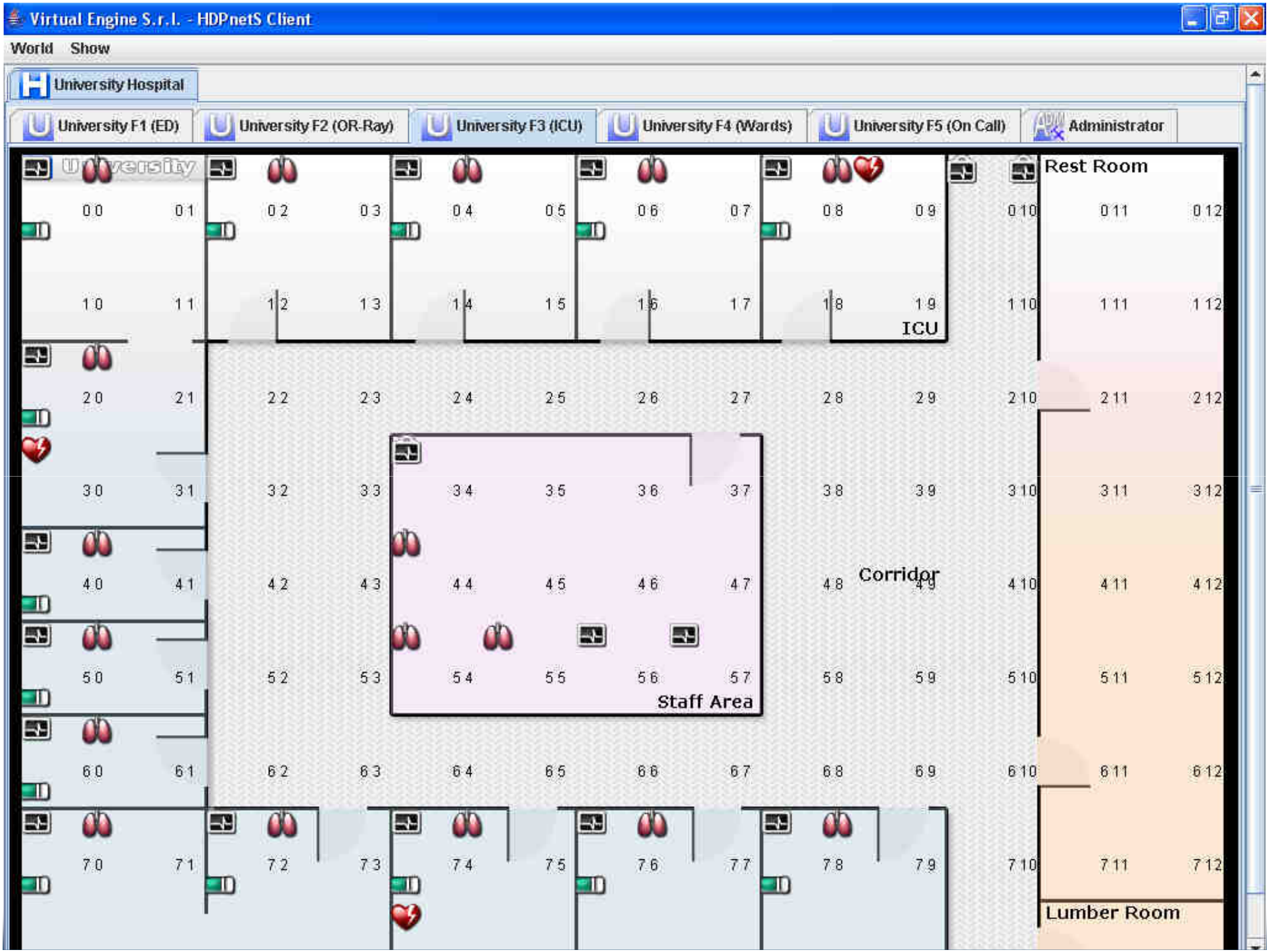

EUROPEAN MASTER IN
Pecanville
H
Jasminetown
H
Millin City Community Hospital
Founded in 1971, CommunityHospital is a 100-beds hospital serving the people of Millin City. It admits more than 3000 patients annually and treats more than 9,000 patients in the emergency department each year. About 300 people (doctors, nurses and other caregivers, administrative staff, etc) work in the hospital.
BACK
InfoLearning

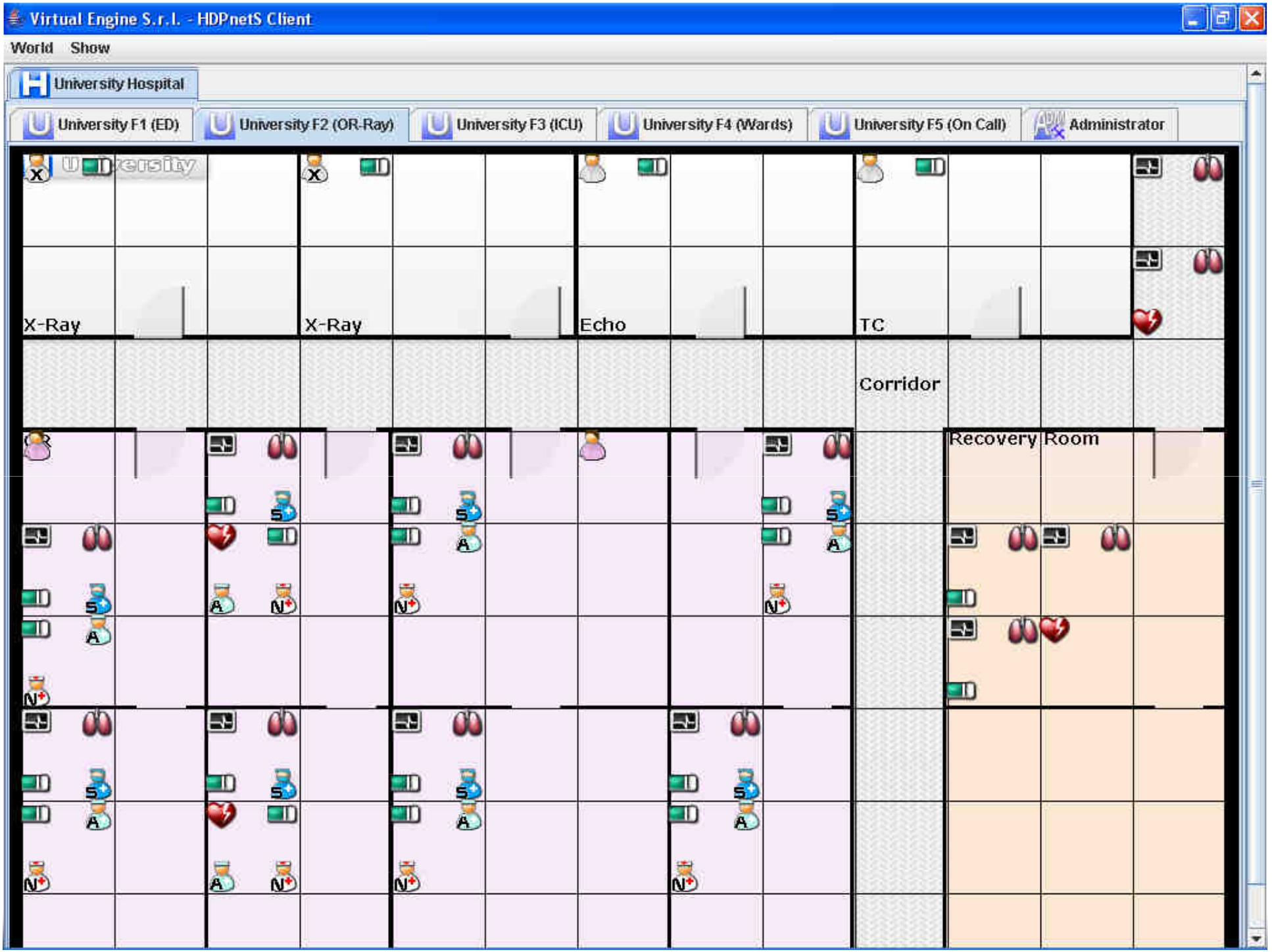

Virtual Engine S.r.l. - HDPnetS Client
World
Show
EMDM 2006 EMS Sim
Incident location: Tunnel
Collecting Area
PMA
Hospitals
Resources

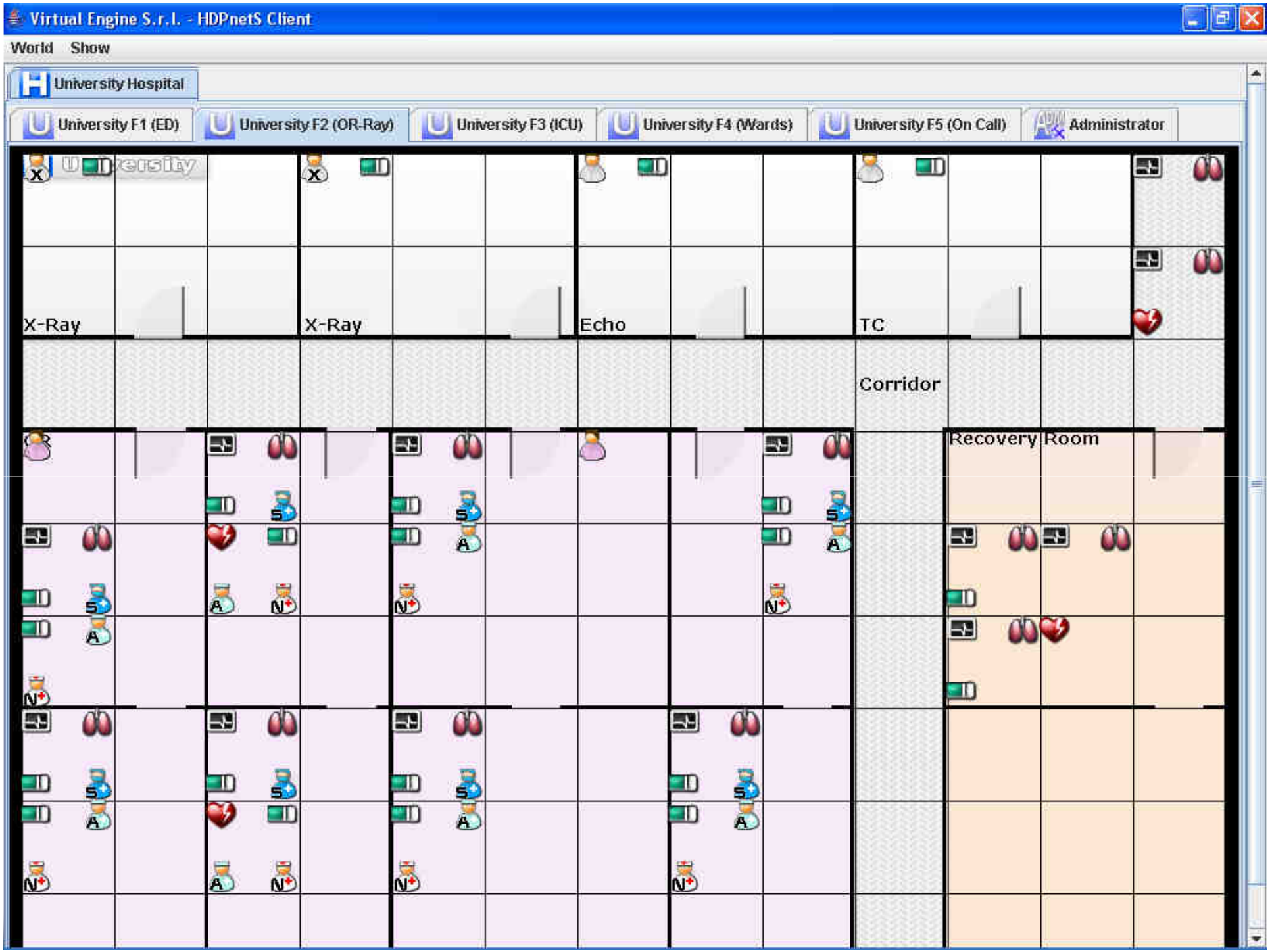

Virtual Engine S.r.l. - HDPnetS Client
World
Show
EMDM 2006 EMS Sim
Incident location: Tunnel
Collecting Area
PMA
Hospitals
055


Virtual Engine S.r.l. - HDPnetS Client

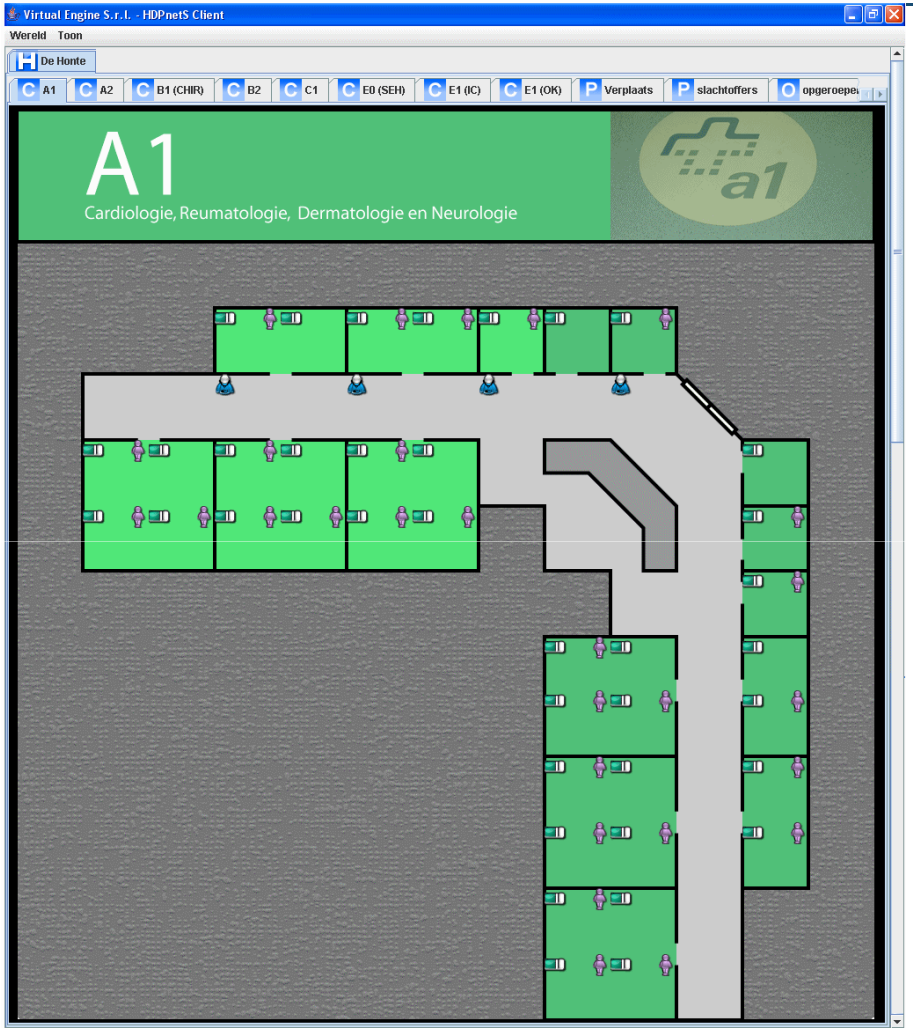

Virtual Engine S.r.l. - HDPnetS Client
World
Show
EMDM 2006 EMS Si
Incident location: Tu
041
Patient - 046
Patient profile
Extra
Available
Idle
Triage:
Triaged: not set
Move:
Administrator
Measures:
IV Line
ET Tube
Infusion
Guedel
Monitor
Oxygen
Blanket
Chest Tube
Dressing
Analgesia
Tests:
Blood
Echo
X-Ray
CAT
Results:
HR
122
RR
28
SpO2
92
NBP
150 (90)
60
Poisoned. She was walking around her car involved in the accident. Patient in middle r
espiratory distress
Name: 046
Status: [Critical]
Age: 25
Sex: Female
Patient available.
Ok
Cancel

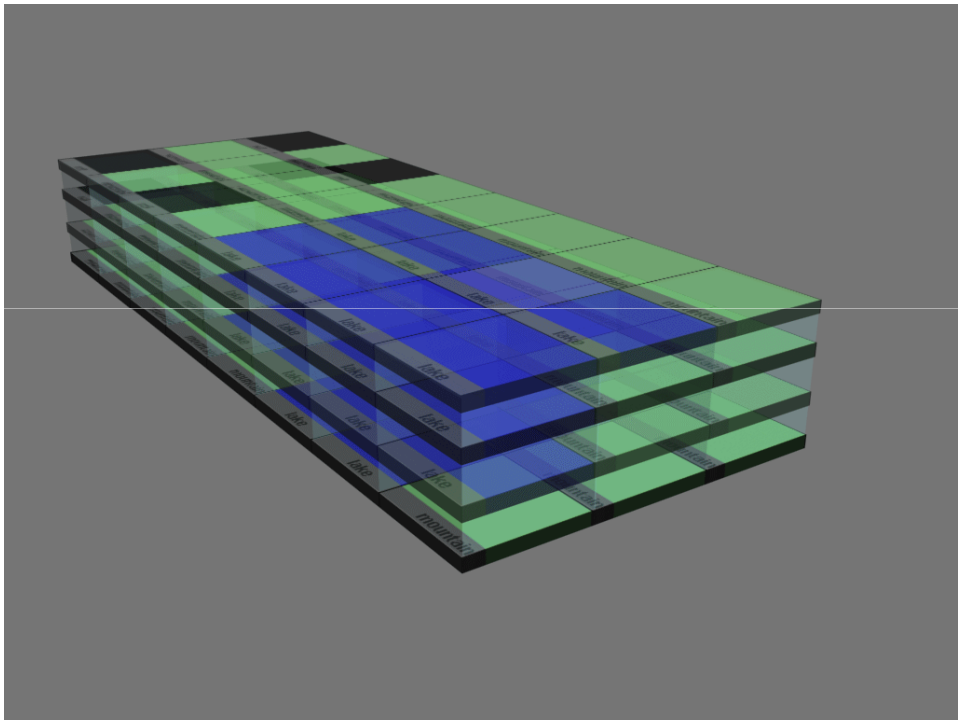

Virtual Engine S.r.l. - HDPnetS Client
World
Show
University Hospital
University F1 (ED)
University F2 (OR-Ray)
University F3 (ICU)
University F4 (Wards)
University F5 (On Call)
Administrator
Rest Room
ICU
Corridor
Staff Area
Lumber Room


Virtual Engine S.r.l. - HDPnetS Client
World
Show
University Hospital
University F1 (ED)
University F2 (OR-Ray)
University F3 (ICU)
University F4 (Wards)
University F5 (On Call)
Administrator
X-Ray
X-Ray
Echo
TC
Corridor
Recovery Room


Virtual Engine S.r.l. - HDPnetS Client
World
Show
University Hospital
University F1 (ED)
University F2 (OR-Ray)
University F3 (ICU)
University F4 (Wards)
University F5 (On Call)
Administrator
X-Ray
X-Ray
Echo
TC
Corridor
Recovery Room

HDPnetS


Virtual Engine S.r.l. - HDPnetS Client
Wereld Toon
De Honte
A1
A2
B1 (CHIR)
B2
C1
E0 (SEH)
E1 (IC)
E1 (OK)
Verplaats
slachtoffers
A1
Cardiologie, Reumatologie, Dermatologie en Neurologie
a1



HDPnetS

- Allows you to re-create your own environment and the Hospitals and the facilities located in your area
- With the available personnel (working and on-call)
- Positioning the available resources
- Possibility to replay the simulation for effective debriefing

LIVE SIMULATION

where real people use simulated (or "dummy") equipment in the real world

St. Christophe
May, 19th 2006

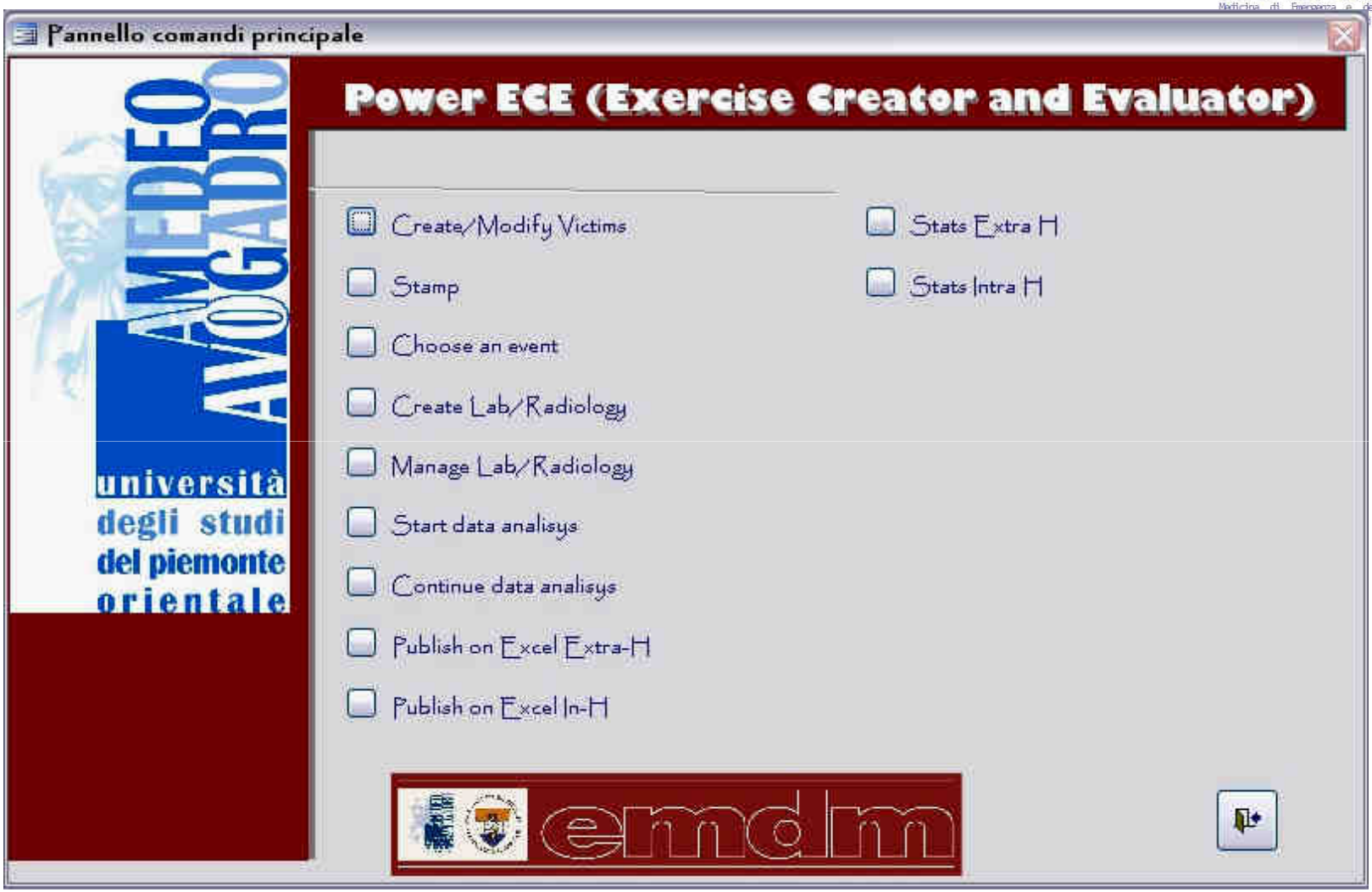
LIVE SIMULATION

CRIMEDIM
Centro di Ricerca Interdipartimentale in Medicina di Emergenza e dei Disastri ed Informatica applicata alla didattica ed alla pratica Medica
università degli studi del piemonte orientale
AMEDEO AVOGADRO

Workshop introduction
Tuesday

Prof. Della Corte

LIVE SIMULATION



SIMULATION IN DISASTER EDUCATION

There is **insufficient** evidence to support **firm conclusions** about the **effectiveness of specific training methods**

Hsu EB et al. *Training of hospital staff to respond to a mass casualty incident (evidence report/technology assessment* No. 95, prepared by the Johns Hopkins University Evidenced-based Practice Center under contract No. 290-02-0018, AHRQ publication No. 04-E015-2). Rockville (MD): Agency for Healthcare Quality and Research; 2004

CASE STUDY

UNDERGRADUATE COMPLEMENTARY COURSE IN DISASTER MEDICINE: ASSESSMENT OF STUDENTS KNOWLEDGE RETENTION AND PRACTICAL ATTITUDE AND SKILLS.

Hypothesis

✓- Simulation exercise in MCI management is more effective in terms of knowledge retention and practical skills

✓- Which learners would be most likely to benefit from the simulation

CASE STUDY

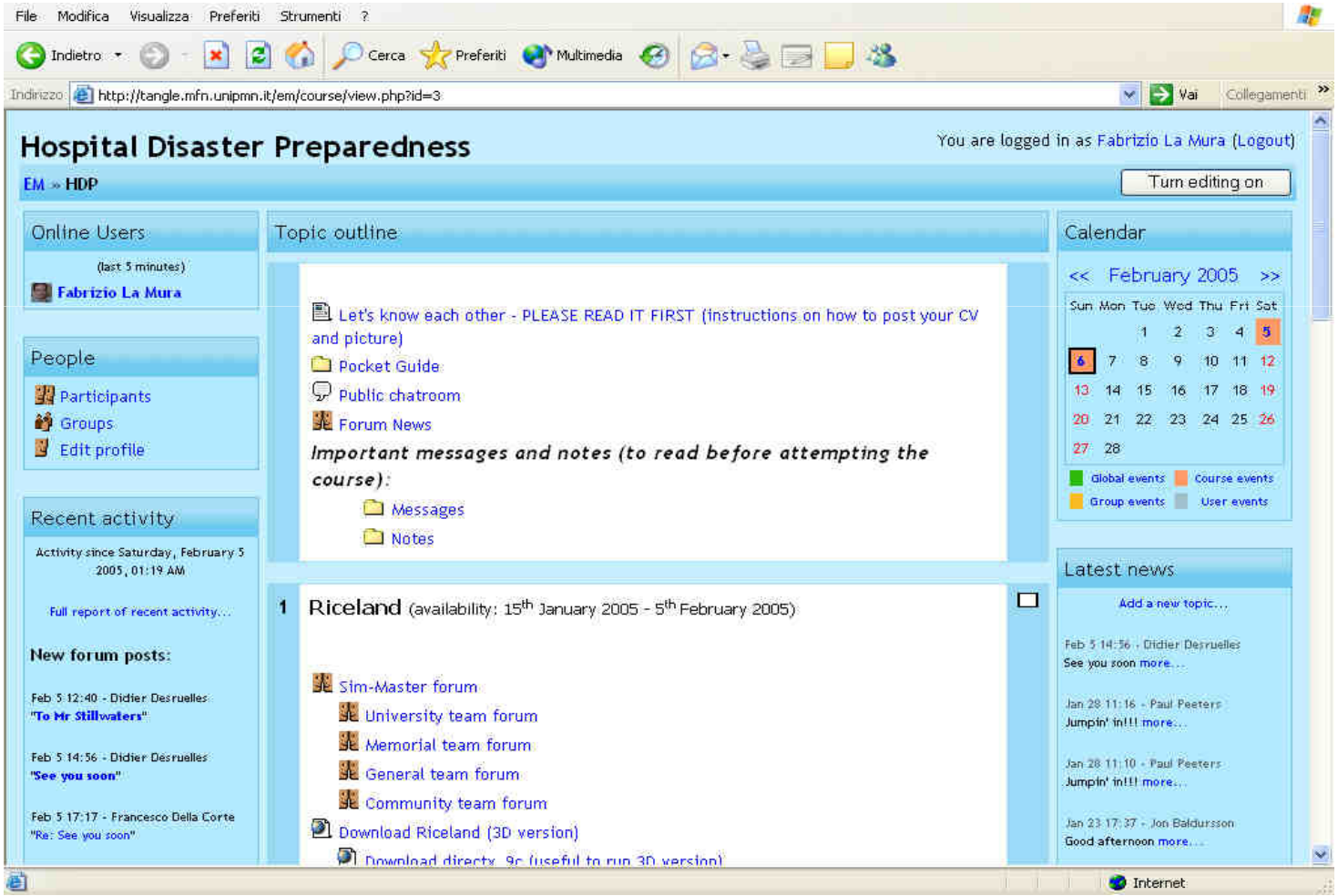
METHODS

4th, 5th, and 6th-year medical students enrolled in a 24-hr complementary course on basic principles of disaster medicine at the University of Eastern Piedmont and University of Palermo

Students were randomized into two groups (control(C)/intervention(I)) matched by year of education to ensure that the student level of education was equally distributed between the two groups

CASE STUDY

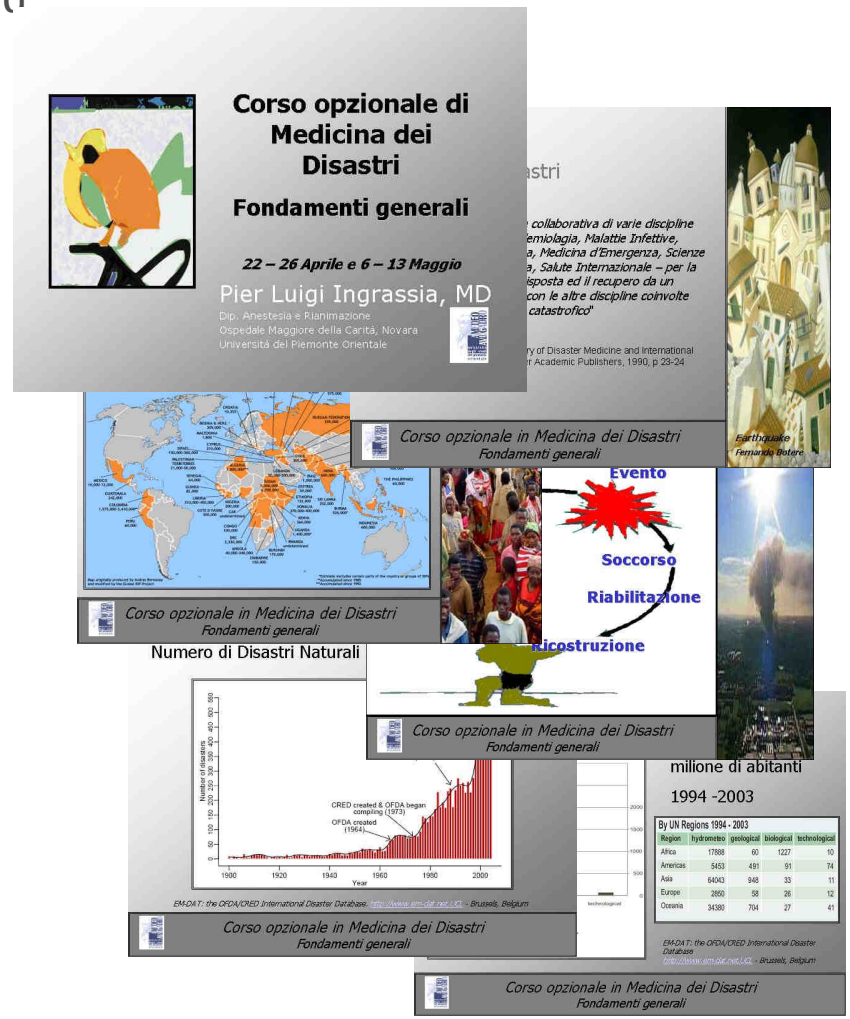
A web page for distance learning was created: text files and .ppt presentations were available for students. Fora were also available to promote interaction



CASE STUDY

six 45-minute didactic lectures discussing principle of mass-casualty incident (MCI) and disaster management were designed

1. Disaster Medicine: medical management and rescue chain
2. Triage: principles and methodologies
3. Command & Control
4. Principles of medical treatment in pre and in-hospital setting
5. Crush, Blast e Burns injuries
6. Mass Casualty Incidents: case studies



CASE STUDY

Disastermed.Ca emergency department simulation was used either as training instrument and assessment tool for practical attitudes and skills at the mid and at the end of the course.

Franc-Law JM, Bullard MJ, Della Corte F. Hospital disaster plan simulation using the Disastermed.ca patient database and an existing, computerized patient tracking system: a virtual live exercise. Prehosp Dis Med. 2007;s172-3

CASE STUDY

METHODS

Learning styles were assessed using Felder and Solomon's Index of Learning Styles.

The ILS provides a separate score for each of four dimensions
(1) active-reflective, (2) visual-verbal, (3)sensing-intuitive, (4)sequential-global)

Multiple-choice questionnaire was used to assess the knowledge retention in both groups (control and intervention).

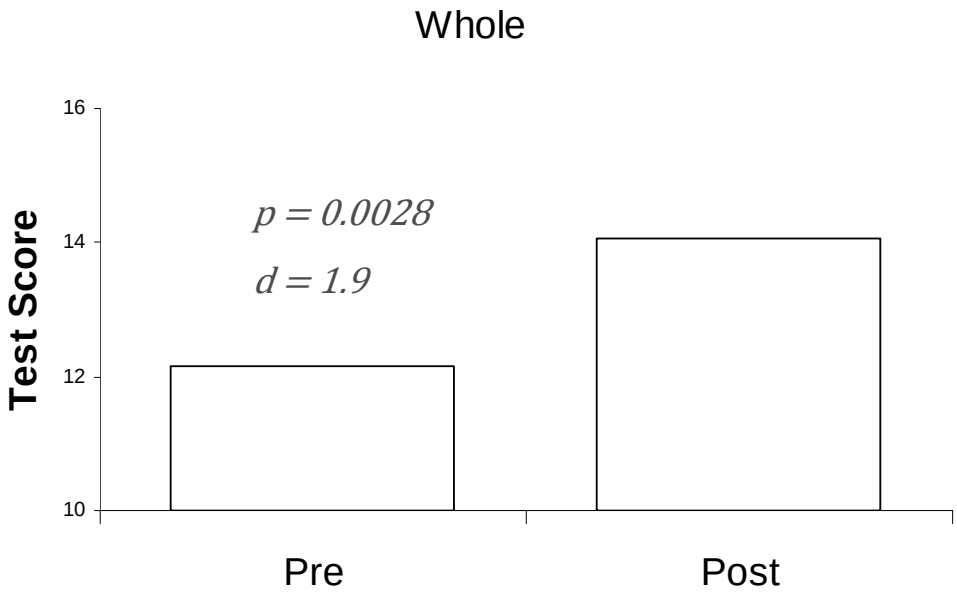
Questions were grouped in 5 categories according to the related topic, were block randomized and two 28-item questionnaires were created and delivered to the two groups at the beginning (pre-test) and at the end (post-test) of the course

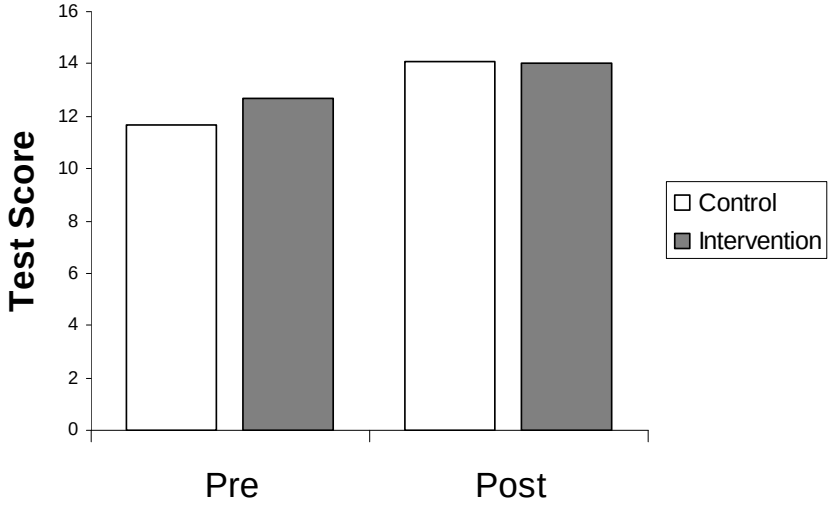
Disastermed.Ca emergency department simulation was used to assess practical skills

Triage accuracy, mean time to triage, mean time to bed assignment, mean time to physician assessment, and mean time to disposition were compared.

CASE STUDY

RESULTS

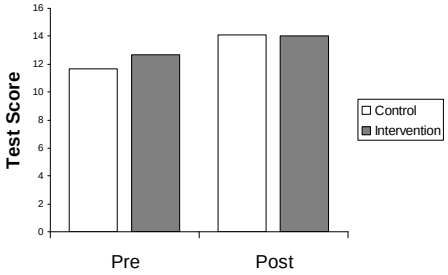




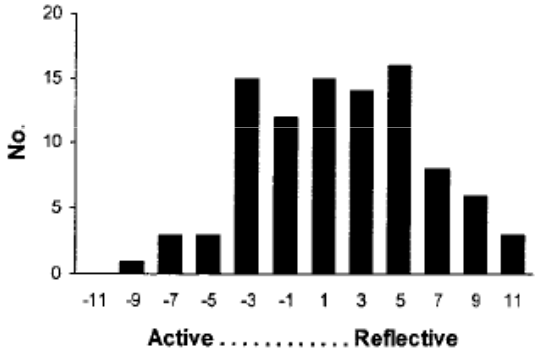
	d (post-pre)
IV	1,77
V	1.454
VI	2,166
FC	4,666

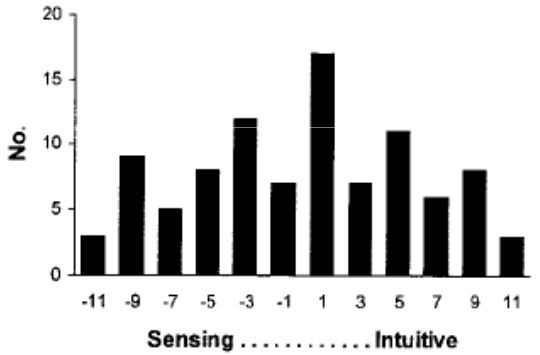
CASE STUDY

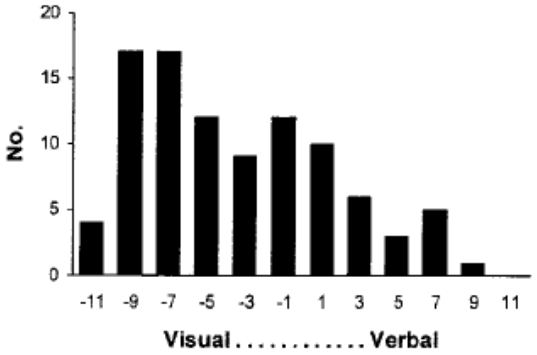
RESULTS

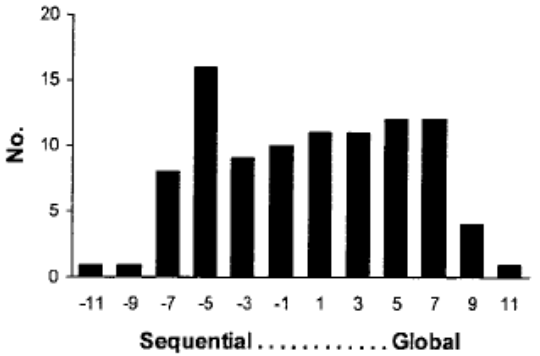


$$d = 2.76 + 0.159\ Grp"I" - 3.43\ preB - 0{,}0059\ AR - 0{,}165\ SI - 0.0846\ VV + 0{,}248\ SG$$



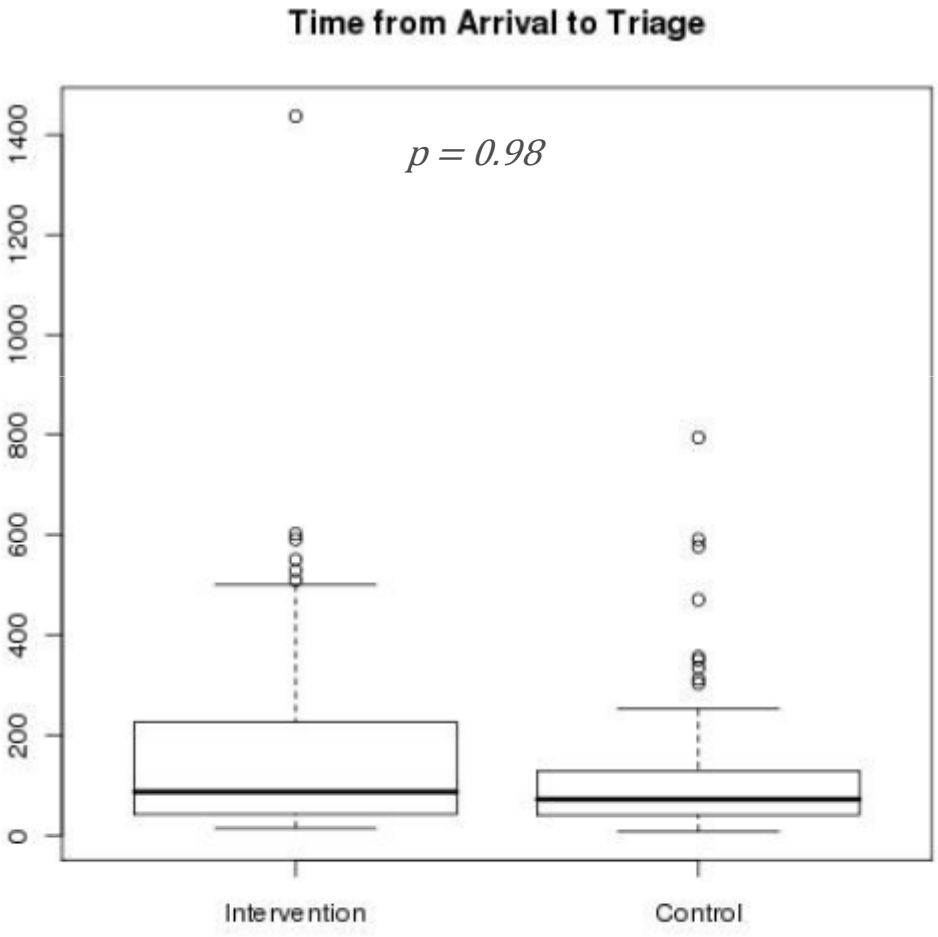


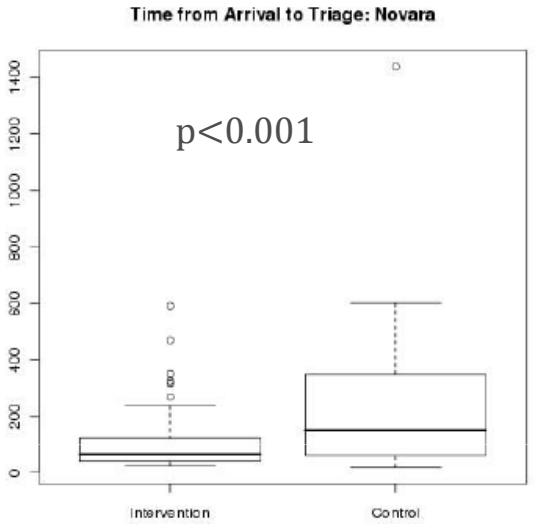


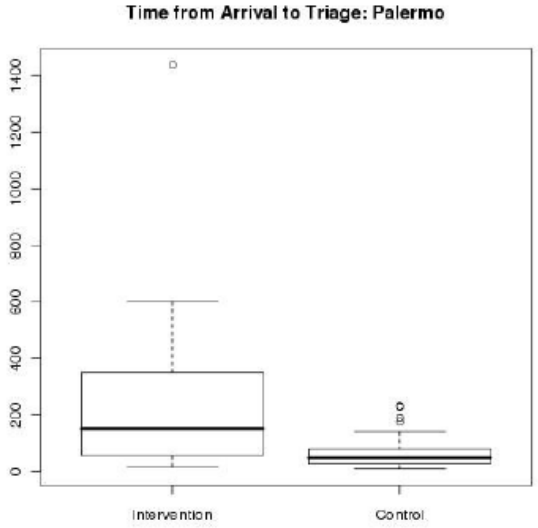


CASE STUDY

RESULTS

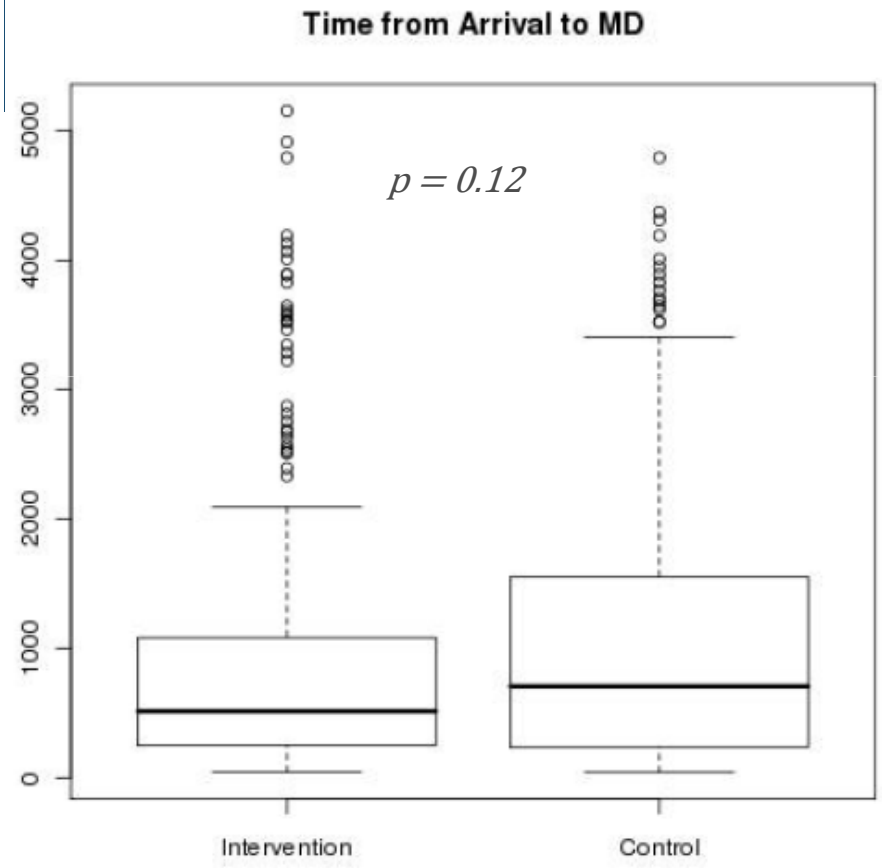


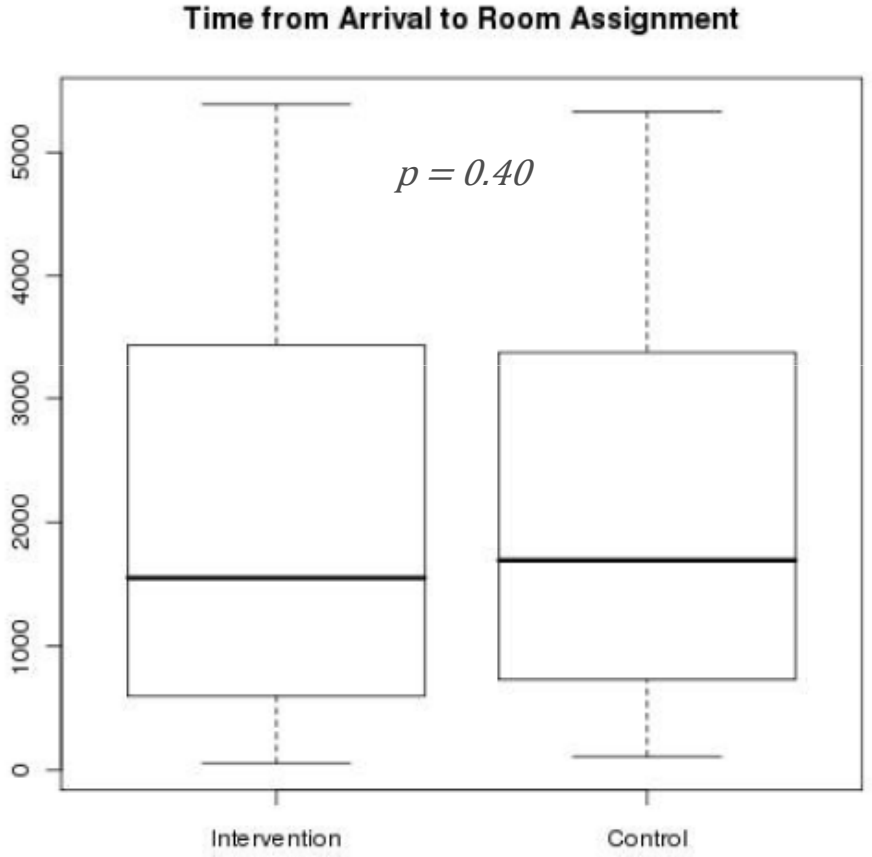




CASE STUDY

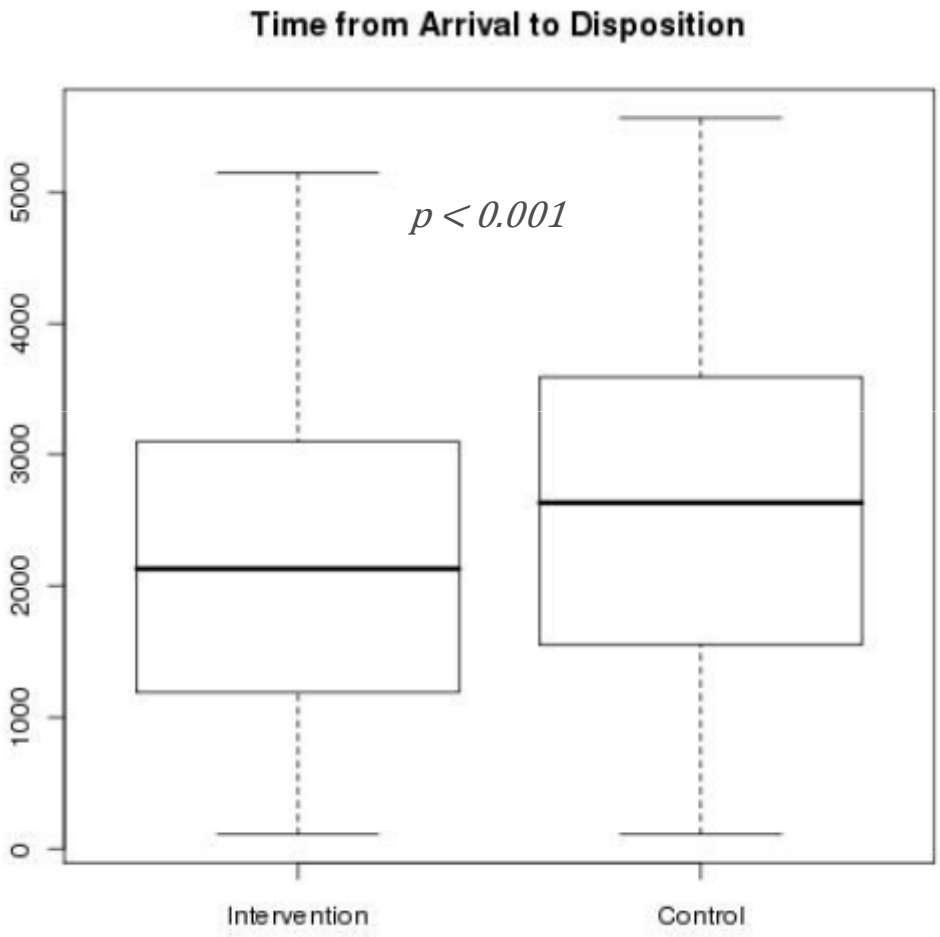
RESULTS





CASE STUDY

RESULTS



CASE STUDY

CONCLUSION

- Simulation exercise in MCI management do not increase knowledge retention
- Simulation exercise in MCI management is effective in terms of practical skills acquisition
- Learning styles did not affect test score
- Altough the course was globally effective, it is more suitable for senior medical students
- Probably simulation exercise in ED management is recommended for medical students

grazie

www.hdpnets.com
www.dismedmaster.com

pierluigi.ingrassia@med.unipmn.it