

Power ECE

Torino, 12 Novembre 2008

Exercise Creator and Evaluator



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S.C.D.U. Anestesia, Terapia Intensiva
e Rianimazione Generale

A.O.U. Maggiore della Carità - Novara

Università "A. Avogadro" del Piemonte Orientale



emdm

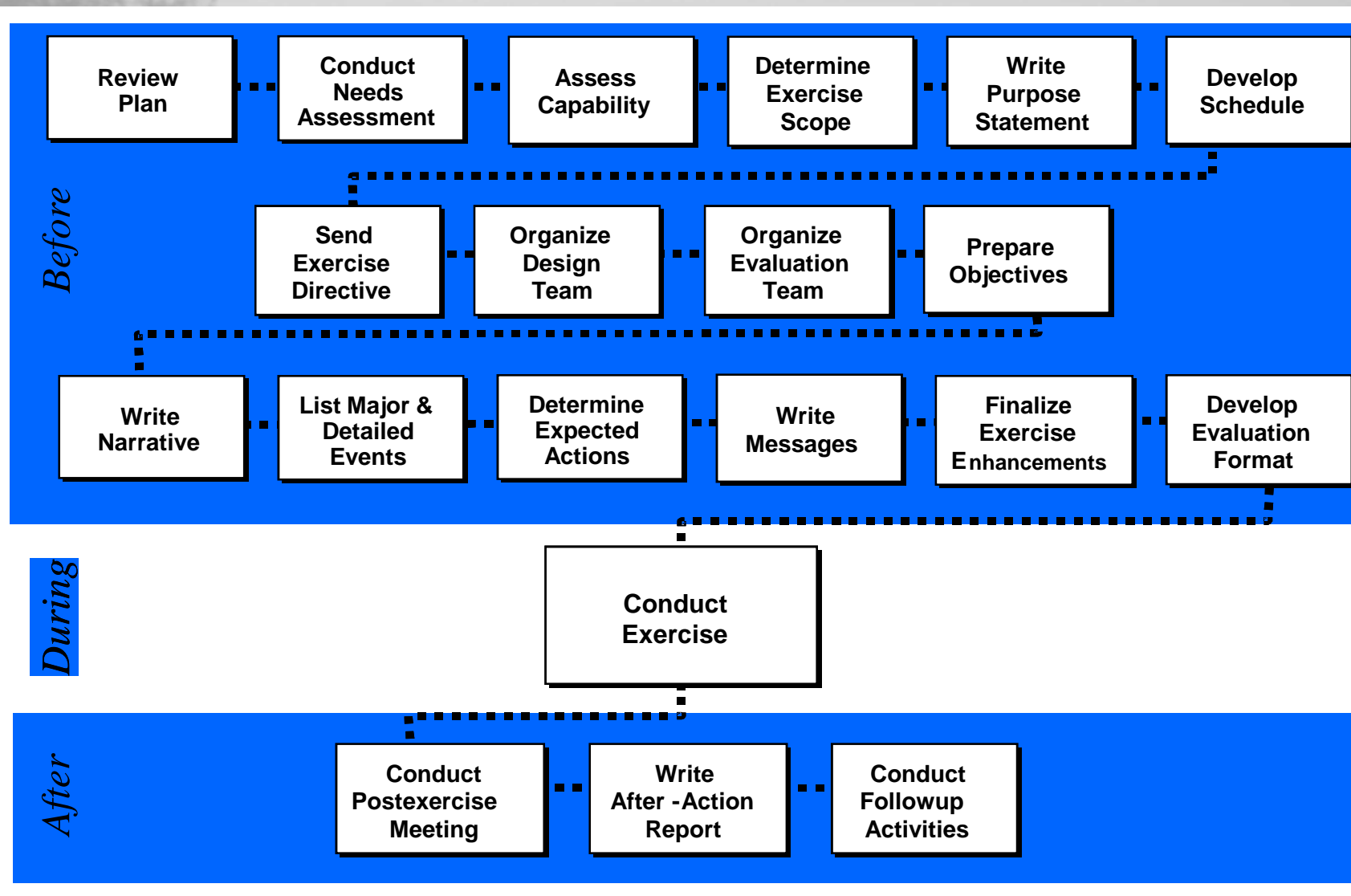
Real size simulation in disaster medicine

- Poor number of paper
- Best system to test plan
- Great stress for participants

But...

- Cost/efficacy
- Expensive organization
- Difficult to evaluate

Tasks for a Successful Exercise



Key Points

- Scenario
- Set up
- Victims
- Realism



To Evaluate an exercise

It allow to identify:

- If you reach the goal
- How improving C&C chain
- How improving system and protocol
- Weakness in skill
- Equipment

Objective

To build a software able to:

- Victim database
- To help in setting up the simulation
- To collect and analyze data

Pannello comandi principale

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Power ECE (Exercise Creator and Evaluator)

- ☐ Create/Modify Victims
- ☐ Stamp
- ☐ Choose an event
- ☐ Create Lab/Radiology
- ☐ Manage Lab/Radiology
- ☐ Start data analysis
- ☐ Continue data analysis
- ☐ Publish on Excel Extra-H
- ☐ Publish on Excel In-H
- ☐ Stats Extra H
- ☐ Stats Intra H



emcdm



Victims' database

Code: R (Rosso)
 AVPU: (U) Unresponsive
 Respiratory Rate: 30
 Heart rate: 120

Expected treatment

O2 ☒ Fluid ☒
 Guedel ☒ Blood Transf ☐

Exit PMA max time: 180

Code out PMA: R (Rosso)

AVPU: (U) Unresponsive

zione Laboratorio Radiologia

Patient n. 14

X-Ray Skull

Normale

No pathological
findings

X-Ray Chest

Pnx sx

Lef pneumotorax

X-Ray Abdomen

Addome Normale

No pathological
findings

X-Ray Arm/Leg

Normale Tibia

No pathological
findings

X-Ray Cervical spine:

Fratt C6C7

C6-C7 fractures

US Abdomen

Rene Normale

No pathological
findings

Tc Brain

Epidurale Acuto

Acute epidural
emathoma

Tc Chest/Abdomen

Torace PNX sx

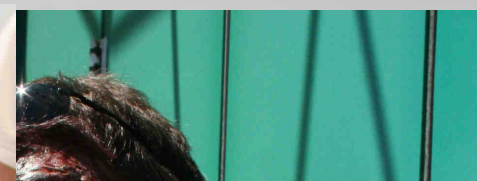
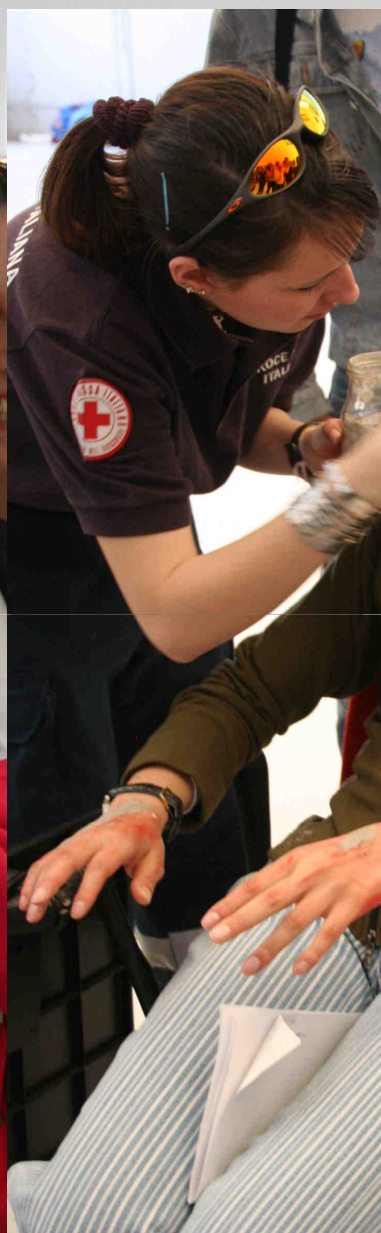
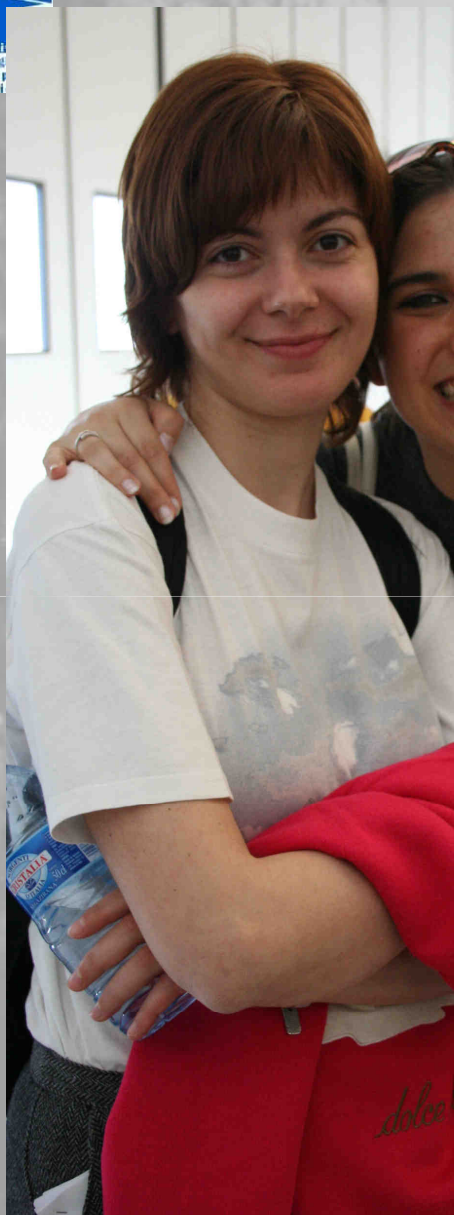
Lef pneumotorax

MR Brain

No pathological
findings

MR Chest/Abdomen

No pathological
findings



Collecting Area - PMA

1. Nel caso venga trasferito in quest'area entro 0 minuti, sarà triaggiato all'ingresso con gli stessi parametri di prima: codice (Codice 3A) ..., coscienza ..., frequenza respiratoria 0, frequenza cardiaca 0; al monitoraggio si avrà SpO₂ 0 del e pressione arteriosa Entro 0 minuti dovrà ricevere almeno i seguenti trattamenti:

+

Ossigeno:	0	Monitor/Def	0	Bendaggio ferite	0
Gue del:	0	IV/line	0	Collare cervicale	0
Ambu/mask:	0	Compressione emorragia/e	0	Spinale	0
IOT:	0	Fluidi	0	Immobilizz. degli arti	0
IPPV:	0	Trasfusioni	0	Analgesia	0
Defens. PNK iperteso:	0	Riscaldamento	0		
Drenaggio toracico:	0	Disinfezione ferite	0		

Se riceverà **tutti** i trattamenti indicati entro un tempo massimo di 0 uscirà dal PMA con il codice (Codice OutpmaA) ... e i seguenti parametri: Coscienza ..., FC 0, FR 0, PA, e SpO₂ 0 assegnato ad un ospedale di livello ...; il suo quadro definitivo sarà quindi: ...

Nel caso il termine temporale non fosse rispettato, o non venissero applicati tutti i provvedimenti il suo stato cambierà in Codice (Codice OutpmaB) ... con i seguenti parametri: Coscienza ..., FC 0, FR 0, PA ..., e SpO₂ 0 assegnato ad un ospedale di livello ...

2. Nel caso invece che trascorrono più di minuti il quadro clinico evolverà in codice (Codice 3B) ..., coscienza ..., frequenza respiratoria 0, frequenza cardiaca 0; al monitoraggio si avrà SpO₂ del 0 e pressione arteriosa Entro 0 minuti dovrà ricevere almeno i seguenti trattamenti:

Ossigeno:	0	Monitor/Def	0	Bendaggio ferite	0
Gue del:	0	IV/line	0	Collare cervicale	0
Ambu/mask:	0	Compressione emorragia/e	0	Spinale	0
IOT:	0	Fluidi	0	Immobilizz. degli arti	0

1 2 3 4 5 6 7 8 9 10

Running the drill

Patient n.: 1



0



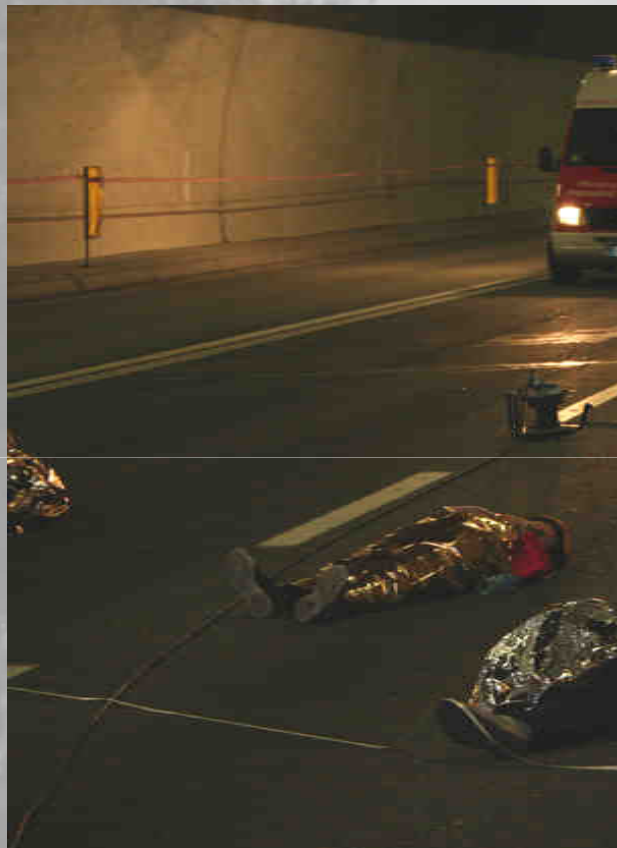
0



0

Codice 3A









Running the Drill...




Patient n.	A	B	ABG 1	Emocromo
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X-Ray Skull	X-Ray Chest	X-Ray		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Tc Brain	Tc Chest/Abdomen			
<input type="checkbox"/>	<input type="checkbox"/>			

Patient n.	A	B	ABG 1	Emocromo
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X-Ray Skull	X-Ray Chest	X-Ray		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Tc Brain	Tc Chest/Abdomen			
<input type="checkbox"/>	<input type="checkbox"/>			

Patient n.	A	B	ABG 1	Emocromo
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X-Ray Skull	X-Ray Chest	X-Ray		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Tc Brain	Tc Chest/Abdomen			
<input type="checkbox"/>	<input type="checkbox"/>			


Gemelli Memorial Hospital
 Radiology Service
 

Patient ID: 16



Refertation
Left pneumothorax

Det. Ray Serv

giovani 11 maggio 2005 Time: 16.47 Pagina 1 di 1

Plotting 2	Heart E.2	ABG 3	Emocromo 3 B
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X-Ray Arm/Leg	US Abdomen		
<input type="checkbox"/>	<input type="checkbox"/>		

Plotting 2	Heart E.2	ABG 3	Emocromo 3 B
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X-Ray Arm/Leg	US Abdomen		
<input type="checkbox"/>	<input type="checkbox"/>		

Plotting 2	Heart E.2	ABG 3	Emocromo 3 B
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X-Ray Arm/Leg	US Abdomen		
<input type="checkbox"/>	<input type="checkbox"/>		

Pri
Pri
Sta

Patient n. A B ABG 1 Emocromo

1 ☐ ☐ ☐ ☐ ☐

X-Ray Skull X-Ray Chest X-Ray

☐ ☐

Tc Brain Tc Chest/Abdomen

☐ ☐

Patient n. A B ABG 1 Emocromo

2 ☐ ☐ ☐ ☐ ☐

X-Ray Skull X-Ray Chest X-Ray

☐ ☐

Tc Brain Tc Chest/Abdomen

☐ ☐

Patient n. A B ABG 1 Emocromo

3 ☐ ☐ ☐ ☐ ☐

X-Ray Skull X-Ray Chest X-Ray

☐ ☐

Tc Brain Tc Chest/Abdomen

☐ ☐

Sanoville Memorial Hospital
Blood Analysis Laboratory

Patient ID 16

Haemocrome	Value	Measure	Unit	Normal range
WBC	7.90	$\times 10^9$	μL	4.00 - 10.00
RBC	3.94	$\times 10^9$	μL	
Hemoglobine	12.5	g/dL		
Htc	38	%		
MCV	91	fL		82 - 100
MCH	31	pg		27 - 32
MCHC	35	g/dL		32 - 36
Platelet	241	$\times 10^9$	μL	150 - 450
Leukocyte count				
Neutrophils	84.5	%		
Lymphocytes	25.0	%		
Monocytes	6.8	%		
Eosinophils	3.2	%		
Basophils	0	%		

Biochemistry	Value	Measure	Unit	Normal range
Glucose	88	mg/dL		74 - 106
Urea Nit	12	mg/dL		6 - 20
Creatinine	1.2	mg/dL		0.7 - 1.2
Albumine	4.4	g/dL		3.4 - 4.8
Na	141	mEq/L		134 - 146
K	3.9	mEq/L		3.5 - 5.5
Cl	98	mEq/L		96 - 110
Ca	9	mEq/L		8.6 - 10
Bilirubin (TOT)	0.5	mg/dL		0.3 - 1.2
GOT	33	U/L		5 - 37
GPT	26	U/L		5 - 40
CPK	137	U/L		24 - 195
LDH	370	U/L		308 - 378
Myoglobin	85	ng/ml		10 - 92

Coagulation	Value	Measure	Unit	Normal range
PT - INR	1.02			0.88 - 1.20
APTT(s)	25.6	s		22 - 33
APTT/Ratio	0.84			0.8 - 1.2
Fibrinogen	341	mg/dL		281 - 503

Enzyme	Value	Measure	Unit	Normal range
CK	389	U/L		260 - 378
CK-MB	98	U/L		26 - 94
Myoglobin	85	ng/ml		10 - 92
Thyroxine T	0	ng/ml		0 - 0.10

Blood Gas

pH 7.29

CO2 37

O2 98

HCO3 17

BE -1.3

COHB 0.5

ing 2 Heart E.2 ABG 3 Emocromo 3 B

☐ ☐ ☐ ☐

ay Arm/Leg US Abdomen

☐ ☐

ing 2 Heart E.2 ABG 3 Emocromo 3 B

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ay Arm/Leg US Abdomen

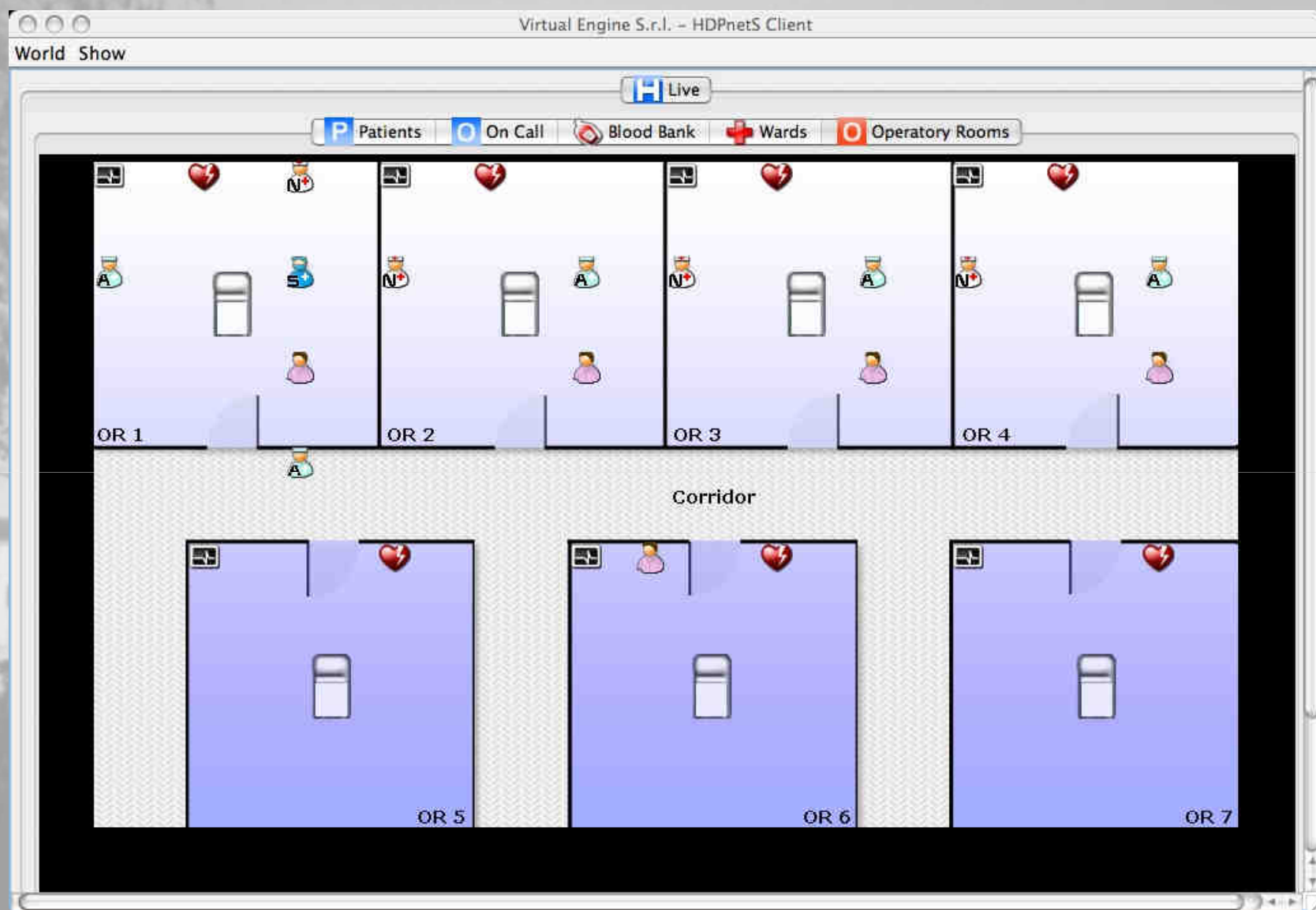
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ing 2 Heart E.2 ABG 3 Emocromo 3 B

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ay Arm/Leg US Abdomen

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After Action Review



Digital
photographs

Replay controls

Maps and
movements

Component
tree

Communication
analysis

Replay time

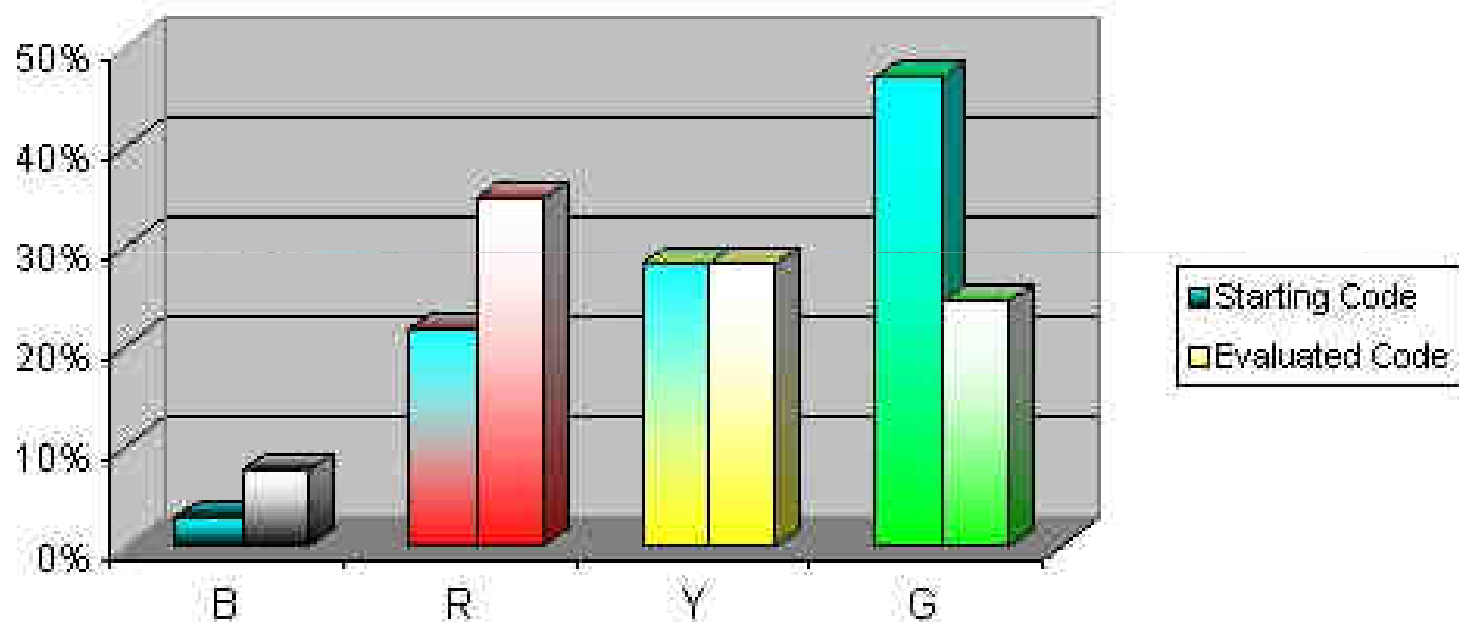
Statistics

Time line

CITE® Explorer System for integration and visualization of information from complex processes using multimedia

STATS

Starting code vs Evaluated at First Triage



Results

EMDM 2006: Gallery car crash, Simulated Hospital in an airport Hangar

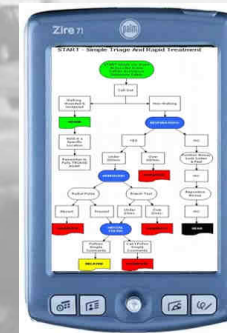
- To modify disaster activation procedure
- To improve communication system
- To modify personnel on call list



Results

EMDM 2007: Air collision, Ospedale Regionale della Valle d'Aosta involved DEA, ICU and Radiology

- To modify procedure to manage in airport disaster
- To modify access road to Hospital
- To modify in Hospital victim's route
- To modify radiology and Laboratory use
- To test computerized triage system



Risultati

Red Cross Civil Protection simulation 2007:
Burn in Elderly residence, Pre-Hospital

- To test technical
- Ambulance and truck mobilization
- Difficult to evacuate patients
- Not Clear definition in C&C Chain



Risultati

EMDM 2008: Bomb during Rock Concert,
Ospedale Borgomanero involved DEA, ICU and Radiology

- Real patient manage in the same space of simulated
- Real test of Hospital plan
- High realism level
- Still analyzing



Further developments

- Connection with real system to manage mass casualty events
- Interconnection between real size and computerized simulation

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