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Virtual training for effective collaborative response to airport emergencies: The CRISIS Project

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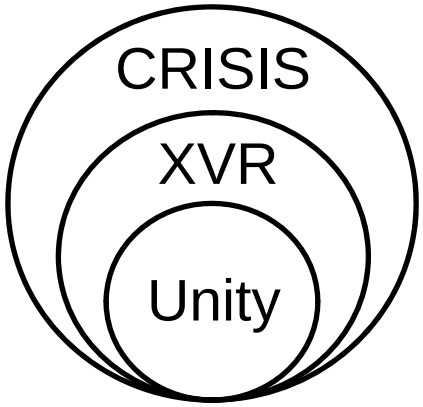
What is CRISIS?

- 3-year FP7 R&D project (2010-2013)
  [Contract No. FP7-242474]
- Better preparation of emergency managers and responders
- Through interactive training simulations
- Based on 3D videogame technology
- 12 European partners

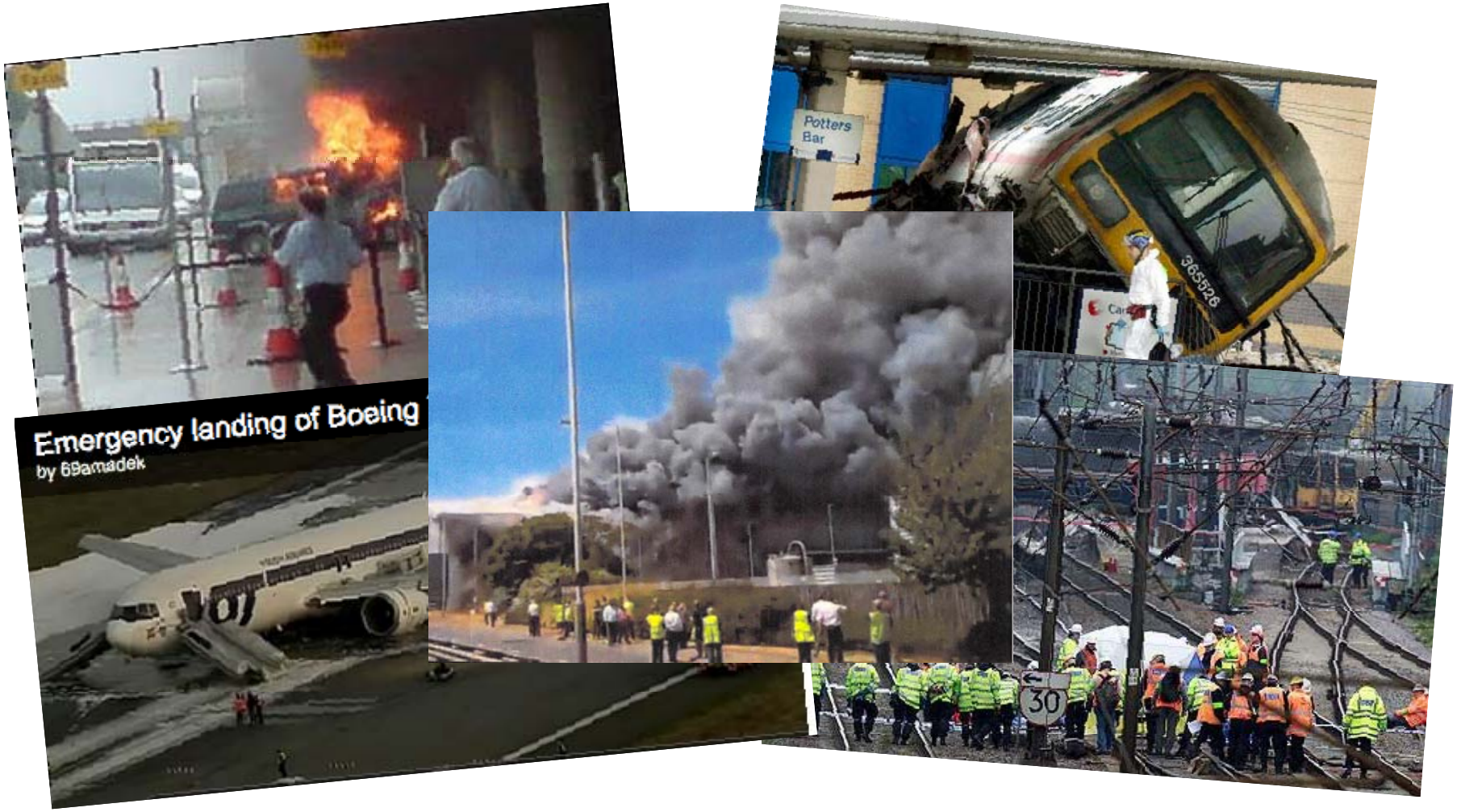
CRISIS partners

From videogames to serious games

Il2 Sturkmovik



Major Incidents



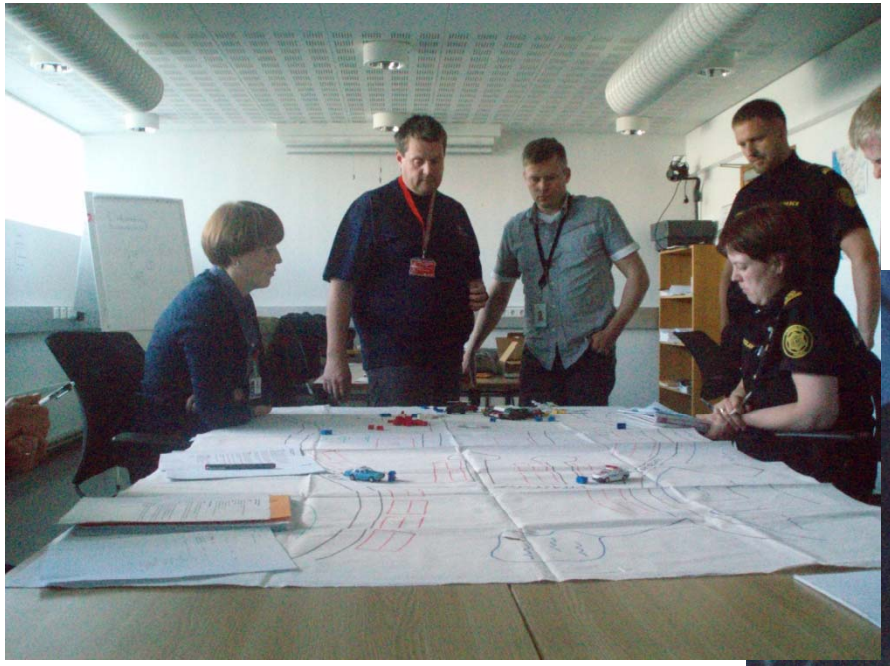
Everyday accidents

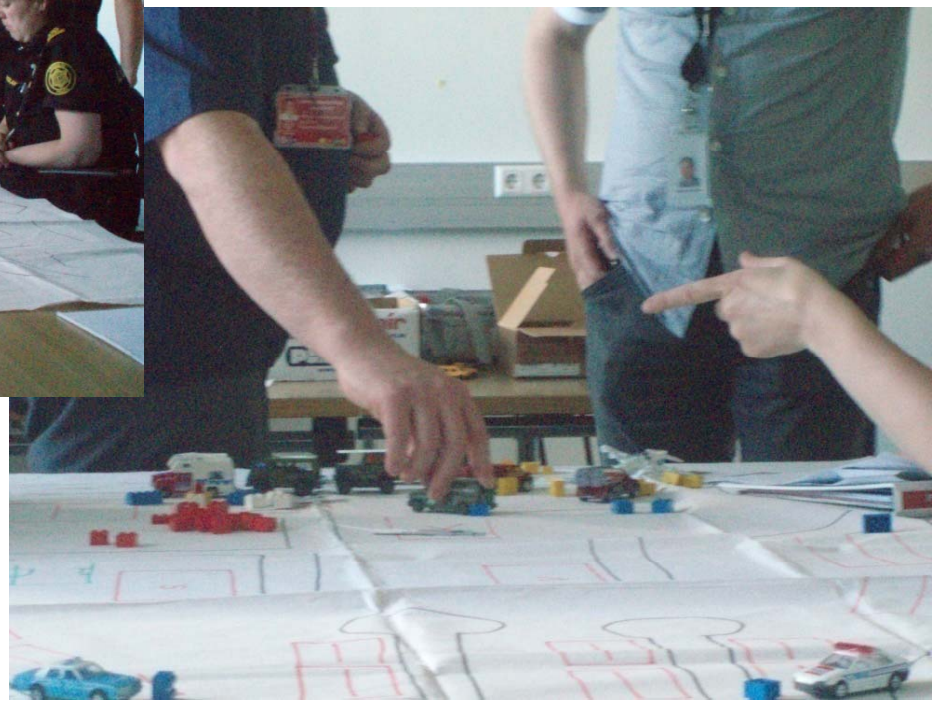
Classroom learning

Trainees

Exercise managers

Table-Top Exercises



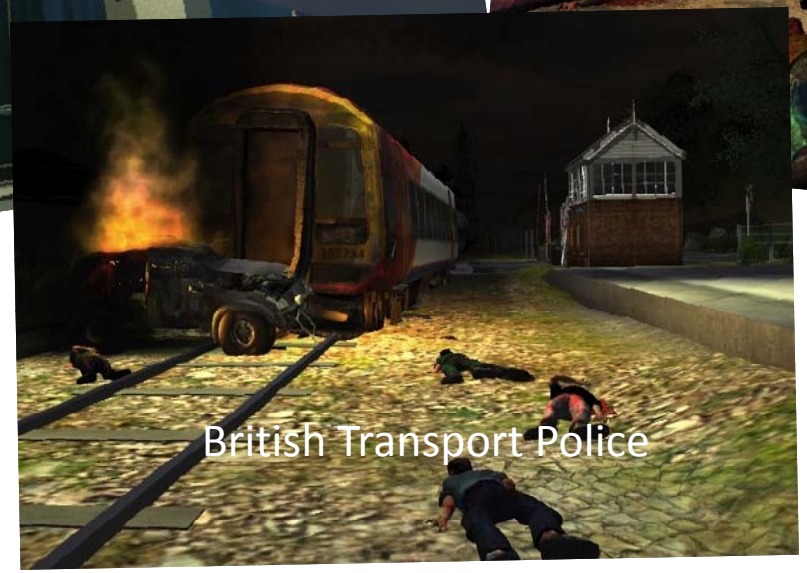


Live Exercises

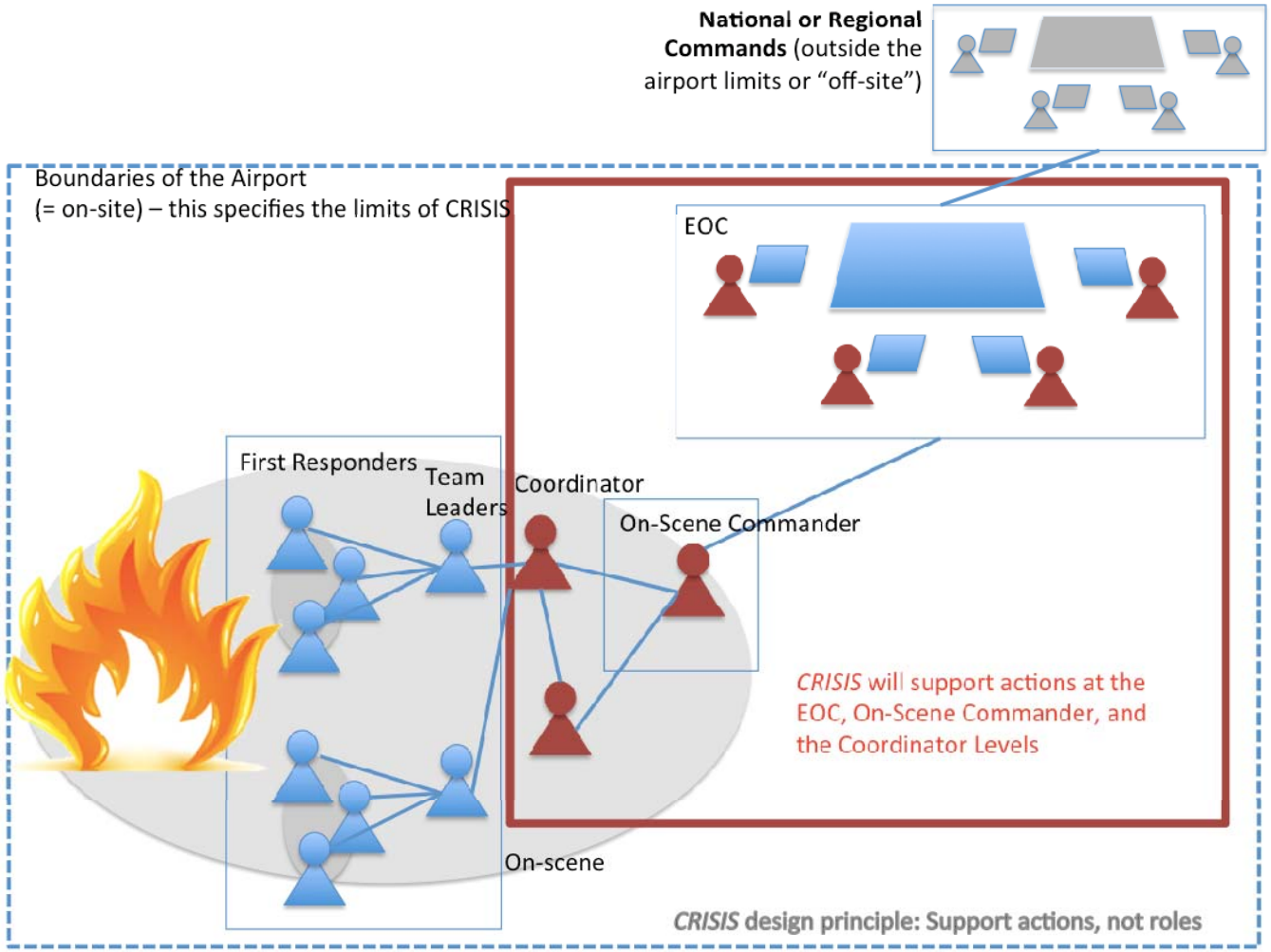
Why CRISIS?

- Complements and enhances conventional training:
  - -- classroom teaching
  - -- table-top exercises
  - -- role-play simulations
  - -- live exercises
- Cheaper (can be)
- More frequent/ad hoc/self service training
- Easier to replicate training setups
- Easier to apply controlled variations to training

CRISIS end-user partners



Scope of the CRISIS simulation environment



Modes of Training

	Co-Located	Distributed / Dispersed
Individual	**MODE 1** **Avatars** (other team members simulated by the system and presented on the display)	Not applicable
Team	**MODE 2** **Real players** Real players acting in a simulated environment	**MODE 3** Real players at different locations connected through computer display; partaking in an actual or simulated exercise

Team training approaches

1. Trainer led [Fully implemented]

- Trainer delivers scenario
- Emergency response team role plays
- Operator manages the simulation software
- Trainees typically on one site
- Trainer debriefs trainees

Team training approaches

2. Automated [Under development]:

- Software delivers training scenario
- Trainees interact via the software
- Trainees may be distributed
- Software gathers data on trainee communications, actions and decisions
- Software facilitates provision of reports for after-action reviews

General characteristics of CRISIS

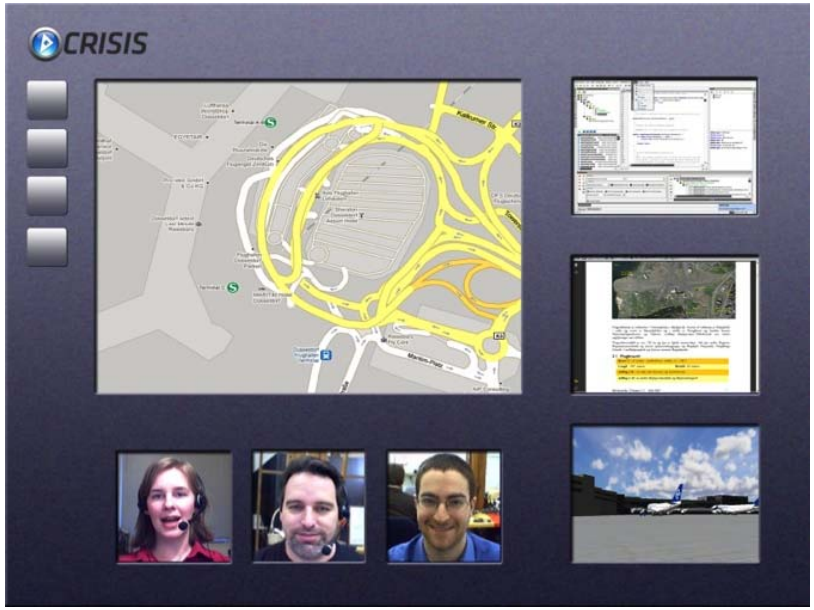
- Realism – physical & response fidelity, plausibility
- Highly interactive environments
- Real-time decision making
- Two complementary perspectives…

Two trainee perspectives

Field operations (FDX)

First-person:
Immersive, first responders

Command post (CPX)

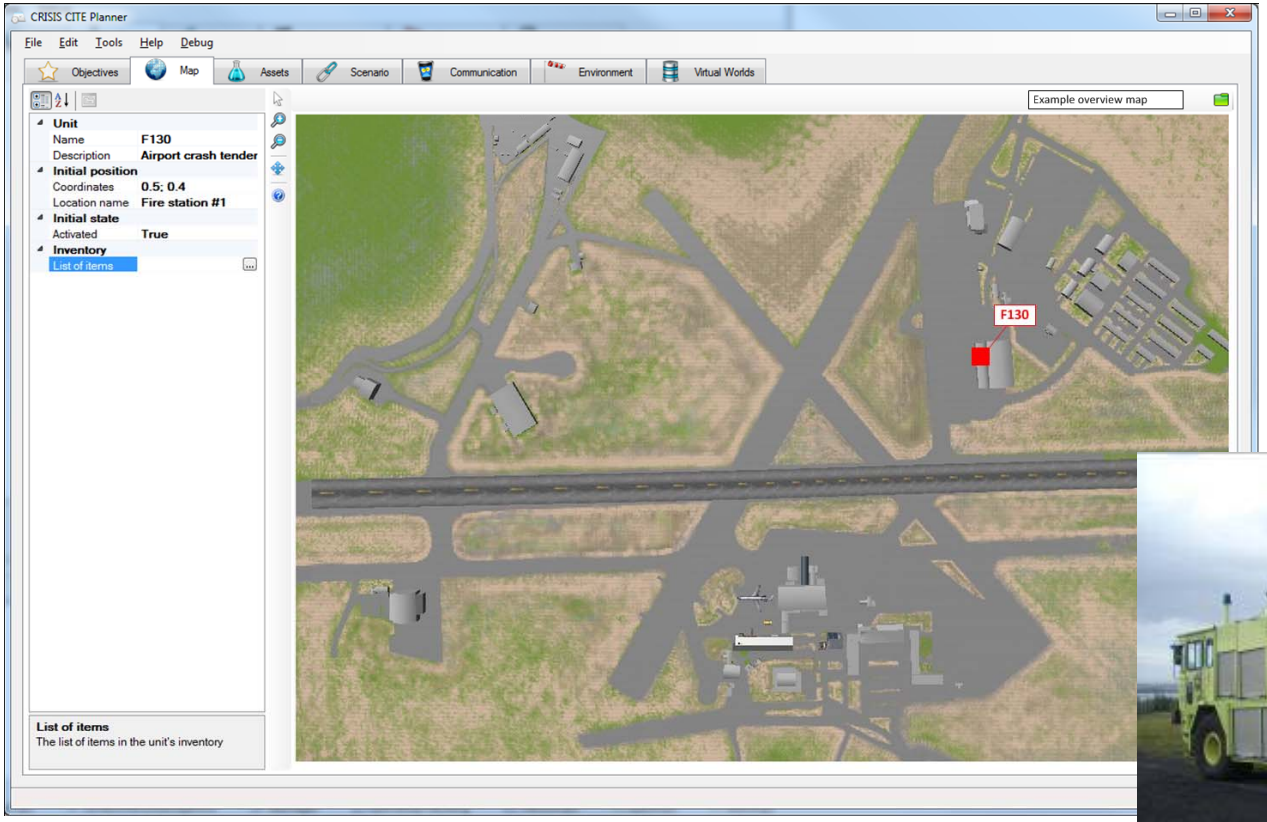


Third-person:
Synoptic, commanders

Field operations viewpoint

TruSim Triage Trainer

Command post viewpoint



General characteristics of CRISIS

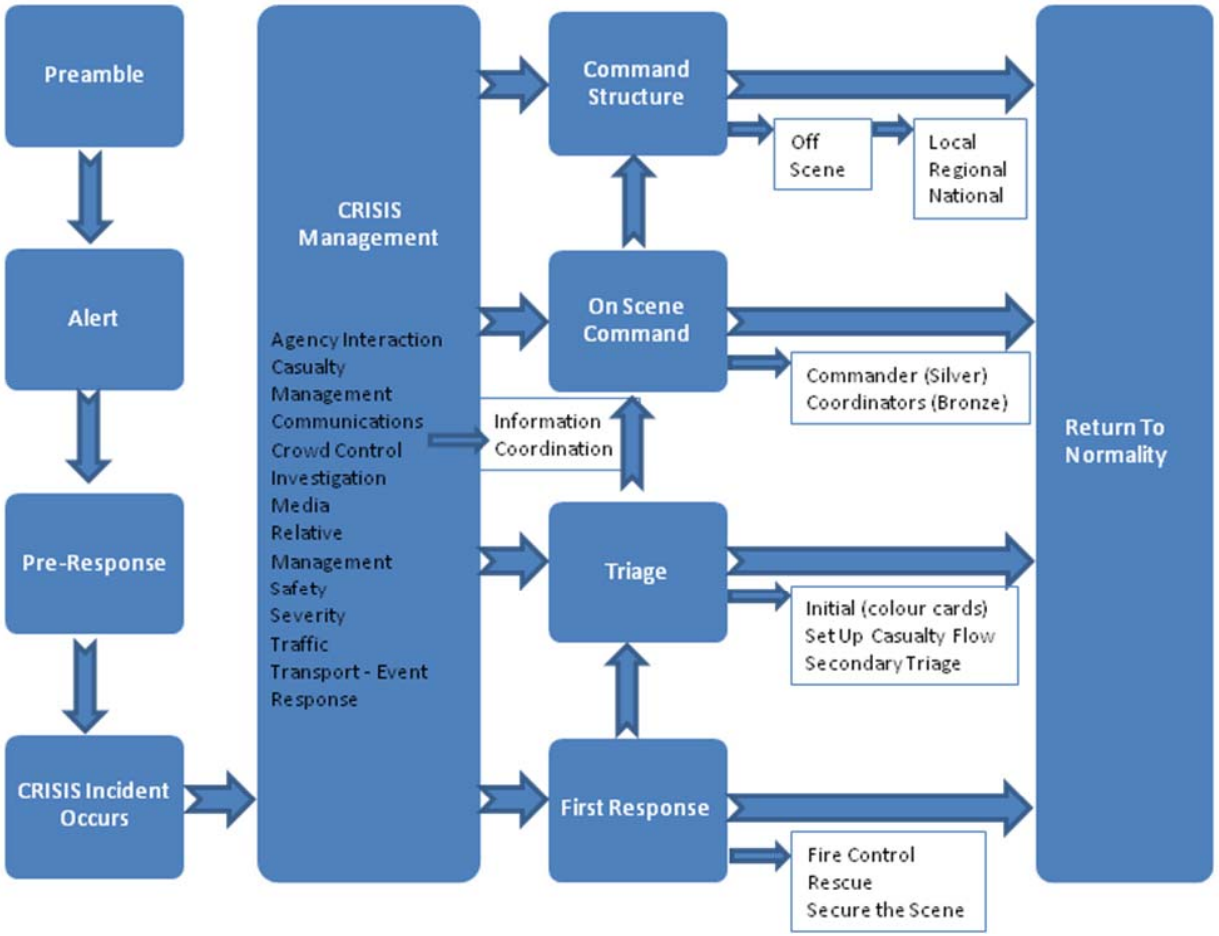
- Realism – physical & response fidelity, plausibility
- Highly interactive environments
- Real-time decision making
- Two complementary perspectives
- Interaction and movement between the two during training sessions
- Pre-prepared scenarios & injected events (VUF)

Scenario design methodology

Aircraft crash scenario

investigation scenario

Bomb threat scenario



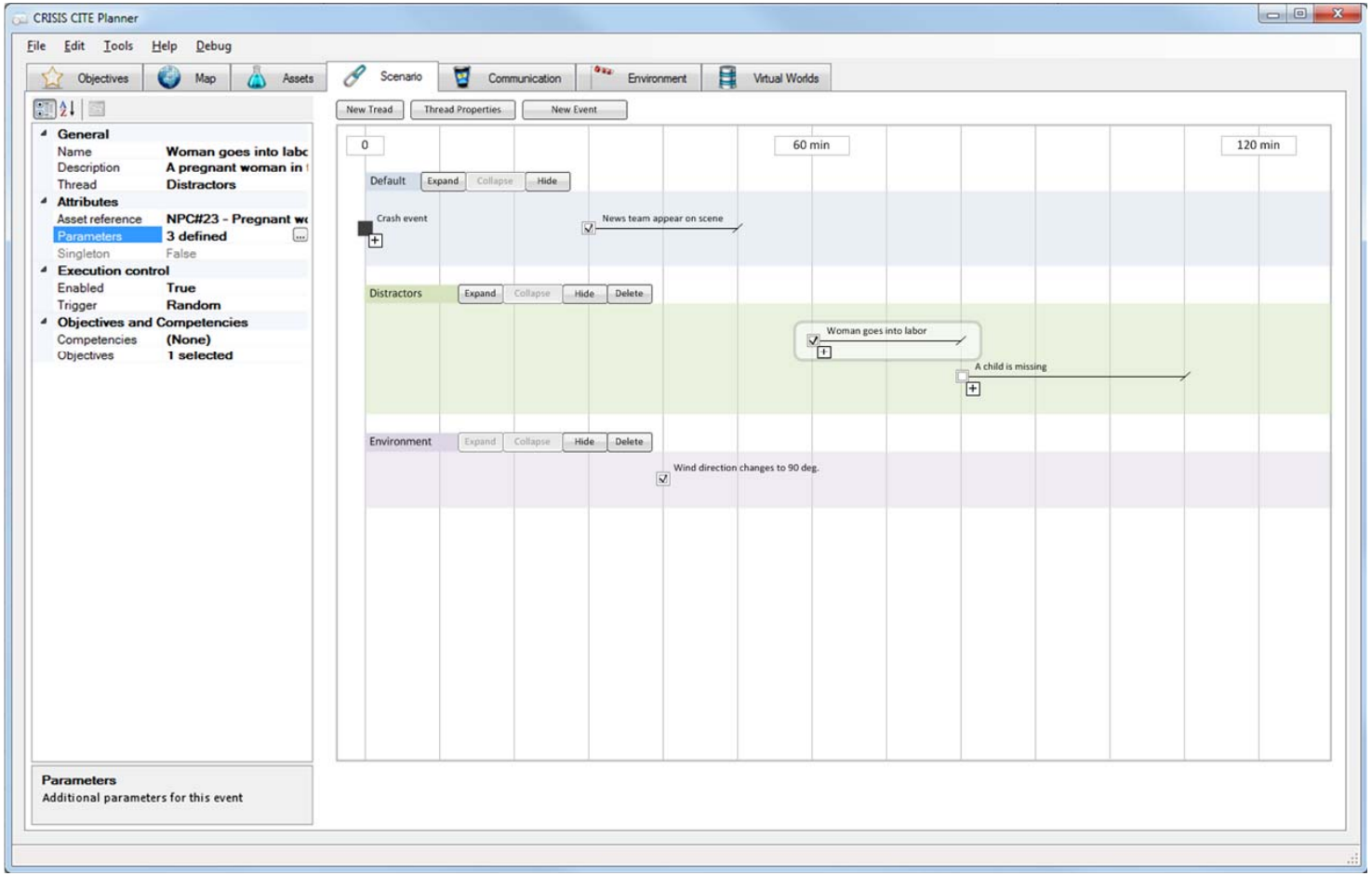
Scenario storyboarding

ISAVIA Scenario

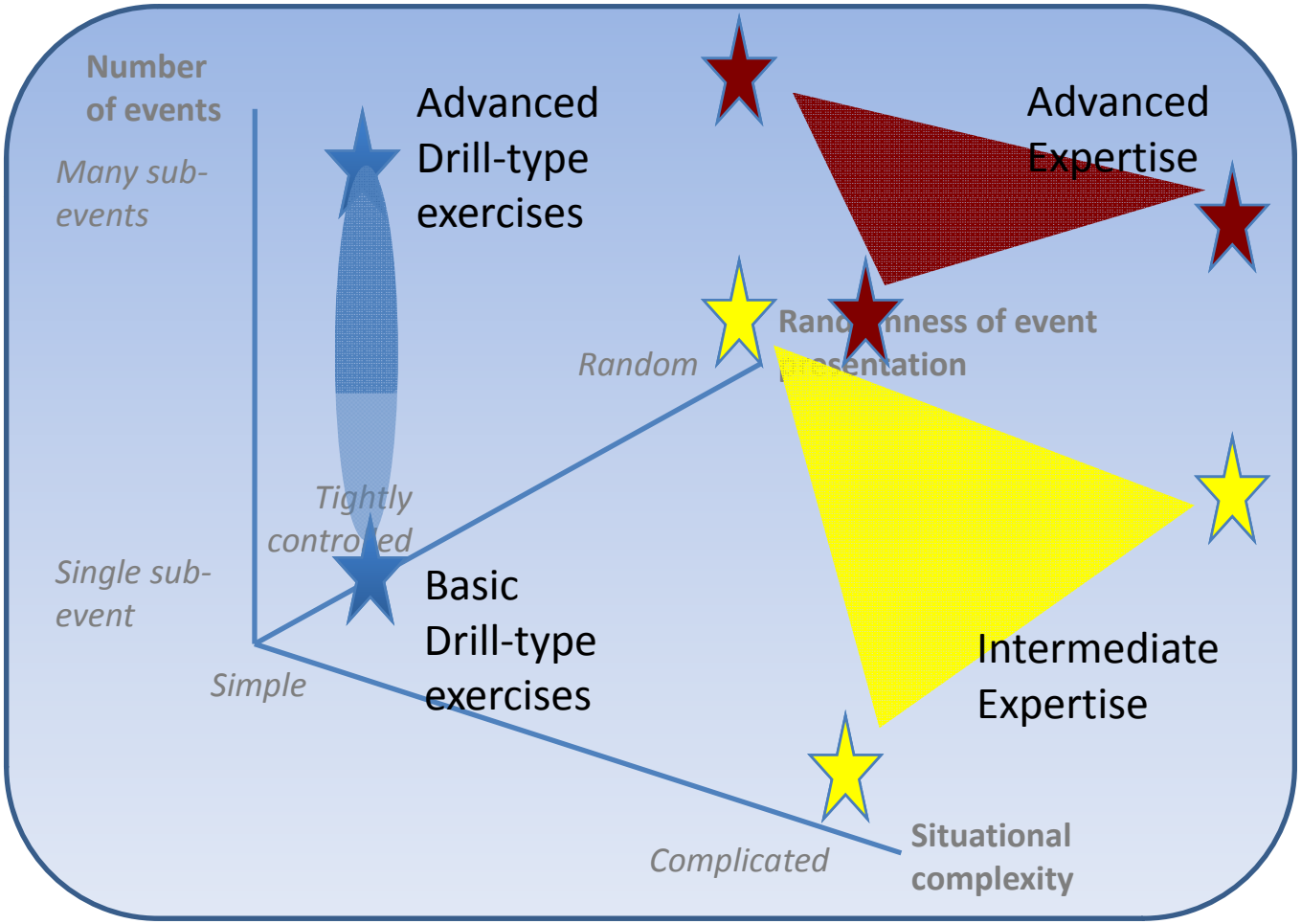
ANA Scenario

BTP Scenario

Scenario design tool



Variable Uncertainty Framework



CRISIS training approaches

- Training, demonstrating and testing
- Repeat training (mastery) and varied training (transfer)
- Part-task and whole-task training

Based on 4C/ID model

(van Merriënboer, J. J. G. (1997) *Training Complex Cognitive Skills: A Four-Component Instructional Design Model for Technical Training*)

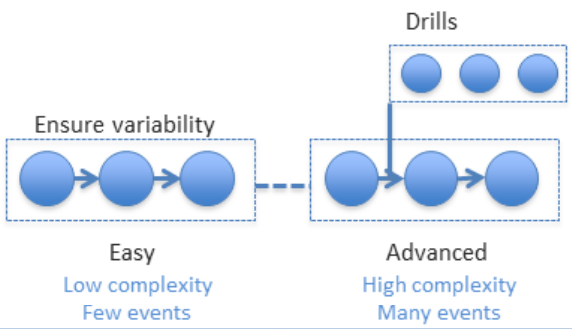
Training design methodology

1 Training Requirements

1. Understanding the Operational Task, including:
   a) Tasks
   b) Complexities
   c) Variabilites
   d) Difficulty/Importance/Frequency (DIF)
2. Identify Required Competencies, including:
   a) Learning difficulty
3. Identify Training Gaps, including:
   a) Entry/Exit criteria
   b) Training objectives

2 Syllabus Design

Identify task classes



3 Exercise Design

1. Plan each exercise
   a) set level of complexity
   b) set level of variability
   c) select objectives (competencies)
   d) outline scenario, ensure relevant tasks included

4 Scenario Generation

Convert task classes into scenario timeline using CITE Planner

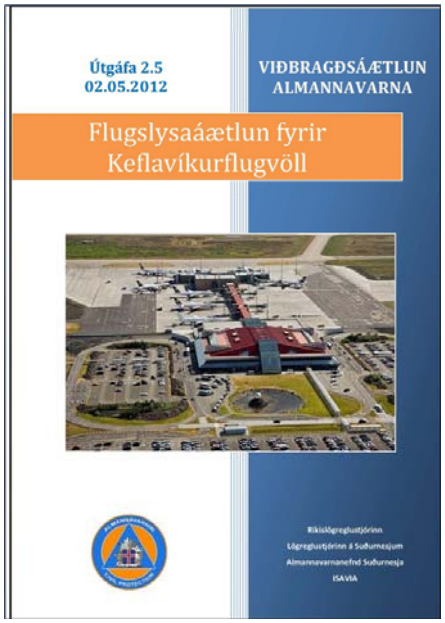
1. Drill - Few events, small random windows, low complexity
2. Whole tasks
   a) Easy – Few events, large random windows, low complexity
   b) Intermediate – Moderate number of events, large random window, moderate complexity
   c) Advanced – Large number of events, large random window, high complexity

Understanding decision making

- Information sources:
  - -- published literature
  - -- airport emergency plans
  - -- interviews with end-user partners
  - -- observation of live training exercises
- Design CRISIS to enable effective decision making dynamics
- Use CRISIS to evaluate virtual training

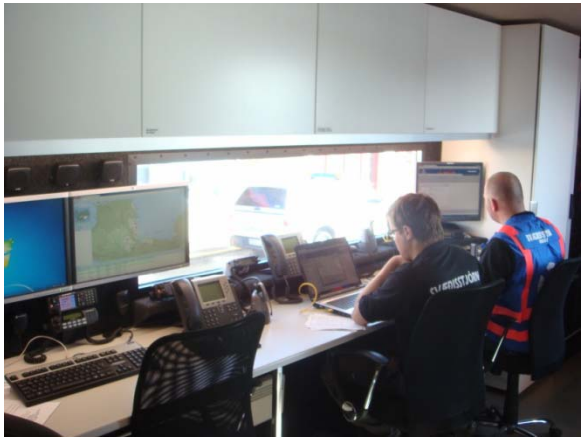
Case study: Live exercise

- 4-5 May 2012 -- major live exercise at Keflavik international airport, Iceland
- Scenario: Aircraft crash lands and bursts into flames
- NOT a training event -- demonstration of competence in operationalising Airport Emergency Plan (ICAO)
- Preceded by table-top simulation exercise by team commanders on previous day
- Involved some 200 personnel



Day 1: table-top exercise

- A dozen key team leaders in planning room for 2 hours around table-top airport map
- Radio communication with on-scene command centre
- Presented with scenario at outset
- Interactions closely observed and recorded



Day 1: table-top exercise

Day 1: table-top exercise

- Usual team dynamics:
  - -- dominant vs quiet individuals
  - -- talking vs thinking vs action taking
  - -- explicit vs implicit communication
- Significance of map and moveable ‘toys’
  - -- focus of interactions/discussions/debates
  - -- outcome/record of group decision making

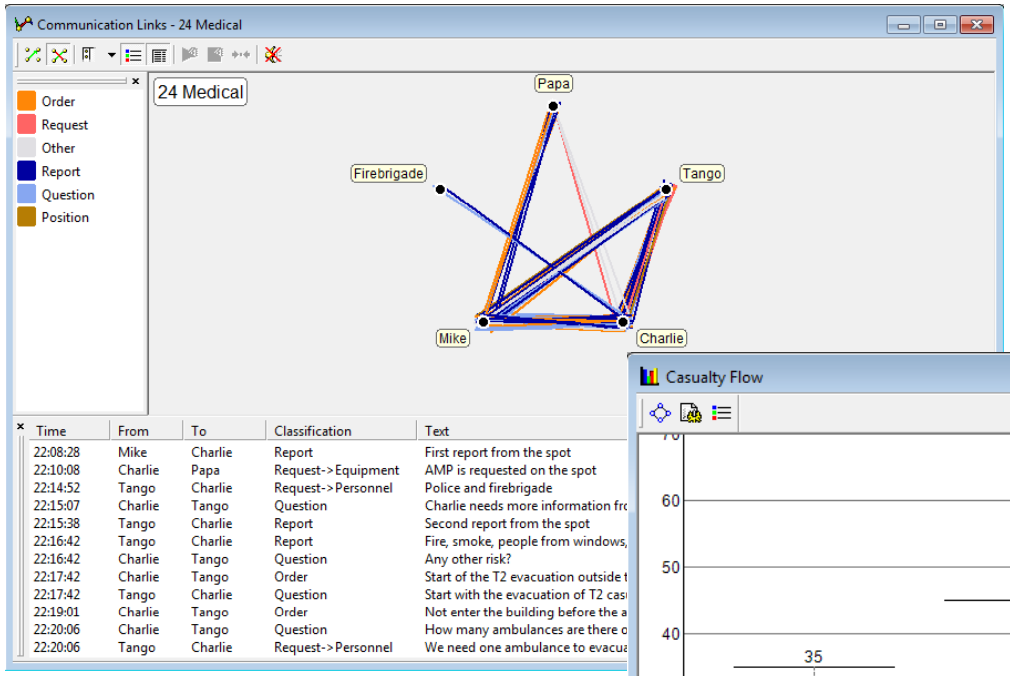
Day 2: live exercise

- Scores of ‘actors’ role playing aircraft passengers
  - -- walking wounded, dead, unharmed, etc.
- All major emergency agencies represented
  - -- fire, ambulance, police
  - -- hospitals
  - -- mountain rescue
  - -- trauma counsellors
- Multiple communication systems
  - -- radio, cellphone, face-to-face, etc.
- Three major venues:
  - -- crash scene
  - -- casualty treatment centre
  - -- hospital (School)

CRISIS

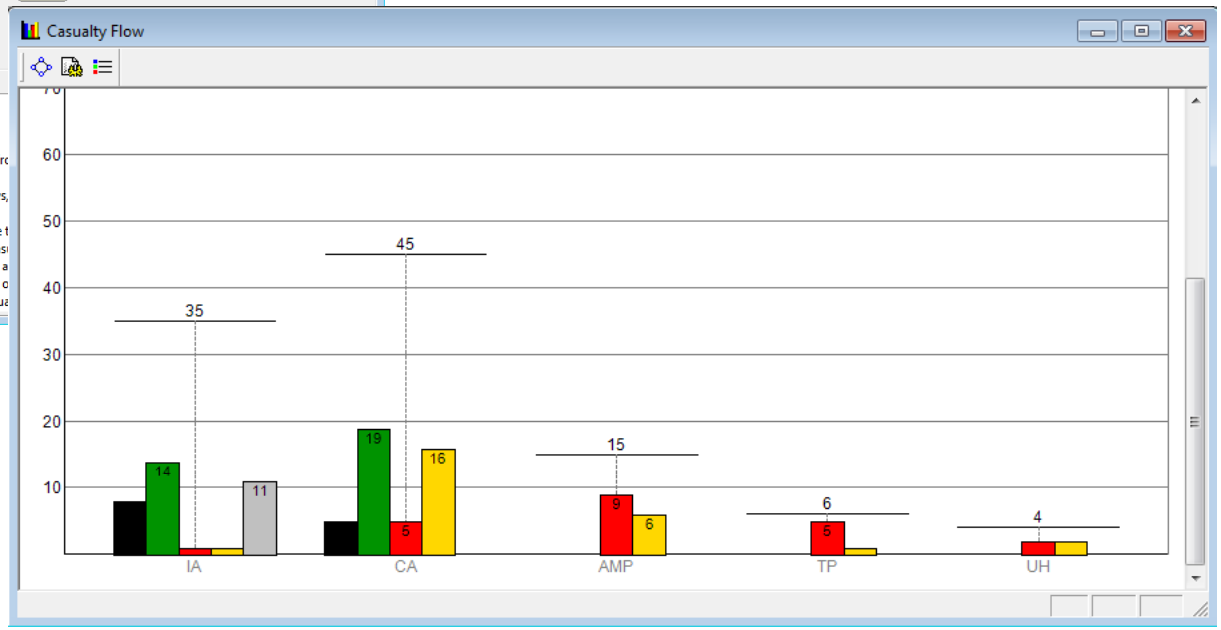
CRISIS

After-action review

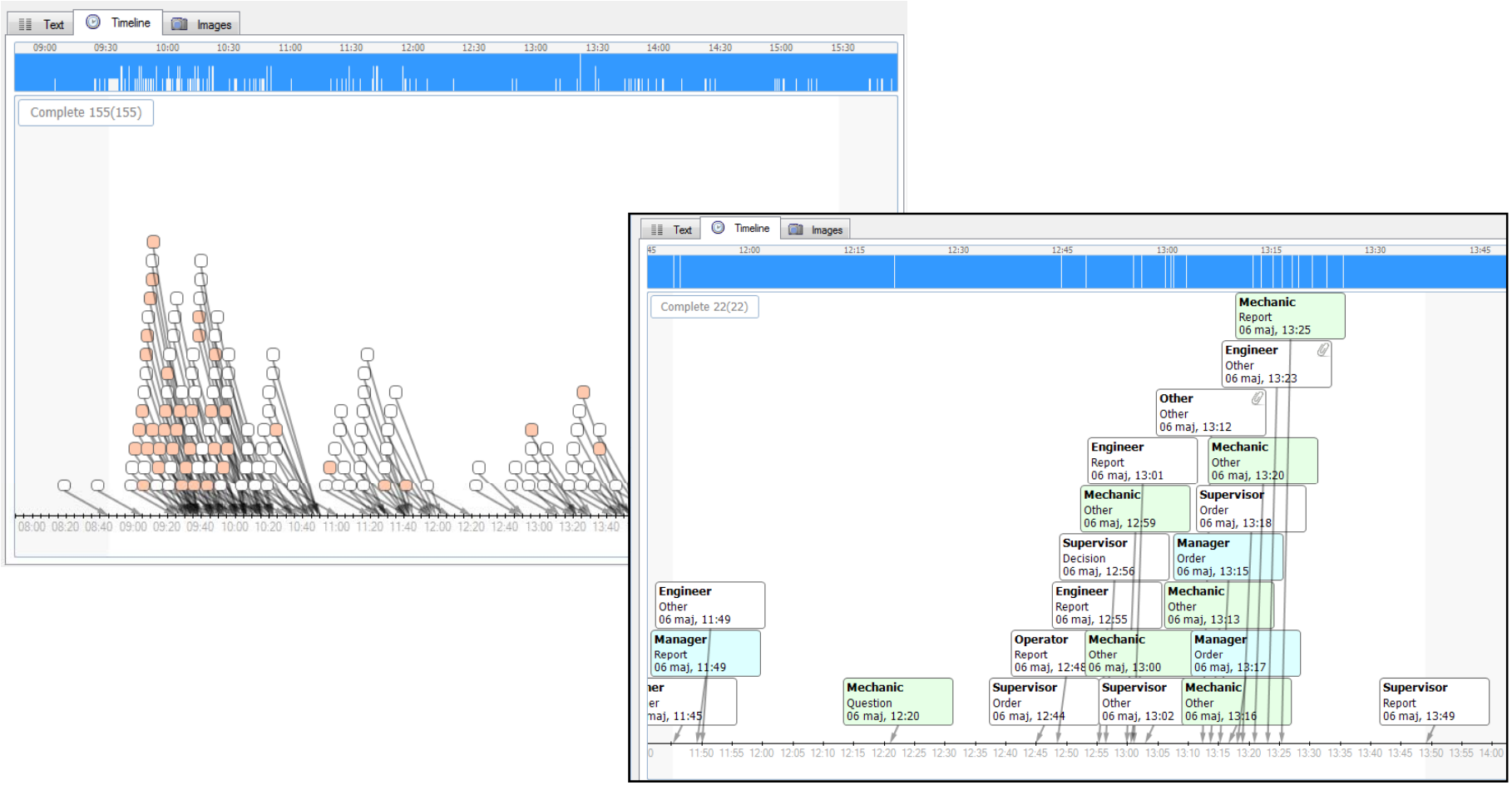


Communications network

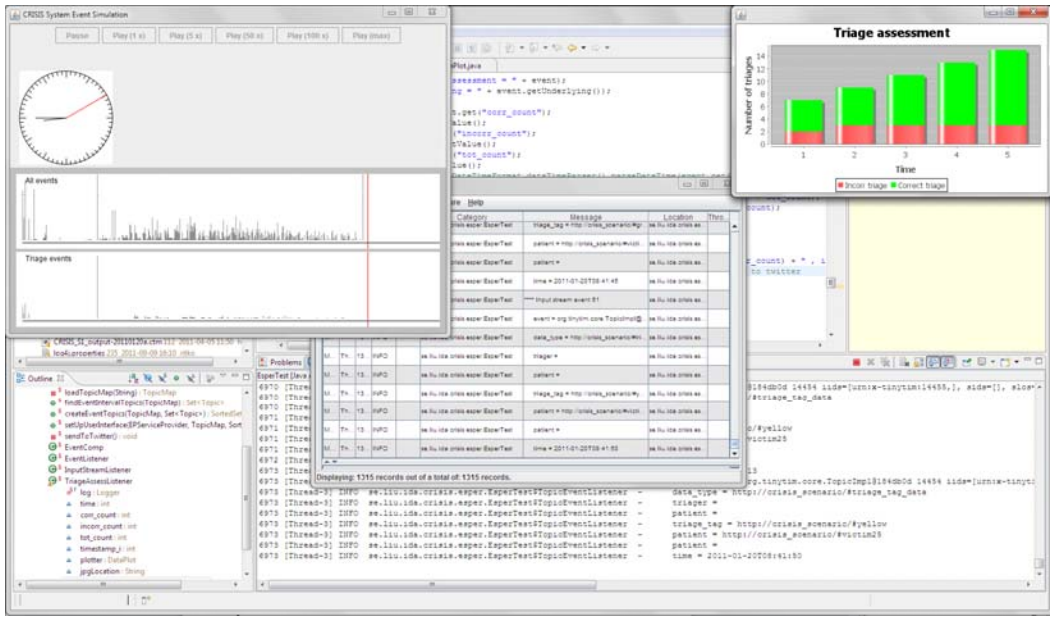
Casualty flow

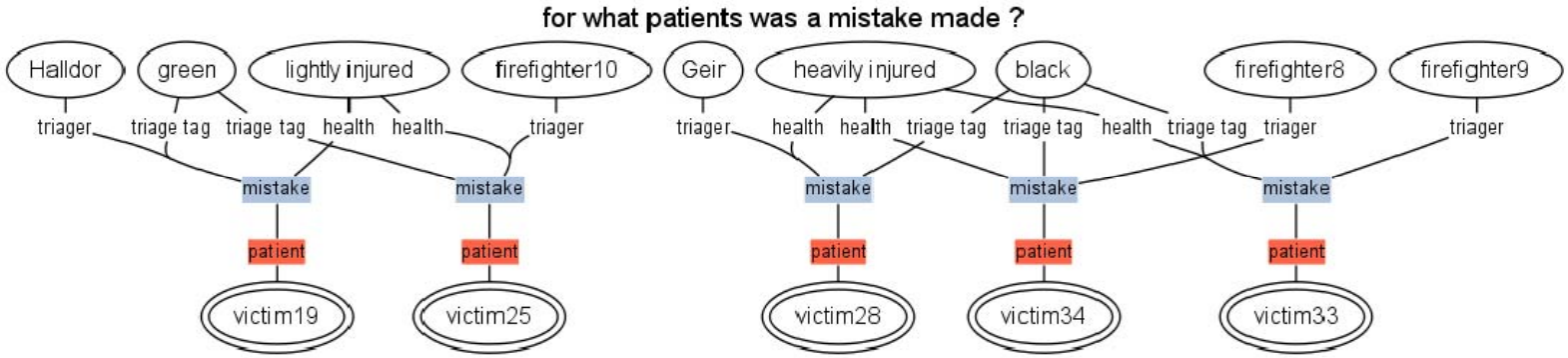


Decisions: timeline views



Topic maps summaries





Hypotheses from the literature…

Research Report

aps ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Psychological Science
23(3) 219–224

DOI: 10.1177/0956797611429132
http://pss.sagepub.com
SAGE

The Cost of Collaboration: Why Joint Decision Making Exacerbates Rejection of Outside Information

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Abstract

Prior investigators have asserted that certain group characteristics cause group members to disregard outside information and that this behavior leads to diminished performance. We demonstrate that the very process of making a judgment collaboratively rather than individually also contributes to such myopic underweighting of external viewpoints. Dyad members exposed to numerical judgments made by peers gave significantly less weight to those judgments than did individuals working alone. This difference in willingness to use peer input was mediated by the greater confidence that the dyad members reported in the accuracy of their own estimates. Furthermore, dyads were no better at judging the relative accuracy of their own estimates and the advisor's estimates than individuals were. Our analyses demonstrate that, relative to individuals, dyads suffered an accuracy cost. Specifically, if dyad members had given as much weight to peer input as individuals working alone did, then their revised estimates would have been significantly more accurate.

Keywords

decision making, judgment, dyads, advice taking, egocentric discounting

Hypotheses from the live exercise…

Questions..?

Thanks for listening!

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