ADVANCED TRAINING ENVIRONMENT FOR CRISIS SCENARIOS

The PANDORA project is developing a novel digital support environment and crisis simulation system to enhance and expand training exercises for Gold Commanders in crisis management.

Gold Commanders are specifically engaged in the development of strategic plans to deal with a wide range of potential crisis situations that can arise in civil society. These crisis situations could be natural events (e.g. extreme weather, earthquake, landslides), transport events (e.g. plane, train or vehicle crashes), service failures (e.g. electrical power plant failure, water supply failure), health crises (e.g. pandemics, epidemics, containment conditions), technology failures (e.g. breakdown of automated control systems, central services), policing and terrorism events, and combinations of some or all of the above.

In order to develop strategic plans to deal with such situations, individuals who carry executive responsibility for the services and facilities identified as strategically critical within these situations are expected to work together to generate them. These individuals are identified as Gold Commanders, and their role is explicitly strategic rather than tactical (Silver) or operational (Bronze), although in practice some individuals may also have tactical or operational responsibility.

For the training offered to Gold Commanders, the focus is on strategic planning of the response to the crisis as it develops rather than operational activities. Currently, the model of training offered to these individuals consists of group-based, table-top activities led by an expert trainer. The bulk of the information provided to the trainees is paper-based, with some limited audio-visual input, and the activities take place during an intensive, time constrained training event. These events can take place in a dedicated training environment or in a standard meeting room at a Gold Commander venue, as required. The purpose of these training events is:

- To develop the collaborative skills of the trainees in formulating strategic responses across a number of organisations and events
- To develop the strategic thinking of the trainees in considering the implications of their decisions and the effects on other services
- To develop the responsive skills of trainees in developing alternative stratagems and remediating actions in the event of the failure of a strategic response
- To determine the strategic planning ability, decision-making capability, flexibility and capability under pressure of the trainees

However, the existing training model has severe limitations in achieving these goals, and is almost entirely dependent on the ability of the trainer to engage and motivate the trainees, and to assess their performance subjectively in the training event.

PROJECT FICHE

Project Full Title:
Advanced Training Environment for Crisis Scenarios

Contract Number:
FP7-ICT-2007–1– 225387 – PANDORA

Area/Strategic Objective:
Security systems integration, interconnectivity and interoperability: Modelling and simulation for training (ICT-SEC-2007-1.0-02)

Duration:
January 2010 – March 2012

Consortium:

- Business Flow Consulting
- ORT France

- CEFRIEL
- Fondazione Ugo Bordoni
- CNR, National Research Council of Italy, ISTC

- XLAB

- Emergency Planning College
- University of East London
- University of Greenwich (Coordinator)

Contact Details:

Liz Bacon
University of Greenwich
Email: E.Bacon@gre.ac.uk

www.pandoraproject.eu

The PANDORA system addresses the shortcomings of the existing training model, enhances the range and scope of the training events, and offers the potential for future development by:

- Offering a fully-featured multimedia environment to provide information to the trainees, including audio, video, maps, texts, email, graphics and text
- Developing a structured, timeline-based, sequence of events, crisis scenario model running in a computer-based simulation environment controlled by the trainer
- Providing real-time operational inputs demonstrating strategic decision outcomes to trainees, asking them to dynamically revise strategic plans and decisions
- Capturing trainee behaviour and emotional state, through the use of pre-event information capture, direct sensor inputs, self-reporting by trainees, and trainer inputs, and using affective media effects to induce changes to those behavioural and emotional states
- Providing a graphical virtual representation of the training environment to support on-line distributed training events
- Providing virtual characters, in any form from textual through to full animation, to engage in the event, including replacements for missing trainees, to ensure the full scenario enactment is supported in all training events
- Providing the trainer with a full control system for the training event, including the ability to change events, add new events, expand and compress timelines, provide direct interventions into the scenario, and increase or decrease the emotional stress applied to individual trainees
- Maintaining a detailed log of the training event, to permit rerun of some or all events, modelling of individual trainee performance, and capture of relevant and useful events as exemplars for future training
- Maintaining configurable scenario models, knowledge, multimedia asset and databases to enable the system to build a wide range of crisis scenarios, to use as training events for those involved in crisis management at all levels

Preliminary Results

To-date Pandora has focussed on the development of an initial prototype for the gold commander crisis training system, reflecting a well established set of user requirements and grounded firmly in the existing state of the art in this sector.

Initial work was based on a detailed survey of existing systems and training mechanisms for crisis management across the globe, and a state of the art report was produced that will, as a project output, be of considerable value to others working in the sector. Alongside this work, the project team worked with the internal end user organisation, and surveyed a number of national organisations through partner contacts, to develop a detailed user requirements specification. From this specification a detailed set of functional and non functional technical requirements were generated for the project and those fed into an architectural specification.

Following the production of the outline architecture, project partners worked on the development of the component sections of the overall Pandora system. This work has produced a number of components, which have been integrated into Pandora. The components which make up the initial system are:

- **The Behavioural Framework** – This considers the behaviour of trainees, based on a pre-determined user model, and feedback from a variety of sensors and the trainer during the training session. This component shows for the first time how a complete loop crisis-stimuli/trainee-reaction/Pandora-behaviour-analysis can be implemented and shown to work in a training environment.

- **The Trainer Support Framework** – this provides a dynamic Run Time Interaction Environment for the trainer to set up a training session, configure and manage the training scenario both prior to the start of the training session and dynamically during the training.

- **The Crisis Simulation Framework** – provides an event network to model a crisis scenario against a timeline, supporting the management of the training process including the introduction of decision points for trainees incorporated into events within the crisis scenario. The trainer, through the trainer support framework, has the ability to expand and compress the timeline, and to interject additional events, to customise a training session. Event network planning and mapping to timelines is managed through a knowledge-based approach, utilising rules stored in the crisis knowledge base.

- **The Emotion Engine** – is a middleware component within the Pandora system, providing facilities for the development, configuration and introduction of non-playing characters (NPC) into the crisis scenario to interact with the trainees, and multimedia information assets, tagged for emotional affect. The NPC framework also permits the trainer to take control of an NPC to provide direct inputs, in specific events, to the trainees. The Affective Framework, which is a sub-component of the emotion engine, manages a repository of affectively tagged multimedia assets, and uses inputs from the behavioural framework and local mashup rules to produce combinations of those assets to provide emotionally and behaviourally affective information to the trainees. The output of the Emotion Engine, generated through the Environment Framework Builder, is a rendering specification describing the environmental conditions, multimedia information assets and NPCs to be generated in the training environment.

PANDORA AWARDED BEST SYSTEM DEMONSTRATION AT ICAPS 2011

On the 11-16th of June 2011, the PANDORA project members participated in the 21st International Conference on Automated Planning and Scheduling (ICAPS 2011) held in Freiburg, Germany. The planning technology used as a backend engine in PANDORA has been described in a talk at the SPARK Workshop (the ICAPS workshop on Planning and Scheduling applications).
The PANDORA demo participated in the System Demonstration track and was awarded the First Price as the Best System Demonstration.
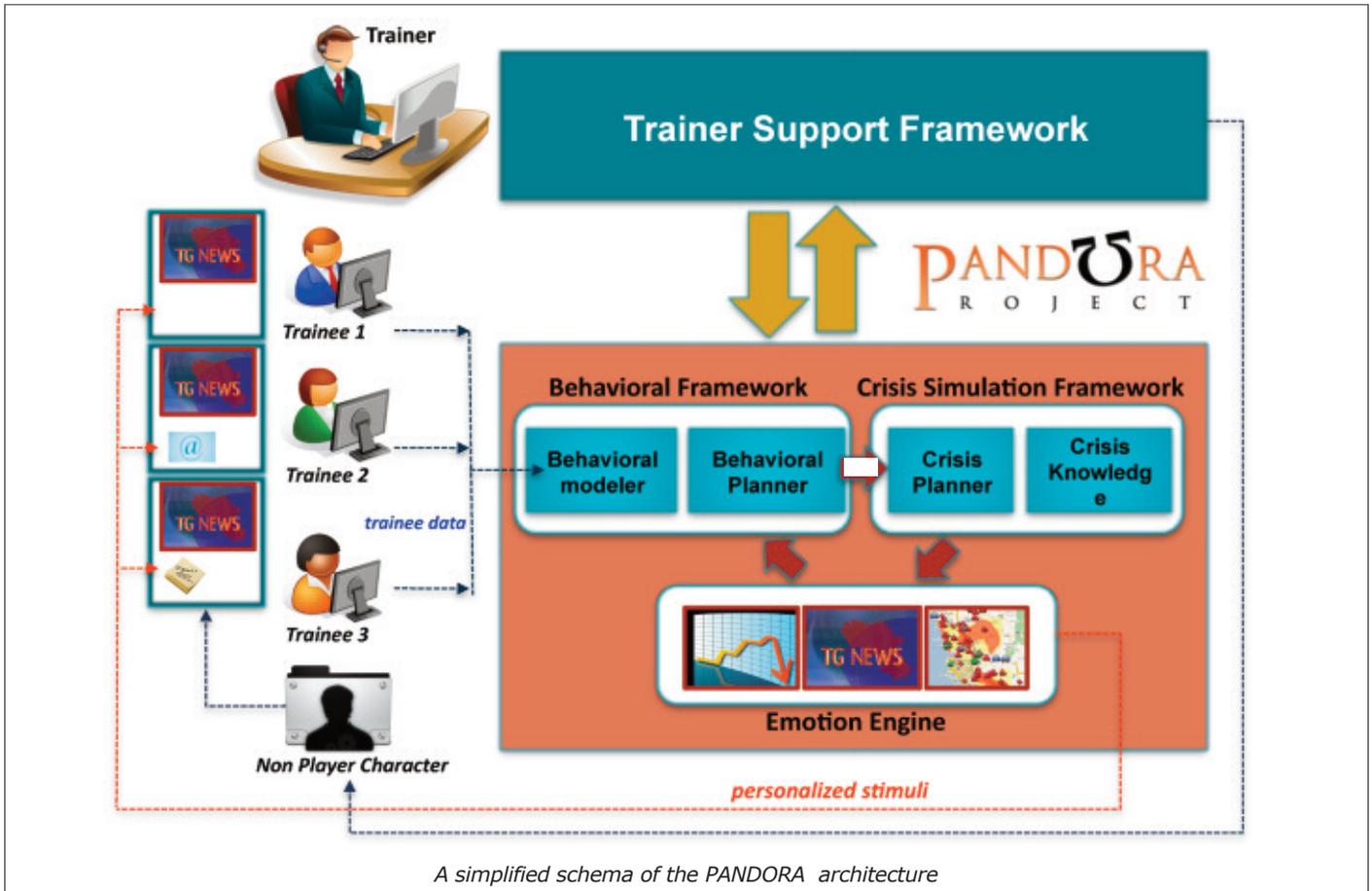(see http://icaps11.informatik.uni-freiburg.de/demos for further info)
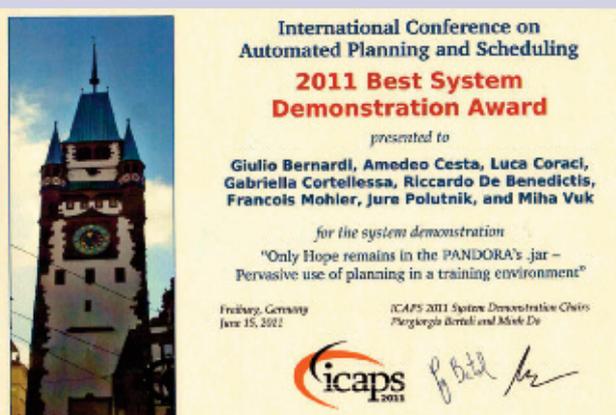
The award certificate for the Best System Demonstration at ICAPS 2011

Amedeo Cesta giving the PANDORA talk at the SPARK workshop

A simplified schema of the PANDORA architecture

- **The Emulated Crisis Room** – is in essence the trainee environment, since the rendering of the information generated from the other components is realised within this component. The Crisis Room is modelled on a physical environment, derived from end user input and existing state of the art crisis management systems, and can be deployed in a physical, virtual or distributed mode. Work on this component is going to be integrated with the other functionalities and a separate distributed system demo has also been produced.

Integration of the above components is being managed through a middleware model that has been developed for the project, and various test beds and test harnesses have also been constructed specifically to meet the needs of the Pandora system.

NEXT STEPS

During the next months, PANDORA project will be focused on the following steps:

- **End of October 2011:**
  Intermediate Evaluation 1 (Paris, France)
- **End of November 2011:**
  Intermediate Evaluation 2 (Rome, Italy)
- **Mid of December 2011:**
  Final version of PANDORA system ready
- **End of January 2012:**
  Final Evaluation Week (York. UK)

A final event for the dissemination of the project results will be held in the United Kingdom at the beginning of March 2012.