Periodic Report Summary - CRISIS (Critical incident management training system using an interactive simulation environment)

Project context and objectives:

The Critical incident management training system using an interactive simulation environment (CRISIS) is a 36-month, 12-partner project which aims to conduct a research and develop a train-on-demand simulation platform for crisis management training. It will first train responder supervisors and emergency operation centre commanders, in real-time decision making and response to simulated critical incidents in virtual world replicas of airport and railway settings. CRISIS will support both collocated and distributed training across different emergency service organisations. CRISIS addresses the problem of infrequent crisis management training. Full-scale exercises are often conducted every two or three years, with two to three small scale exercises each year, as they are expensive to run and can significantly inconvenience the public.

The project started in May 2010, with a series of iterative user studies and participation in emergency exercises at Reykjavik Airport (Iceland), Lisbon Airport, Caiscais Aerodrome (Portugal), and at the British Transport Police (UK). Training scenarios are being developed and used to specify the interactive virtual world, to be developed in Unity3D, an advance commercial video game engine. Using this engine, CRISIS will be designed to enable individuals, teams, and teams from different emergency service organisations to train together in an immersive multi-player environment.

Project results:

The work during Work package (WP) two included the definition of a generic scenario writing methodology. This method was used to analyse the exercises and operational procedures at end users and compile the reference scenarios that will be used in the remainder of the CRISIS project. This method established the basic stages of the crisis management response to an accident or incident that are included in the training.

The operation and training analysis in WP2 contributed to the definition of generic competency profiles for each of the three key responsibility areas within the crisis management team: the first responders, coordinators and commanders. These competency profiles were supported with an analysis of crisis management team literature and an initial validation with the end users. The competency profiles form the basis of the training analysis and are used to identify the primary training objectives for the crisis management team within the training concept for CRISIS.

The analysis of the emergency procedures, regulations, and operational organisation at each end-user was used to compile a generic crisis management organisation description. This generic organisation was supported by the literature review of crisis management teams.

WP3 has laid down a new approach for customer specification of exercise and emergency management drills that is based on the ‘A five-step method for extracting functional requirements’. This method bridges the gap between users and developers using storyboards in training systems design.

The requirements and the high-level architecture for the Secure integration platform (SIP) have been defined. It will allow a flexible and secure integration of the core components of the CRISIS systems, additional analysis and decision support tools and also external C2 systems. The SIP allows the integration of advanced concepts like Complex event processing and semantic technologies.

Work models and mind maps for crisis management scenarios (aircraft incident, bomb threat, train crash) have been created to find out common tasks and differences across incident types and crisis management systems and which have greatly aided the understanding of the partners for each scenario.

Interactive PowerPoint presentations have been developed to demonstrate the end-users different solutions and technologies for parts of the CRISIS system. This was followed by the development on mock-ups using the Unity game engine that showed how the end users could interact with the Field Exercise (FDX) and Command post exercise (CPX) environments.
Preliminary results from the work on natural interfaces was reported at the CRISIS consortium workshop in Sweden, January 2011 (WP6 Interim Findings Workshop) and a workshop at the CHI Conference, 2011. MU will present results from the work on startle points at ISCRAM 2011 (Lisbon, May 2011) and NDM (Orlando, June 2011).

AES co-authored the paper Startle points: A preliminary framework of decision making during uncertainty, accepted by NDM 2011, and co-authored the paper Startle points: Identifying situational cues, and their implications for developing realistic emergency training scenarios, accepted by ISCRAM 2011. AES authored the position paper: Assessing Stress in Immersive Training Environments, presented at NordiCHI 2011. Furthermore, the work by AES was reported at the WP6 Interim Findings Workshop in Sweden, January 2011. The integration of topic maps and rule-based reasoning is a novel contribution to especially the topic-map knowledge-representation field. This integration will form the framework for design of decision and knowledge-management tools for crisis managers. We plan for a publication of this result detailing the integration approach. Preliminary results from the work on decision support and the integration of topic maps and rule-based systems were reported and discussed at the CRISIS consortium workshop in Sweden, January 2011 (WP6 Interim findings workshop).

The off-line integration of topic maps data and a rule engine was achieved. A question answering system was adapted to the ontology model, and the integrated system was demonstrated to partners and end users. Preliminary results from the work on decision support and question-answering systems were reported at the CRISIS consortium workshop in Sweden, January 2011 (WP6 Interim findings workshop). We intend to publish papers on the rule integration, and on using a domain-specific language for defining training expectations.

HI has organised crisis-management data collected from end users into work models. The models were consolidated across incident types and crisis systems in order to find similarities and differences crisis management. Results can be used as a basis for the development of the CRISIS simulator and for further research on natural interactions in CRISIS.

The results have been presented in two conference papers (ISCRAM and HCII) and one workshop presentation (NordiCHI WS). Additionally, another conference paper is under review (Interact). Furthermore, the progress was reported at the WP6 Interim findings workshop in Sweden, January 2011.

The main results of Tasks 7.1 and 7.2 are the preliminary overall architecture, and the first prototypes of the information flow DSL, the protected model repository and the access control system for secure publish/subscribe.

In Task 7.2, the prototype of the natural language question answering interface for the ontology was demonstrated by SAS in the January research meeting, because the entire prototype also involved a research element in connecting the data layer to a rule engine layer. Since then work has continued on scalability. There are no benchmarks for this domain on which SAS could quote performance as a technical achievement.

CRISIS has been disseminated extensively at the scientific level in conference presentations and publications, at the professional level at exhibitions, nationally through meetings with stakeholders, and internationally through conferences and websites. Various artefacts have been made to facilitate further dissemination such as flyers, posters and videos. Services have been set up to encourage dissemination within the project and externally. Close collaboration has been with end users. Finally, the project has participation in standardisation work on topic maps.

Potential impact:
In operation for just over a year, CRISIS has made significant progress in understanding the problem of critical incident management and how we can use simulation environments to supplement crisis managers’ training. Ideas are also emerging about how we might exploit the research in the future. We envisage CRISIS being capable of being reconfigured and re-purposed by enabling users with limited programming ability to configure the simulation from the given set of avatars, props and their behaviours, thereby allowing the same system to be used to create environments to train crisis managers at other airports, rail crossings, or even a football stadium. In addition, it can also be used as a testbed for the unthinkable by creating new threat scenarios and evaluating our plans against them.

PLEASE SEE ATTACHMENT FOR MORE DETAILED INFORMATION

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