PULSE Newsletter

Issue 1 : April 2016

Platform for European medical support during major emergencies

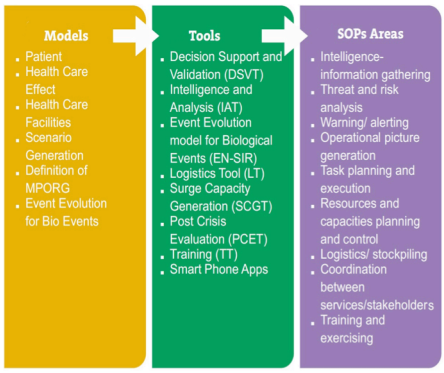
EDITORIAL

Following completion of the first phase of the PULSE project, we are very pleased to share our results to date. The focus of phase 1 has been on the specification, design and development of the PULSE platform. Our goals included: to analyse existing European emergency management procedures, to develop a set of end-user requirements, to specify Use Cases for PULSE, to identify training requirements, to develop software models and Standard Operating Procedures (SOPs), whilst incorporating the legal, ethical and societal considerations into each work package. This work has led to the detailed design of the architectural components of the PULSE system. The system will be further developed in the next months into a full prototype that will be ready for implementation during the PULSE trials.

SUMMARY

PULSE PLATFORM COMPONENTS

The PULSE Platform is made up of three high level components: mathematical models underlying the simulation engine, software tools and standard operating procedures (SOPs).



SCENARIOS

PULSE will be validated by two pilot scenarios based on multiple exercises and demonstrations: a stadium crush at a large concert in Ireland and a SARS-like epidemic in Italy. The pandemic scenario will involve cross-border support from neighboring countries.

METHODOLOGY SCENARIOS AND USE CASES

A key objective of PULSE is to provide validated procedures which will be adequate to improve the operation and success of the healthcare system in challenging disaster situations where combined operations are required at local, regional, cross border and international levels.

To outline the requirements and standards for managing key tasks in major emergencies, six core procedural areas (as depicted in the graph) are used to devise this framework.

These core areas are linked together in a revolving cycle, feeding and receiving information and data, mutually dependent on each other. Over and above, all areas are functionally interconnected by the continuous management of knowledge.

EVENTS

CPDP 2016

The PULSE project was presented by our team at the Computers, Privacy and Data Protection Conference 2016 in Brussels on 27 January 2016, in a panel on "Philosophy and privacy: new (inter)faces". The panel was organised by 3TU.

Westminster Health Forum Keynote Seminar on Electronic patient records and IT in the NHS

The PULSE legal, ethical and societal impacts were presented at the Westminster Health Forum Keynote Seminar on Electronic patient records and IT in the NHS, held at Glaziers Hall, London on 9 February 2016.

ESTES 2016

The PULSE project was presented at the 17th European Congress of Trauma and Emergency Surgery in Vienna, Austria on 24-26 April 2016.

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PULSE LEGAL, ETHICAL AND SOCIETAL IMPACT

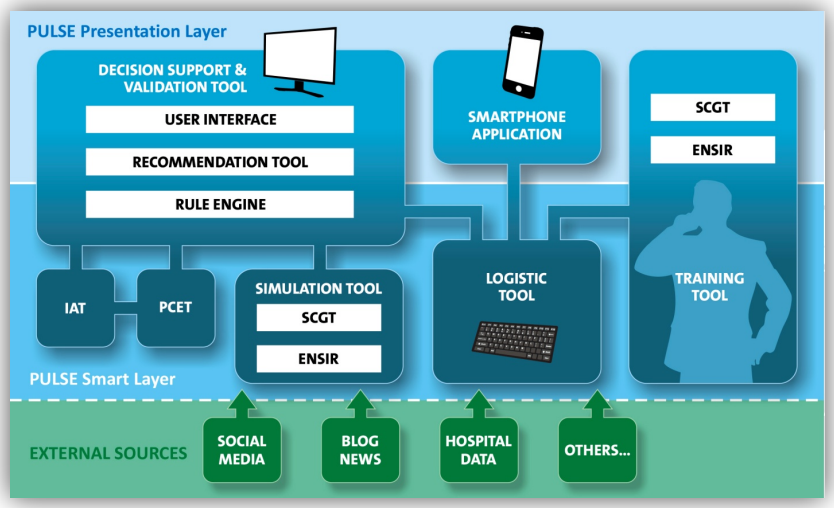
From the outset the legal, ethical and societal aspects of the project have been considered in tandem with development activities. PULSE will deliver a legal, ethical and societal impact assessment during the project, including consultation and engagement with stakeholders with the aim of identifying socio-political impacts, risks and possible solutions to overcome such risks.

Decisions Made

Type	From	To	Dispatch Time	Arrival Time	Optimal Decision	Reason
Dispatched Ambulance	Beaumont	Stadium Crush	Tue Sep 01 2015 12:11:14 GMT+0100 (GMT Summer Time)	Thu Sep 10 2015 10:54:34 GMT+0100 (GMT Summer Time)	true	N/A
Dispatched Ambulance	Mater	Stadium Crush	Tue Sep 01 2015 14:46:45 GMT+0100 (GMT Summer Time)	Sat Sep 05 2015 04:36:45 GMT+0100 (GMT Summer Time)	false	N/A
Dispatched Ambulance	Stadium Crush	Mater	Tue Sep 01 2015 15:43:45 GMT+0100 (GMT Summer Time)	Sat Sep 05 2015 08:37:05 GMT+0100 (GMT Summer Time)	false	More Suitable Hospital near by
Assign Patient	patient-0	Mater	Tue Sep 01 2015 15:43:45 GMT+0100 (GMT Summer Time)	null	true	N/A
Dispatched Ambulance	Stadium Crush	Mater	Tue Sep 01 2015 15:45:45 GMT+0100 (GMT Summer Time)	Sat Sep 05 2015 06:25:45 GMT+0100 (GMT Summer Time)	true	N/A

PULSE ARCHITECTURE

The architecture of the PULSE platform is composed of several software modules distributed on a service-based architecture.



WORK PERFORMED:

- End user requirements gathering & analysis, and specification of the Use Cases
- Identification of training requirements
- Development of PULSE models
- Detailed design of the architectural components of the PULSE system
- Development of validated operational procedures

ONGOING:

- LEPPI & Dissemination activities
- PULSE tools development and integration
- Preparation of the trials and validation sessions

NEXT STEPS:

- Trials & Validation

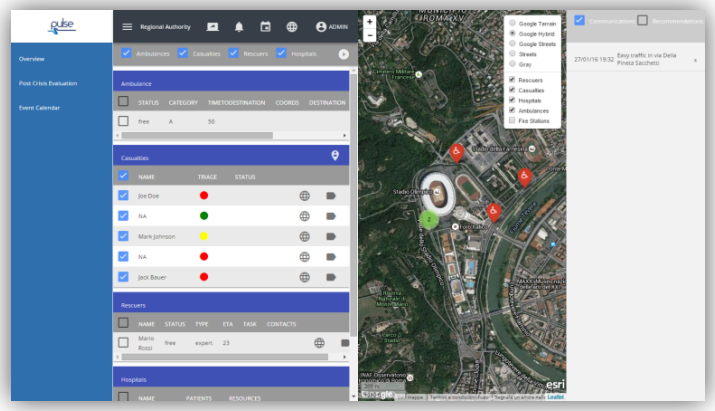
PULSE TOOLS

DSVT

The **Decision Support Validation Tool** provides an innovative approach to accessing timely key data, planning and decisions, categorising and visualising the information obtained during the emergency and automatically creating personalized suggestions to efficiently manage a major healthcare emergency.

SCGT

The **Surge Capacity Generation Tool** provides support for the prediction of the evolution of the critical medical resources during a major health crisis. The tool is able to suggest the amount of resources that should be made available to efficiently manage the emergency situation.



LT

The **Logistic Tool** is in charge of the management of the emergency information enabling the storage and retrieval of all information on the status of crisis resources. The tool also features an innovative functionality to calculate the optimal dispatch of the casualties to the available surrounding hospitals.

ENSIR

The **ENSIR Tool** computes the expected time evolution of the geographical spread of a biological event. ENSIR (ENhanced SIR) is an evolution of the well known SIR (Susceptible - Infected -Recovered) and SEIR (Susceptible- Exposed- Infected- Recovered) models.

PCET

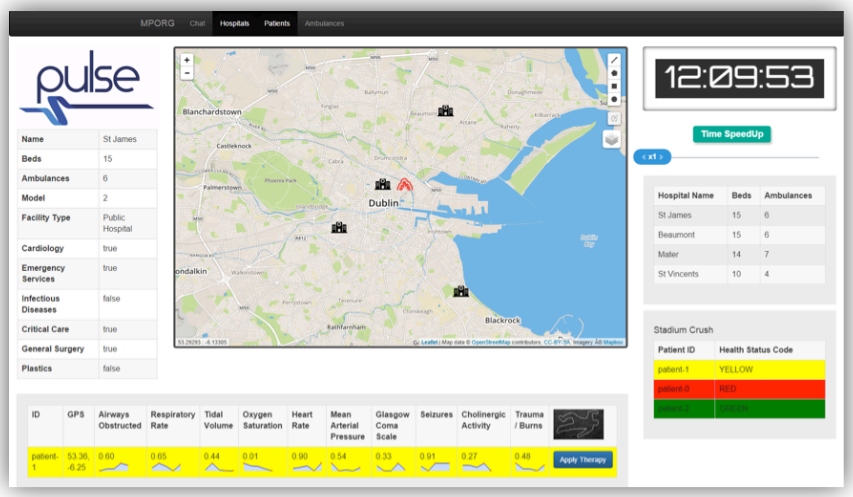
The **Post Crisis Evaluation Tool** implements specific functionalities that improve current methods of post crisis evaluation of decisions taken during medical emergencies. PCET provides integrated features that simplify the identification of past bad choices and helps emergency personnel to understand where to intervene in addressing critical issues in future emergencies.

IAT

The **Intelligence Analysis Tool** is able to systematically gather and analyse incoming disease-related data and to notify the presence of possible breeding grounds for epidemics. This is achieved by extracting and correlating information from hospitals (e.g. Clinical Records), Social Media (e.g. geo-localized Twitter messages) and Websites (e.g. specialized blogs, news sites containing disease-related information).

MPORG

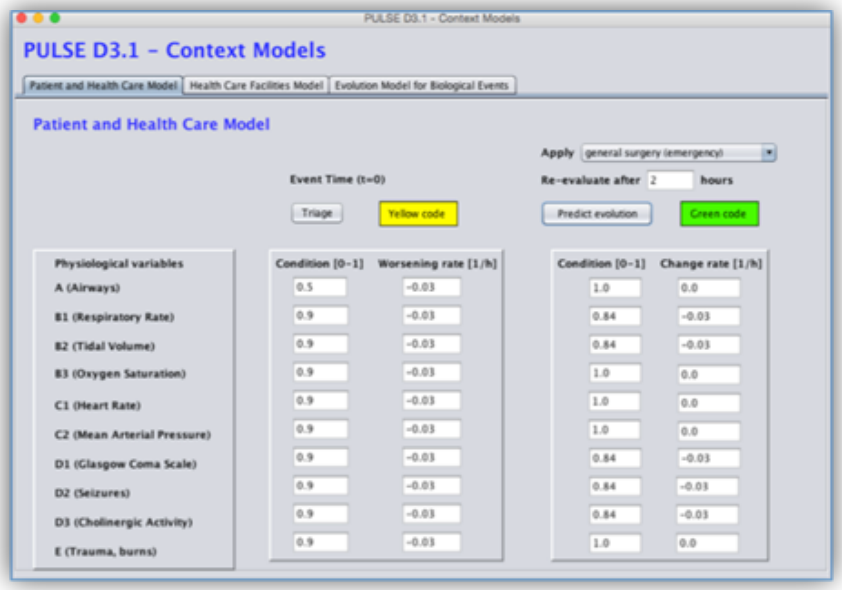
The Pulse **MPORG** is a web-based virtual reality training environment, where users play the role of an emergency coordinator reacting to an event. Using a Multi-Player Online Role-Playing Game engine, a team of users can coordinate in real-time resources, casualties, ambulances & hospitals, each with their own specialties and unique situation; to gain experience in co-operation & decision making, ultimately to find the optimal solution for managing any number of configurable, repayable scenarios defined in the PULSE system. Each 'player' can also experience the challenges facing another role thereby improving co-operation and decision making.



PULSE MODELS

The models developed in PULSE are central to its key feature as a decision support solution. They include:

- **Patient model**: calculates the effects of injuries of several types on victims, and the corresponding effect of treatment;
- **Health care effect model**: the model of the first aid personnel activities in case of health incidents;
- **Health care facilities model**: the model of the hospital capacity, health care effect, hospital surge capability and timing;
- **Scenario generation**: synthetic simulated environment with realistic scenarios for exercises;
- **MPORG**: building of game and virtual reality training background;
- **Event evolution models for biological events**: mathematical model of epidemics evolution



PULSE at a glance

PULSE- *Platform for European Medical Support During Major Emergencies*

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http://www.pulse-fp7.com/

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Trilateral Research

UNIVERSITÀ CATTOLICA del Sacro Cuore

FINMECCANICA

CESS Centre for European Security Strategies

IAEMO MEM REGION SOUTH
Oifig Idirghníomhaireachta Interagency Office

ONEST SOLUTIONS