

eNewsletter

April 2017

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Our thanks to:

Dimitris Petrantonakis,
Hanneke Vreugdenhil,
Chrisoula Falagaris,
Ioanna Varvitsioti and
Vitrociset Team



HIGHLIGHT

Welcome from Coordinator Dimitris Petrantonakis

I am pleased to welcome you to the first issue of the eVACUATE Newsletter. Started in March 2013, eVACUATE is a four-year EU project, partly funded by the European Commission under the Seventh Framework Programme for Research and Technological Development and it involves 19 partners from 8 EU member states.

eVACUATE aims to address the needs of the safety of citizens during complex evacuation processes following normal and abnormal events (crises) towards the creation of a holistic system.

[Read more p. 2](#)



NEWS FROM PILOTS

The first two pilots at Anoeta Stadium and Athens International Airport

The eVACUATE Consortium in October 2016 and January 2017 executed the first two pilots specifically in San Sebastian (Spain) at Anoeta Stadium and in Athens (Greece) at Athens International Airport.

The results of the 1st pilot exercise were above expectation. The eVACUATE Team encountered only minor problems or errors while agreeing at the end of the day that it was a complete success".

[Read more p. 3](#)



HOW Evacuate WORKS

The main sub-systems

The eVACUATE project aims to understand the complexity of large-scale disasters by tackling the operational challenges of situation awareness (SA) giving effective, safe solutions and support to the decision making commandment to achieve the efficient solution possible.

In this issue we start to explore the main sub-systems that work together in the eVACUATE framework.

[Read more p. 6](#)



NOT TO BE MISSED

eVACUATE project results @ PTE EXPO, Amsterdam, 16 March 2017

Athens International Airport participated in the third day (Thursday 16 March) of PTE EXPO Conference in the section entitled "Management & Operations: Crisis & Disaster" as part of AIA's dissemination activities. The speakers were Chrisoula Falagaris that covered the functional and operational concepts and Nikos Papagiannopoulos, (DB Architect – Project Manager of eVACUATE) that covered the technology and project management aspects of the project.

[Read more p. 8](#)



FORTHCOMING APPOINTMENTS

4th pilot exercise in Metro Bilbao, Spain, May 5, 2017

The 4th pilot exercise of the eVACUATE project will take place at San Mames Metro Station, in Bilbao on May 5, 2017.

VITROCISSET presents eVACUATE project at IDEF 2017 in Istanbul, Turkey, May 9-12, 2017

Vitrociset will attend to the 13th International Exhibition of Defence to be held in Istanbul, and will present its offer within the context of Defense, Space and Homeland Security, which includes eVACUATE project.



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HIGHLIGHT

Welcome from Coordinator



Dear Reader,

I am pleased to welcome you to the first issue of the eVACUATE Newsletter. Started in March 2013, eVACUATE is a four-year EU project, partly funded by the European Commission under the Seventh Framework Programme for Research and Technological Development (Grant Agreement no. 313161) and it involves 19 partners from 8 EU member states.

eVACUATE aims to address the needs of the safety of citizens during complex evacuation processes following normal and abnormal events (crises) towards the creation of a holistic system that **a)** will enhance the effectiveness of complex evacuation operations at any type of venue or infrastructure, **b)** adapt evacuation plans to the current conditions, **c)** dynamically survey how an evacuation is evolved and **d)** support civil protection authorities. eVACUATE framework employs all key elements in the design and operation of the envisaged system; the eVACUATE **Crowd Models**, the **Simulator Tools**, the **Common**

Operational Picture that integrates feedback from various heterogeneous inputs and finally the major constituent of all proposed work, which is the **Smart Spaces**.

A service oriented Decision-Support platform has been therefore developed to dynamically distribute on-demand evacuation information to emergency management actors as the crisis unfolds.

Decision-makers at the command posts, first responders, front-line stewards and volunteers are therefore able to receive real-time situation aware information of updated evacuation strategies using eVACUATE towards the identification, designation and sustainability of an Active Evacuation Route (AER) comprised of the most recently generated evacuation route that adapts dynamically according to current and evolving circumstances.

The system architecture has been now finalized and the technical developments are reaching a significant level of maturity based on the end-users needs. The first three pilot activities within eVACUATE has been obtained successfully, testing eVACUATE system performance in diverse environments (Stadium, Airport and Cruise Ship).

Inside the newsletter you will read about the work we have carried out over the last 4 years as well as details of the consortium's participation in conferences and other events related to the project's research field. Further information can be found on the project's official website.

I hope you enjoy the newsletter and invite you to keep in touch with the eVACUATE project.

Dimitris Petrantonakis
eVACUATE Project Coordinator
on behalf of the eVACUATE Consortium



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NEWS FROM PILOTS

1ST PILOT EXERCISE AT ANOETA STADIUM, SAN SEBASTIAN, SPAIN IN OCTOBER 2016

For an evacuation exercise to be successful, it must be as close to reality as possible.

That being said, the evacuation should ideally be accomplished using usual populations of people within a given operational environment.

For example, imagine an evacuation exercise in a football stadium, with the usual high concentration of people.

Ideally, in such an evacuation exercise, we would need a number of participants higher than that which could be achieved, however, efforts were made, for the evacuation exercise in Real Sociedad de Fútbol, to accomplish the same outcome using as many participants as possible.



In this respect, using Facebook, an invitation to local fans was made to have their involvement in exchange for a free ticket to a match to be held in the evening following the pilot. Dozens of fans expressed their willingness to participate, seemingly not only because of the token but by their interest to take part in the exercise itself.

The partners of the consortium remain ever so grateful for the participation of these volunteers who made the exercise possible. The pilot demonstration was accomplished using 73 volunteers to perform 5 types of evacuation drills during approximately 1 hour and 15 minutes.

The demonstration commenced on November 21st, 2016 at 10:45 and involved the issuance of tickets bearing RFID tags to the volunteers. At 11:00, people start to enter the venue via the RFID reader and proceeded to occupy the part of the stadium used for the exercise.

The demonstration was successful. The End-User commenced a guided tour to visit the demonstration area and the evacuation exercise results were displayed in the eVACUATE Operations Centre which was placed inside the Press Room of the stadium.

The results of the pilot demonstration were as expected and despite the limiting factors (less people than what a usual stadium can hold), it was considered as successfully depicting a real-life evacuation. During the demonstration, all components of the system were functional.

For More information

ASRS has produced an interesting dissemination video publishing the simulation exercise on their corporate website: <http://www.realsociedad.com/document/view/spa/0/207461/anoeta-participo-en-un-simulacro-de-evacuare>

Also available in Youtube:

<https://youtu.be/g10hsRKw5PQ>



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2ND PILOT EXERCISE AT ATHENS INTERNATIONAL AIRPORT, ATHENS, GREECE IN JANUARY 2017

In mid-November 2016, the technical partners of the eVACUATE Consortium commenced preparation towards the pilot demonstration scheduled to take place at Athens International Airport on January 27th, 2017.

More specifically, the simulation loops (scenarios) used in the pilot were effectuated at Athens International Airport using 4 departure gates within a passenger terminal which was made available and dedicated for this purpose.



During the course of 4 days prior to the pilot, the partners worked closely to:

- Fine tune the system components;
- Achieve response to real-time events (projected scenarios);
- Ensure that the Presentation Layer, Decision Layer and field of view of the sensors were all able to visualize the same physical spaces and obstacles.

The aforementioned effort inevitably allowed for calculation of the evacuation routes, which of course automatically excluded any areas that would be affected by obstacles which would otherwise prevent evacuation.

Additionally, integration was made with the Airport's Legacy Systems which encompassed environmental sensors, existing emergency evacuation (green box) doors, access control doors, intrusion alarms and the fire system.

The Presentation Layer gives to the COP operator a view of the affected operational area, whilst allowing for immediate response to potentially life-threatening situations.



Figure 1 - 3D COP Operative Map of Athens International Airport.



Figure 2 – 2D Operative Map of Athens International Airport.

In the Decision Layer, all physical spaces are analysed in real time, gathering data from all sensors (fixed and mobile).

This layer includes actuators (emergency response units and personnel) to support the COP operator in managing incidents and who may essentially effectuate, if needed, an evacuation of the affected area of the terminal.



Figure 3 – 2D Sensors Disposition Map of Athens International Airport.

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The pilot was met with success as approximately 80 enthusiastic volunteers employed at Athens International Airport were involved in performing the simulation loops (scenarios) which resulted in the following:

- Using eVACUATE was successful as better evacuation times were achieved.
- eVACUATE provides added value in an operational crisis as it expedites the emergency response.
- Real time notification and communication is a valuable tool offered by eVACUATE, allowing security personnel identifying the nature of a threat, currently accomplished only through the CCTV capability.
- There were positive impressions of eVACUATE's functionalities and they consider it as an important system especially for airports.
- The Social Media functionality was considered added value as people, especially young, are frequently using it to communicate.
- The eVAMAPP Mobile Application considered a valuable tool as it provides useful information to people (passengers) who may be far removed from communication in crisis situations. This feature has potential for commercial exploitation.
- The usage of RFID tags in tracking people down in a building was of concern given that several passengers print their boarding passes independently ticket but they have done the check-in electronically.
- More effective and efficient communication to and amongst emergency response parties (Police, Fire Brigade, Medical services, Security etc.) is achieved through eVACUATE. This is presently managed by way of telephones, mobiles, Tetra, etc.

The system was demonstrated to the following stakeholders who were present:

- the EU Project Officer;
- AIA as an End-User;
- Police (directly involved in the operational handling of an evacuation);
- Security Company representatives employed at the Airport (who are directly involved in the operational handling of an evacuation).

For More information

The AIA End-User has produced an official video for dissemination purpose about this pilot.
<https://youtu.be/9uvWSdE4egs>



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HOW eVACUATE WORKS

The main sub-systems

With the purpose to achieve the main objectives of eVACUATE it was necessary to research, develop and demonstrate the capabilities of both framework and prototype, enhancing the results of complex crowd evacuation operations taking place in any type of venue or infrastructure.

Thus, eVACUATE is yield a holistic system that fulfils the below mentioned objectives:

i. Development of a Situation Awareness (SA) evacuation system able to adapt dynamically to changing situations. eVACUATE' dynamic system is able to adapt its decision taking into account several variables, such as: type of situation, human's reaction, state of the evacuation or sensors information, inhibit external influence.

ii. Integration of multiple heterogeneous information sources to command posts. eVACUATE provides information to the citizens but also to the intervention personnel to increase the precision in their response.

iii. Development of a system able to share all relevant multimedia data, video, pictures, voice, force locations, plans, orders, messaging etc. between all operating personnel in order to detect the optimal route and guide safely the persons out the venue.

iv. Development of a system applicable to a broad range of areas (e.g. large gatherings on confined outdoor areas, office buildings, underground stations) and to various incidents (natural and man-made as well as terrorism). Thus, eVACUATE will be tested in four different scenarios according the previous broad range of areas.

v. Development of respective optimal evacuation strategy. This strategy has been implemented through the Active Evacuation Route (AER) which will be design in real-time based on crowd behavior, the type of venue, and the crowd monitoring.

The result of the satisfaction of all the above requirements has led to the definition of a complex system that orchestrates high precision hardware and software as listed below:

Component List of eVACUATE system

Component	Description	Function Provided
RFID	Radio Frequency Identifier Detector	Counting People
		Classification People
Video Analysis	Real Time Multi Spectral Video Analysis	Sector Counting People
		Unusual Behaviours
Mobile Application	Mobile Application for People and First Responders	Maps
		Problem Reporting
		Active Evacuation Route
Evacuation Routes	Dynamic Evacuation Prediction and Routes Calculation	Dynamic Evacuation People with Time Prediction
		Routes Evacuation
Mobimesh Network	Emergency WiFi Network	Ad Hoc WIFI Network for Mobile equipment
Data Fusion & Inference	Geo reference and Data Fusion of Sensors/Actuators, Inference for Notification Alert Generation and Tasking Actuators	Data Fusion
		Geo Reference Events
		Density Calculation
		Notification Alert
Communication Layer	Communication gateway system with all equipment and Legacy Systems	Tasking Actuators
		Cameras
		Exit Signs
		Multi Media Equipment
Emergency Operation Centre	Bypass Command Actuators and messaging	Wireless Environmental Sensor Network
		Connection / integration with Legacy Systems
		Bypass Command Actuator
Common Operating Picture	3D Vision	Send Text Message to the Users
		Venue 3D Map Rendering and Navigation
		Geo Reference Event Display
		Threat Incident Management
		Evacuation Management

Now we begin to explore the various components of the system, with the objective to describe the main features of each of them.

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The visualization module – Common Operational Picture

One of the key elements that can permit to reduce time in evacuation is the visualization of information. The Visualization Module of eVACUATE displays all relevant data such as crowd geometry, density, flow, congestions, groups, “specific” categories of persons (Children, disabled, pregnant, etc.).

This data can be visualized in 3D or by geographical reference and the user should be able to manipulate the Visualization Module without requiring any specific knowledge.

With eVACUATE, the user is able to visualize crowd information displayed in the COP which presents this information in a schematic manner.

This enables the user to quickly understand what is happening in an emergency case and helps increasing the decision making efficiency, allowing the user to manage several layers of information, all visible in one screen.

On the other hand, the Visualization Module is not just design to improve decision making efficiency, it is also focus on End-Users by allowing them to add data, icons, visualize status, choosing between different representations and by rolling back in time to see a previous state of the evacuation.



The value of time: Active Evacuation Route (AER)

In the event of a fire or a security threat, time is critical. While time is so scarce, crisis communication about evacuation decisions should go fast and without noise. In eVACUATE we prepared the way of communication and we facilitated the preparation of the content of instructive messages. In particular when something abnormal happens, the system can process the crowd characteristics and raise an alert.

At the same time, the commander user is able to locate the problem and process it, being asked to either closing the message if it was a wrong alert or report the issue. Simultaneously the command user is able to prepare and deliver alert messages and specific commands for AER, and also define the type of devices that receives the message.

During all that process, the system helps the commander, showing the Active Evacuation Route (AER) at any time. But not only displaying the route but also the currently predicted evacuation time necessary as well as possible congestions that may occur at particular spots or alternative evacuation routes with statistics, which may improve the evacuation performance.

The commander user is also able to determine what to be displayed into the active signs to help the evacuees find their routes to the desired evacuation spot or message them important information like first aid instructions, etc.



With the help of prediction of near future problems and simulation of possible actions, the system assist a commander user in the decision process, advising him with suggestions as to the predicted best actions at any particular time.

This comes as proposed new evacuation routes, messages for public, message for crew, etc. To estimate all this tactical plans (and consequently to design strategic plans) for effectively controlling the evolution of an emergency by exploiting the estimation tools, the information observations and the crowd dynamics models. Towards this direction, we incorporate dynamic and adaptable decision making strategies through the exploitation of game theory, for real-time adjusting the AER so as to elaborate optimal evacuation strategy.

TO BE CONTINUED... in next eNewsletter

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NOT TO BE MISSED

eVACUATE project results @ PTE EXPO, Amsterdam, 16 March 2017

The Passenger Terminal Expo (PTE) is an international conference addresses airport and airline business-critical issues and solutions, providing innovative ideas and progressive thinking for future development, and proven measures for maintaining passenger custom and satisfaction – all key to the industry's future success.



Athens International Airport participated in the third day (Thursday 16 March) of PTE EXPO Conference in the section entitled " Management & Operations: Crisis & Disaster" as part of AIA's dissemination activities.

The title of the presentation was "Situational awareness guidance and evacuation systems for airports"

The speakers were Chrisoula Falagaris (Head, Security Planning - Training & Contract Monitoring, Security Operations) that covered the functional and operational concepts and Nikos Papagiannopoulos, (DB Architect – Project Manager of eVACUATE) that covered the technology and project management aspects of the project.

On this issue, the speakers outlined a complete system for the provision of efficient support for the application of safe and effective evacuation strategies at large public venues such as airports.

They specified that it is a resilient and seamless communication platform (namely the outcome of the eVACUATE EU-funded research project) integrated into the mechanisms already in place, to allow communication with the theatre of the evacuation operations and other civil and military response units.



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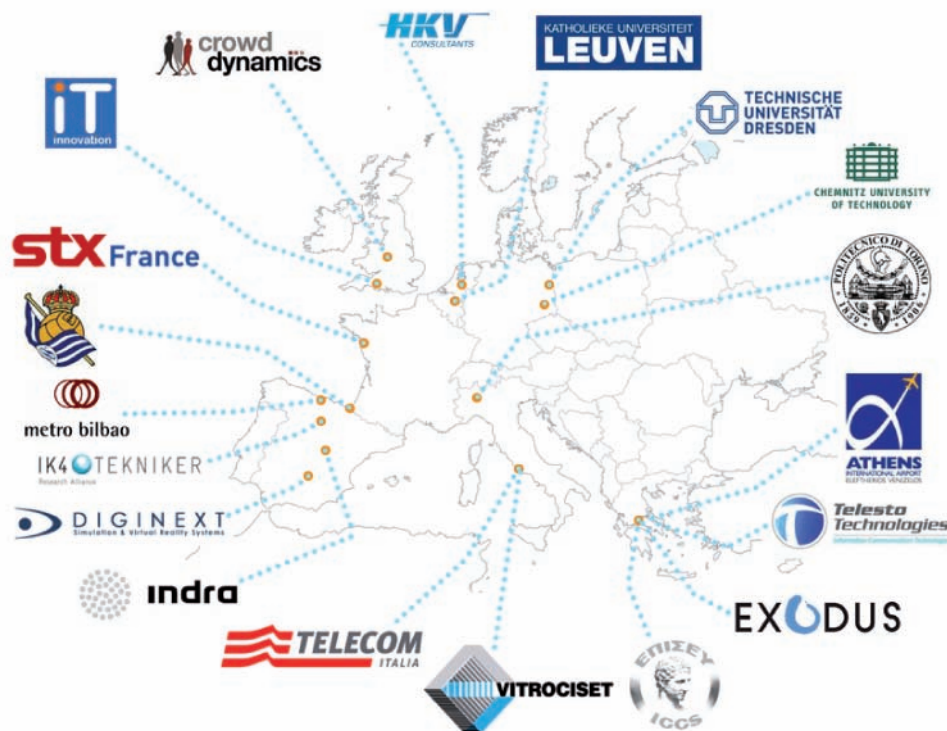


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CONSORTIUM

The eVACUATE Consortium has been carefully selected forming a balanced consortium concerning all aspects including R&D, public entities, large companies and SMEs. Furthermore, the partnership structure is based on complementarity, transnationality and multidisciplinary.



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