D9.3 – THE EVACUATE INTEGRATED SYSTEM RELEASE 2 – READY FOR PILOT TESTING

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The D9.3 the eVACUATE Integrated System release 2 - ready for Pilot Testing

- Prototype & Demonstrator – not textual
- Dissemination Level : PU
- *This deliverable describes the main building blocks as developed within each WP that constitute the eVACUATE platform.*
- *Includes work from Tasks T.9.1, T.9.2, T9.3 and T9.4, along with work from all the other technical Work Packages.*
- Scheduled for month 38 = May 2016
  - The San Sebastián integration meeting evaluating overall system’s performance in real environment took place in month 39 = June 2016
  - Delivery of D9.3 postponed to month 40 = July 2016 to make use of that event.
• What is done:
  • An implementation of the architecture of eVACUATE,
  • integrating the technical WP’s including:
    • Hardware
    • Software
    • Local Infrastructure customized to each pilot location
    • Cloud- and Fog-based software
INTEGRATED SYSTEM, FINAL RELEASE READY FOR PILOT ACTIVITIES
eVACUATE system – individual building blocks

- **WP3**: Behavior & counting
- **WP4**: Strategic route
- **WP6**: Physical interface
- **WP7**: Agents (KPs)
- **WP8**: SIB & CEP
- **WP5**: COP
- **WP8 EOC**
eVACUATE system – individual building blocks

- **WP3** Behavior & counting
- **WP4** Strategic route
- **WP5** COP
- **WP6** Physical interface
- **WP7** Agents (KPs)
- **WP8** SIB & CEP
- **WP8** EOC

Environmental sensor
WSN Gateway
RFID device
BASIC ENVIRONMENT - INPUT HARDWARE

- RFID Device
- Environmental sensors
- WSN gateway
- COP display incl. hardware readings
BASIC ENVIRONMENT- INPUT SOFTWARE – EVAMAPP

eVACUATE system – individual building blocks

WP3 Behavior & counting
WP4 Strategic route
WP6 Physical interface
WP7 Agents (KPs)
WP8 SIB & CEP
WP8 EOC
WP5 COP

EVAMAPP
eVACUATE

BASIC ENVIRONMENT - INPUT SOFTWARE – EVAMAPP

eVAMAPP smartphone application – (Screenshots)
eVACUATE system – individual building blocks

WP3
Behavior & counting

WP4
Strategic route

WP6
Physical interface

WP7
Agents (KPs)

WP8
SIB & CEP

WP5
COP

WP8
EOC

CCTV cameras

Processed input

BASIC ENVIRONMENT- INPUT – VIDEO CAMERAS
Display of video camera streaming
1. WP3 receives input from cameras, processes it, sends it to WP8
2. WP8 sends data to WP4; WP4 uses it to update evacuation route
3. WP4 sends new route to WP8; WP8 sends all its information to WP5
BASIC ENVIRONMENT - INPUT – SPECIALIZED CAMERAS
EVAMAPP interface goes to EOC. EOC analyses input to check if an alert should be generated following rules (key words with hashtags, too many messages per time unit). If so, EOC sends an alert to COP (WP5).
BASIC ENVIRONMENT - INPUT - SOCIAL MEDIA +

EOC screenshots

Software managing social media
BASIC ENVIRONMENT OUTPUT - EVACUATION STRATEGY (I)

eVACUATE system – individual building blocks

WP3 Behavior & counting

WP4 Strategic route

WP5 COP

WP6 Physical interface

WP7 Agents (KPs)

WP8 SIB & CEP

WP8 EOC

Adaptive signals

Multimedia signals
evAMAPP
1. WP3 counts crowd, sends information to WP8

2. WP8 forwards this info to WP4 along with paths, open doors, etc. WP4 replies with optimal route at a given point. WP8 then calculates the needed signals to evacuate. WP5 can check this info at any moment, through WP8.

3. If WP5 decides to start an evacuation, then WP8 knows the signals it must send. Signals first sent to WP7 (agent), then to WP6 to send to output hardware signals. eVAMAPP, being a software app, does not require the WP6 step.
OUTPUT – EVACUATION STRATEGY

Multimedia signal

Adaptive Signals

COP during evacuation
Displaying AER
eVACUATE system – individual building blocks

**WP3** Behavior & counting

**WP4** Strategic route

**WP5** COP

**WP6** Physical interface

**WP7** Agents (KPs)

**WP8** SIB & CEP

**WP8 EOC**

- Adaptive signals
- Multimedia signals
- evAMAPP
1. WP5 blocks one exit, then starts evacuation. Requests information to WP8. WP8 asks WP5 for optimal route, defines specific needs (which doors must be open, etc.)

2. WP8 sends information to WP7, which manages what to send to what output device. Hardware devices require one more complexity level, managed by WP6. eVAMAPP doesn’t because it’s software.
SPECIAL – DETECT UNUSUAL BEHAVIOR

Detection of unusual behavior

Usual: Collectiveness increases as the crowd start moving collectively towards the exit.

Unusual: If below learned levels then the evacuation is not proceeding orderly. If above then scenario not anticipated.
## PLATFORM IMPLEMENTATION DETAILS - REFERENCED SUBMITTED DELIVERABLES

<table>
<thead>
<tr>
<th>WP3</th>
<th>WP4</th>
<th>WP5</th>
<th>WP6</th>
<th>WP7</th>
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<tbody>
<tr>
<td><strong>ITINNOV</strong></td>
<td><strong>CDI</strong></td>
<td><strong>DXT</strong></td>
<td><strong>ICCS</strong></td>
<td><strong>TEK</strong></td>
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<tr>
<td>Behavior recognition, cam-based</td>
<td>Optimal route prediction</td>
<td>COP (Common Operational Picture)</td>
<td>Sensors: Light, temperature, humidity, ...</td>
<td>Smart space &amp; agents</td>
</tr>
<tr>
<td><strong>D3.4</strong></td>
<td><strong>D4.4</strong></td>
<td><strong>D5.3</strong></td>
<td><strong>D6.3</strong></td>
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<table>
<thead>
<tr>
<th>WP7</th>
<th><strong>TELESTO</strong></th>
<th><strong>TUC/TUD</strong></th>
<th><strong>VITRO</strong></th>
<th><strong>INDRA</strong></th>
<th><strong>ICCS, TEK, ASRS, etc.</strong></th>
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<tbody>
<tr>
<td><strong>Mobile phone application eVAMAPP</strong></td>
<td><strong>Chipless RFID tags in tickets</strong></td>
<td><strong>CEP rules</strong></td>
<td><strong>SOFIA2 interoperab. framework</strong></td>
<td>Decision crew &amp; comm; legacy systems</td>
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<tr>
<td><strong>D7.4</strong></td>
<td><strong>D7.4</strong></td>
<td><strong>D8.4</strong></td>
<td><strong>D9.3</strong></td>
<td>n/a</td>
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</tr>
</tbody>
</table>
ANNEX A
ASRS SCENARIO IMPLEMENTATION
• ASRS infrastructure: Build and connect all components.
  • individual tests & checks.
• Gates open, volunteers enter & sit pretending to be audience.
• Scenario: Alarm sounds, crowd goes to nearest exit.
  • COP monitors crowd movement and alarms.
• Scenario: Alarm sounds, crowd can go to nearest exit or to field.
• Scenario: Crowd must follow indications, remain where cameras can follow.
• Scenario: Security staff blocks one exit (representing that the exit was blocked for other reasons).
  • Crowd must follow dynamic exit signs, digital signs and app.
ITINNOV makes crowd **analysis on crowd density & speed.**

COP receives info about incident, blocked exit. Decision maker get overview of specific activities, defines evacuation strategies

- **COP** Counts visitors entering the stadium by receiving feedback from **RFIDs** and **Optical Cameras**.
- **COP** counts visitor leaving the stadium
- One exit is suddenly obstructed!
  - Alternate evacuation routes (AER) are used
- **eVAMAPP** used for situation awareness, inc. visualizing position of smartphones, inform crew of situation.
- **COP** gets Simulated forecasts, accessing **historic data**
  - Several decision makers can operate COP simultaneously.
- **Exit** and **Multimedia signs** activated
- Monitor Communication on AER by all channels.
- Crowd leaving the stadium following the indications in all sensors.
• Use eVAMAPP/ FR Application to notify crew & service people outside stadium to redirect crew & people inside stadium to evacuate them per AER.

• Thermal & hyperspectral sensors to count people passing a line.

• EOC to send messages to eVAMAPP & change dynamic signs on demand.

• ITINNOV: Detect unusual behavior of people not evacuating or following wrong route.

• CEP estimates crowd figures in blind spots for early issue detection.

• EXUS/TEK: Decision maker communications successful evacuation; evacuated people receive message “Safe” on eVAMAPP.
Please check Tekniker_MOV_0104.mp4:

1 min 24 sec video file available upon request.

(Video not included here due to document size, 229 MB)

Example image from the video: