1. Publishable summary

Summary description of the project objectives

surveillance platform based on multi-source **video** analytics, localized data and cognitive interfaces

www.fp7-sv3d.eu

The federating objective of SV3D consisted in developing the technology required to offer the surveillance operator the facilities required to navigate into a virtual 3D world displaying the scene (both environment and location) activity (typically people or object appearance and displacement), as well as sensor alerts.

The scientific and technical objectives were:

- An integrated security platform back-ended by a global positioning information system with facilities for 3D-coordinates treatment, in order to facilitate integration and coherence of all components, as well as to guaranty the interoperability with legacy systems,
- A tool for calibrating a set of video cameras present in a same space,
- Improvements of people detection thanks to a modeled background with spatial and temporal properties.
- Improvements of tracking techniques to be used in spaces covered by a set of cameras, thanks to the use of spatial calibration data about the monitored area,
- Improvement of people tracking over wide areas by using auto-controlled PTZ cameras,
- Improvements and novelties in user interfaces for video surveillance operators, through the application of 3D computer graphics aided visualization technology as well as the use of cognitive studies in the design and the evaluation of the browsing and navigation systems.

The commercial objectives were:

- To answer the increasing demand for a modern, open and safe security platform aimed at large and/or public installations (train stations, schools …).
- To improve and facilitate the work of each one of the operators involved in a video-surveillance task, from configuring and modeling an installation, to monitoring alarms which occur in a complex public environment.
- To improve and make more secure and faster, the treatment of alarms and the use of video views, with respect to the new legal restrictions.
- To augment the market penetration of the SME partners with respect to large and complex installations.

The SV3D system technology developed is flexible, modular, extensible and standard. The SV3D final outcome is the introduction of 3D-localization data in the whole chain of processing of a surveillance system.

Description of the work performed since the beginning of the project and main results achieved

SV3D started in June 2011 and ended in January 2013. The main results achieved were:

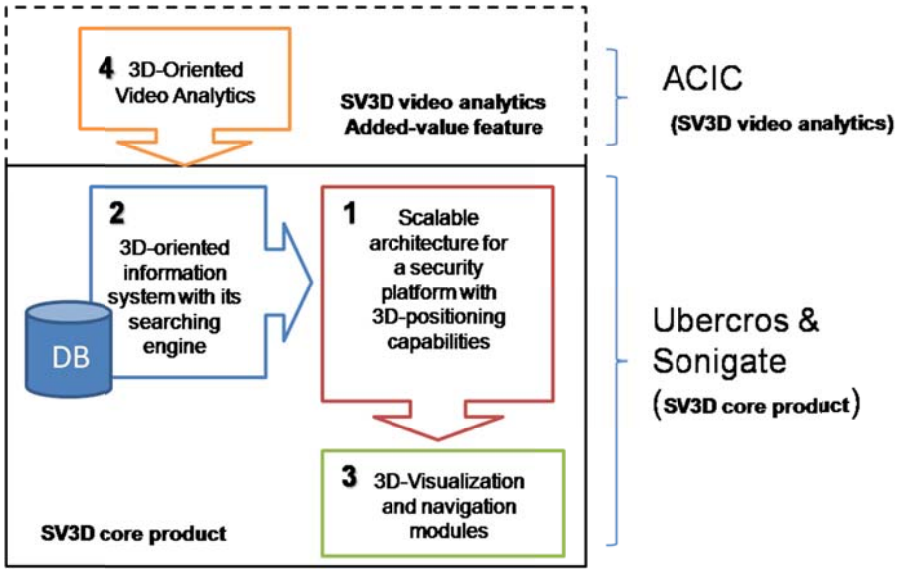
- An updated and integrated version of the final architecture. D1.3 “Final version of the scalable architecture”.
- The final search and forensic system which includes the Alarm Engine, the Action Engine and the Replay Engine as well as the SV3D Rule Description Language which controls the engines. D2.2 “Search engine for forensic tasks”.
- An evaluation of the perceptual and cognitive workload and learning patterns of operators while using the new visualization system. D3.2 “Human machine interface report.”
- Final prototype of the visual system for the control room operator, in a surveillance system – D3.3 “Final prototype of the visualization system”.
- People or moving objects tracking, using a motorized PTZ camera. D4.2 “Visual target representation and tracking for behavior analysis.”
- Initial and final versions of the testbed systems. An initial trail phase tested the interoperability of the initial prototypes. A number of issues were identified from the testing. Issue assessments led to plans for improvements for the final integrated testbed. All testing was driven by the real needs of the SMES. D5.1 “First testbed configuration report” and D5.2 Final testbed configuration and report”.
- A public summary of D1.3, D2.2, D3.2 D3.3, D4.2, D5.1 and D5.2 is available: http://www.fp7-sv3d.com/pdfs/publicsummariesP2.pdf/.
- Final dissemination actions, market analysis and monitoring and exploitation planning.

The final results and their potential impact and use

The SV3D project’s final result is a new approach to video surveillance through the integration of the spatial localization paradigm to already existing or new software components. SV3D will improve:

- The operator’s task, by introducing 3D technology and cognitive interfaces in the visualization and navigation software, and by monitoring the control room,
- Person detection and long term tracking in well configured installations, where a network of static and PTZ cameras monitors the same site,
- Alarm detection, by extending the triggering rule model,
- Supervision and monitoring of the operator control center.

The SV3D final outcome is a flexible modular system:

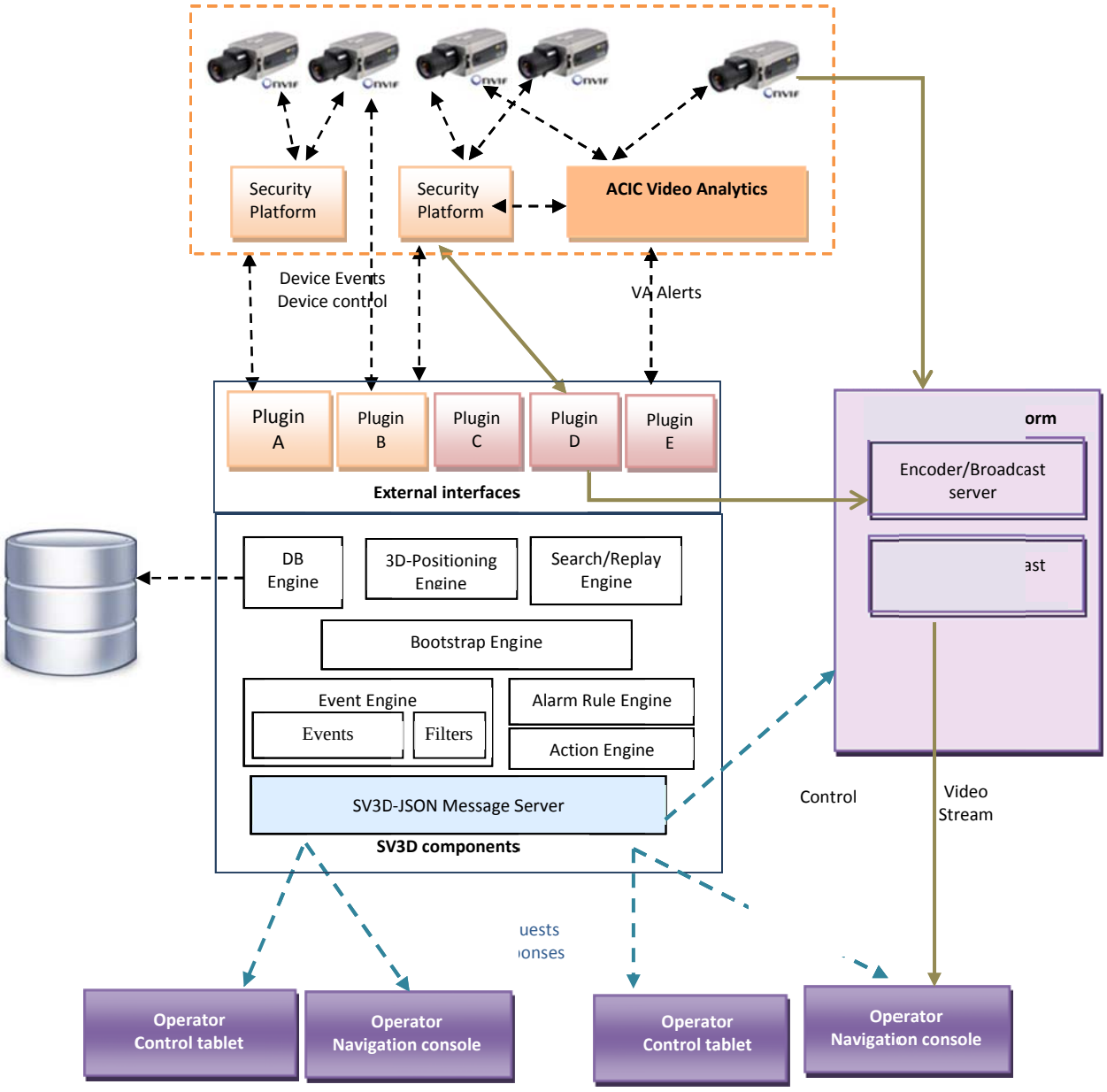


1. Scalable architecture for a security platform with 3D-positioning capabilities, for the SME partners Ubercros and Sonigate, with BM and Lapospo as their subcontracted R&D partners.
2. 3D-oriented information system with its replay (including search), alarm and action engines for the SME partners Ubercros and Sonigate, with BM and Lapospo as their subcontracted R&D partners.
3. 3D-Visualization and navigation modules with, again, the SMEs Ubercros and Sonigate, with BM and Lapospo as their subcontracted R&D partners.
4. 3D-Oriented Video Analytics for the SME partner ACIC with UCL as its subcontracted R&D partner.

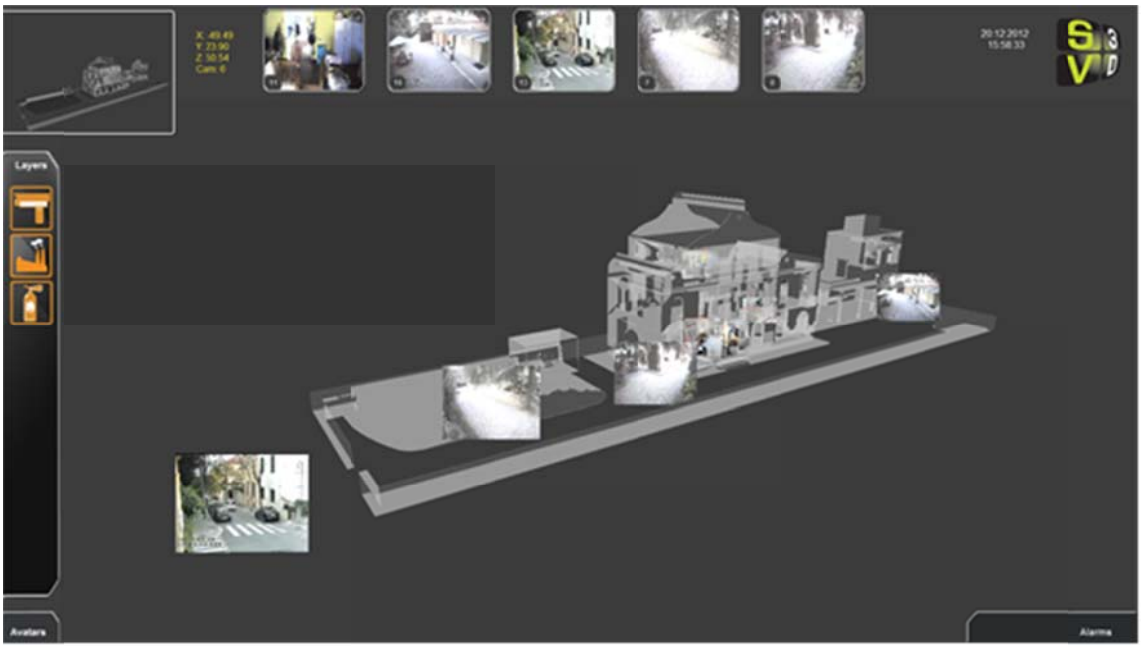
The SV3D demo platform integrates the following main components.

- External media server devices, like cameras or video recorders.
- Video analytics platforms fed by the devices, like the SV3D ACIC platform developed by ACIC and UCL which integrates 3D paradigms in mobile detection and tracking,
- Integration surveillance platforms, like Milestone, in charge of the data capture from the elements.
- The SV3D System Manager, mainly in charge of acquiring data from the surveillance platforms, and broadcasting it to the operator devices.
- The GStreamer Encoding/Broadcast platform in charge of transcoding video images in a web browser compatible format and broadcast them towards the operator navigation consoles.
- SV3D operator devices for visualization and control tasks.

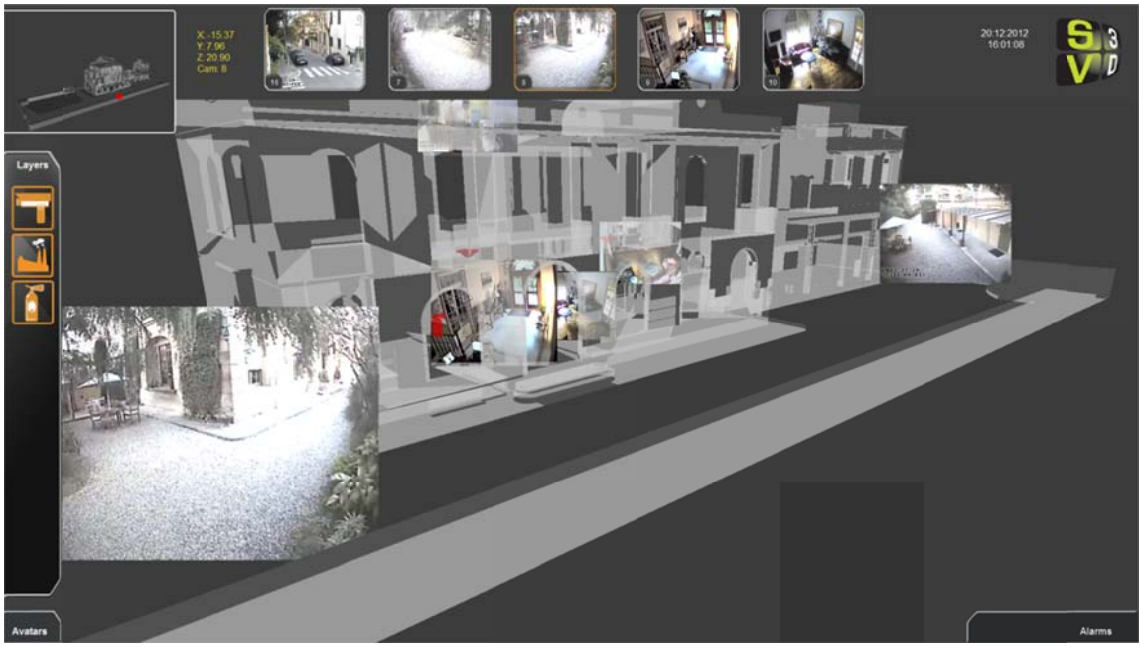
Note that in the same installation the same device, like a camera or a video analytics platform, can simultaneously serve several clients including the SV3D System Manager.



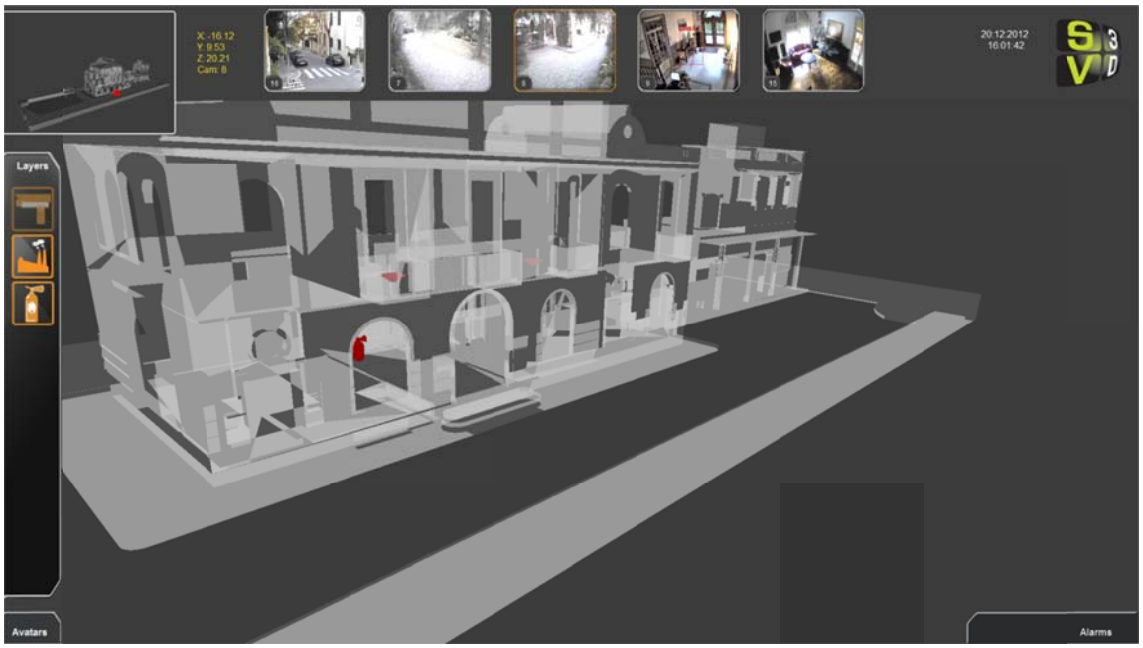
The control room operator's 3D visualization and navigation system prototype is shown below:



The control room operator's 3D visualization console is used by the operator to display the observed scenes where camera views are projected. He can navigate within this 3D modelled world with a mouse or joystick, and he can also use the control tablet to move directly to a given space.

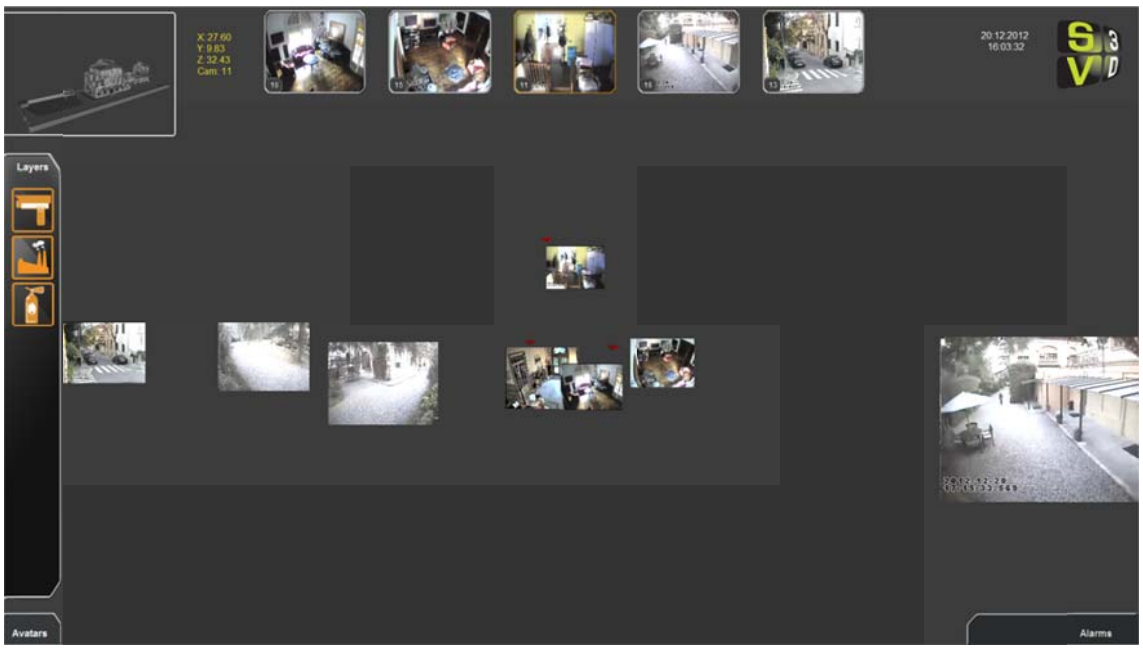


SV3D Navigator camera view when "jumping" to a defined viewpoint, the operator can see the whole zone in which the camera is placed, so he can have better information about the surrounding area. The current camera is highlighted at the top video reel on the centre of the screen, and the closest cameras are displayed next to it.



SV3D Navigator layers when the operator "asks" the navigator to hide a layer, the navigator adds transparency to the desired elements and allows the operator to focus on the important activities. It can hide:

- Cameras
- Specific devices
- All the devices
- …



SV3D Navigator building transparency as for the layers, the operator can also hide the whole building to focus on the cameras and devices.

SV3D Navigator alarms reach the Navigator and display on the operator's tablet. In this case, only an icon is shown, so the operator only has the necessary information. If the operator needs more information, he can display it with the tablet. The Navigator uses the same system to show the six newest alarms received and can switch automatically to the camera.

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