Final prototype testing

On September 27, 2016, Project ATHENA held its final prototype exercise at the West Yorkshire Police Training and Development Center in Wakefield, UK.

Exercise participants roleplaying the riot scene

The main goal of the exercise was to ensure that the ATHENA solution was fit for purpose and met end-user needs. Although the technical development had already been signed off, testing it in a live-play dynamic situation was also one of the aims. The exercise centered on five different scenarios: an ordinary day, a public order incident that included a weapon, a bus attack in which a police officer was injured, a potential terrorist incident that included both chemical weapons and firearms, and an 'at risk' vulnerable person scenario that was run simultaneously in a different geographic location.

The storylines in the scenarios were designed to test the ATHENA system in various ways, including how social media and smart mobile communication devices can play an important part in providing mutually beneficial information exchanges between the general public and professional organizations managing incidents. In this particular exercise, the main focus was on the police's use of the system.

In total, around 100 people were involved with the exercise, all of whom fully engaged with the proceedings so that near 'real-life' scenarios could be played out. A senior officer from West Yorkshire Police took the role of Silver Command and made strategic decisions based on the incoming information. Other police officers, volunteers and staff took various roles, and the ATHENA consortium members helped to facilitate and engaged with sending social media messages from the ATHENA app.

West Yorkshire Police public order training officers played a key role in organizing the exercise and ensured the proceedings ran smoothly and safely. The knowledge, expertise and enthusiasm of all those involved contributed to the overall success of the event.

The Command and Control Center during the exercise

Setting the stage for the exercise

The exercise was played in the public order training village, which is a large indoor and outdoor complex, simulating an ordinary city with roads, a town square and facades of small shops, restaurants, a library, a hospital, and a hotel. The training village has a pub equipped with real fixtures and seating, and was a central point of action during the exercise. In order to make the exercise environment as realistic as possible, lighting and sound conditions were manipulated and a few vehicles and a police horse patrol unit circulated the exercise arena.
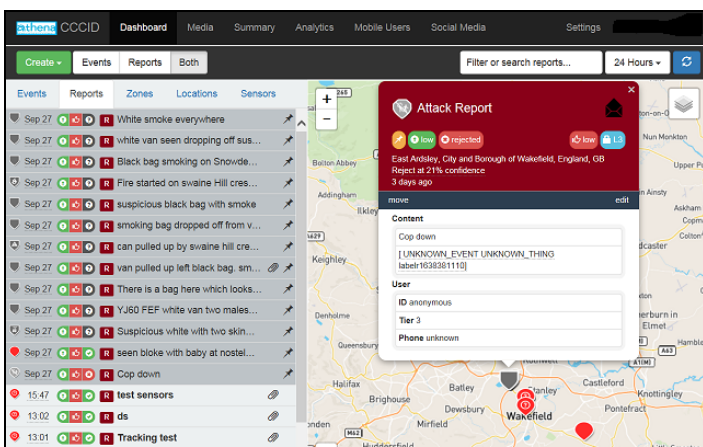
There were several observations points, including a viewing gantry providing a bird's eye view of the action below, and the live play exercise was video-recorded. Although the exercise was largely an unscripted dynamic event, several of the exercise participants received specific roles to play during the exercise and were requested to be in particular areas at specific times performing certain actions in order to create the scenarios.

Behind the scene

Throughout the exercise, information from the ATHENA app (text, audio, images, and videos) and social media was collected, processed, and fed into the Crisis Command and Control Intelligence Dashboard (CCCID), which is often just referred to as the "dashboard".

Screenshot of the CCID (the "dashboard")

The CCCID enabled the operators and Silver Command to have situational awareness, assess the incoming information, post situation reports, and identify danger zones for the ATHENA app users, with the aim of providing assistance and reassurance to them.

Screenshots of the ATHENA app

Depending on their access level, the app users received various degrees of information. For example, those users deemed as "trusted users" (e.g., professional first responders, command team members, official volunteers, and community organizers) were able to see all of the incoming reports, even those which had not been assessed for credibility; whereas, the "citizen users" could only view the reports that had been assessed and validated by the CCID operators.
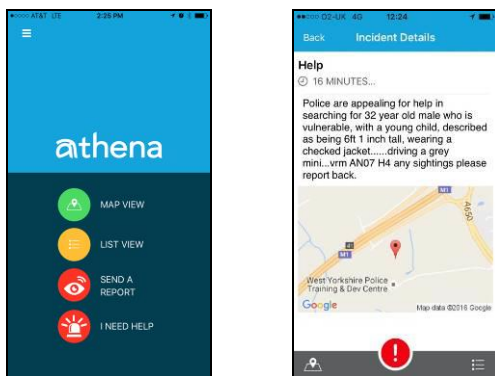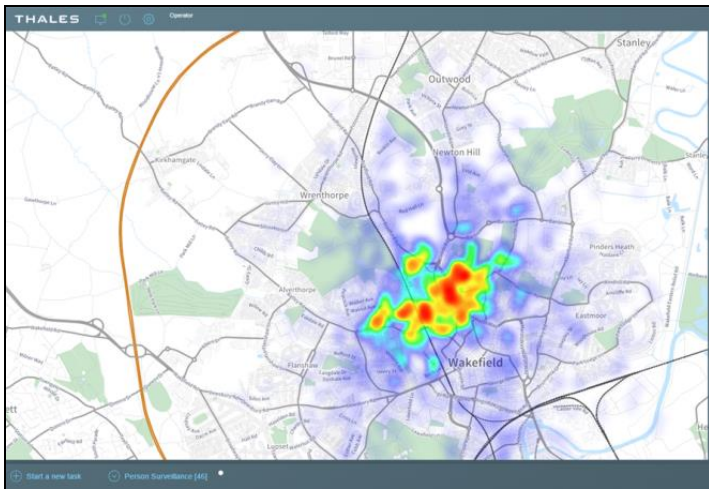
Behind the scene, the ATHENA Logic Cloud (ALC) was also tested. During the exercise, it supported an automated estimation of the whereabouts of a specific person by using heterogeneous data sources, such as the ATHENA reporting app system, specialized mobile devices, and simulated license plate recognition sensors. The estimated results were presented as a heat map superimposed on a GIS map, with the various colors indicating the likelihood that the person in question was present at specific locations.

This solution was a combination of the Dynamic Process Integration Framework (DPIF) and a novel context-boosted filtering algorithm, which was developed within the ATHENA project. The DPIF supported the information flows between the fusion algorithm and relevant data sources (such as the app users, police, license plate recognition sensors, and knowledge about the local environment). The fusion was based on a new algorithm that fuses sequences of disparate data and information about the environment in which a subject/object moves (e.g. GIS maps, intelligence about road blocks/traffic jams, etc.).

October 2016

Screenshot of the ATHENA tracker control interface, displaying a heat map for two different points in time. The warmer the color the more likely the subject is located at that specific coordinate.

This was an example of a composite socio-technical system in the ATHENA Cloud Logic, combining advanced fusion algorithms, the ATHENA app system, sensors, and humans as data sources and operators. The operators could influence tracking by providing additional information about possible/impossible locations, based on their domain knowledge. In general, the DPIF facilitates the integration of human cognitive capabilities directly into the problem solving processes and workflows. Thus, the general public and professional responders are not mere users of an automated system but contribute information to the system through the use of mobile devices and a control and command dashboard.

During the exercise, no installation was required on site as the ATHENA Logic Cloud was hosting the automated fusion algorithms, the interfaces with the ATHENA app system, and the interfaces with experts.

With the help of the ATHENA Logic Cloud, relevant capabilities are made visible and interoperable, so that the right analysis capabilities (in this case, an automated fusion algorithm) are quickly identified, activated, and connected with the right data sources. Overall, the system accurately localized the subject in all phases of the exercise in a fully automated way. In a real life situation, this would greatly assist those who are normally in charge of manual data management and interpretation, enabling them to focus on other tasks.

From a technical point of view, the system performed to its capabilities during the live play exercise. Despite the fact that the final testing on whether the end-user needs were met is still being assessed and that the evaluation of the exercise is not yet complete, the exercise was deemed a success since all elements of the ATHENA system functioned well and the participants understood what was required of them and engaged with great enthusiasm and interest.

The ATHENA project officially ends November 30, 2016, but the consortium partners are discussing how the components of the system can be utilized even after the termination of the project. For example, in addition to being useful in real crisis situations and incidents, the ATHENA solution could be used as an interactive exercise tool or be tailored to address everyday issues regarding situational awareness in many different geographic locations.

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October 2016