

# MAGNETO NEWS

H2020 MAGNETO Project | Newsletter Issue #1 | 19 March 2020

## Institute of Communication and Computer Systems (ICCS)

ICCS is a non-profit Academic Research Body established in 1989 by the Greek Ministry of Education. In FP7 ICCS ranked in the 19<sup>th</sup> position with respect to funding among all European research establishments, companies and universities. Together with NTUA (its academic branch), it ranked in the 12<sup>th</sup> position. The aim of ICCS is to carry research and development activities in the fields of all diverse aspects of telecommunications and computer systems, as well as their application in a variety of areas. The personnel of ICCS include more than 500 research associate scientists. ICCS aims to remain ahead of the wave of change in ICT by cooperating with industry and academia in highly distributed systems, energy management, machine learning, secure data and communication networks, context-awareness and data mining related projects. ICCS has highly qualified members with extensive expertise in the areas of energy management, system integration, machine learning, mobile and personal communications, context-awareness and pervasive computing.

ICCS will exploit MAGNETO results by strengthening its expertise and know-how in the area of intelligent management of large amounts of data through academic

publications, but also through co-operations with major stakeholders of the consortium in its existing domain of excellence (situational awareness, especially regarding the use of machine learning and pervasive technologies). ICCS will develop services relevant to advanced machine learning and reasoning in support of forensic investigations and

situational awareness, and may offer training and support, installation, code maintenance services after the project completion.



*Dr. Konstantinos Demestichas (R&D Project Manager and MAGNETO coordinator)*

## Heterogeneous Data Mining and Evidence Collection

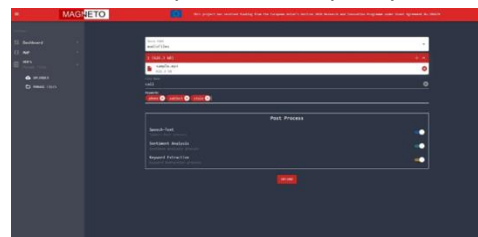
The ultimate mission of MAGNETO is to develop a tailored platform to assist law enforcement agencies in their investigations. To enable fast and accurate automatic search, detection and tracking capabilities, MAGNETO developed a number of media data solutions. Some of the achievements include robust foreground and background subtraction which enables real time separation of the background from the objects in the video scene despite of the camera movement. Another MAGNETO solution brings unique search functionality for distinctive visual regions in large CCTV datasets. This enables investigators to track down a suspect across CCTV footage based on a unique pattern appearing on suspect's clothes or body. MAGNETO is producing also a range of solutions building on latest Machine Learning technologies for text and data mining, including speech recognition, and language translation. As MAGNETO is designed to handle vast amounts of heterogeneous data, innovative solutions have been developed and integrated to form a tailored big data framework in order to handle data acquisition, storage, processing, security management and overall reliability.

## Requirements and Architecture

The LEAs in the consortium have carried out extensive criminal investigations analysis to identify and describe end user requirements and relevant use cases. This had a tremendous impact on all subsequent research, development and demonstration activities that have finally converged into the design of the MAGNETO platform. More specifically, the MAGNETO common representation model and the system architecture have been designed. The main system components and interfaces have been specified taking into account the required security and privacy levels and having in mind the human and organizational aspects to provide full support for all research and development activities.

## Augmented Intelligence

One of the main objectives of MAGNETO project is provide to LEAs user-oriented HMIs that augment their situation awareness and their operational capacity. Until now, the platform designs and developments were focused on isolated services and capabilities without interaction between them and the end users. The Augmented intelligence tools cover this identified need, providing a set of prototypes that allows the end-users to interact with the different services provided by MAGNETO platform. For convenience, LEAs have a single entry point for visualization in MAGNETO platform. This endpoint is a web page application where the end users can interact with the platform, providing information, or visualizing the results of the different analysis performed.



## University of Applied Sciences for Public Service in Bavaria – Department Police (HfoeD)

HfoeD is located in the south of Germany and trains the majority of police students in



Hochschule für den  
öffentlichen Dienst  
in Bayern  
Fachbereich  
Polizei

Bavaria for their career on professional and executive levels for the Police Enforcement Service. HfoeD teaches future higher ranked police officers in disciplines including psychology, political science and social sciences. The inter-disciplinary research team of HfoeD examines various domains relevant for policing including cybercrime, radicalization, extremism, terrorism. Security research for and via the police strengthens everyday networking in police practice with training and further education, in other words integrating theory and practice. The research team of HfoeD provides scientific knowledge on relevant topics in the field (i.e. security research, crime prevention or crime research) to police or institutions of the security structure and aids in the design of further training courses and seminars and the mediation of contacts. Furthermore, HfoeD works closely with the Ministry of the Interior and the Police Departments in Bavaria to maintain current standards between theory and practice and to serve the needs of police officers and citizens, alike.

HfoeD provides its knowledge and its widespread contacts to the field officers in Bavaria for providing a reliable input about the end-user needs and a baseline for the technical development of the MAGNETO platform. Additionally, HfoeD is responsible for the prototypes testing and verification, as well as for the feedback from the field officers.

Together with our project partner Munich Police Department, HfoeD

provides also the relevant data and the testing infrastructure for the field demonstrations of the MAGNETO platform. Finally, HfoeD uses its network to spread the results and disseminate the innovations created by the MAGNETO project among the LEAs in Europe.



*Left to right: Dr. Sebastian Allertseeder (Senior researcher and MAGNETO Project manager), Bianca Baker-Eck (Senior researcher), Dr. Holger Nitsch (Head of Research Department)*

## Advanced Semantic Reasoning

The goal of the Advanced Semantic Reasoning activity is to provide a toolbox of reasoning and fusing services in order to find criminal evidences to be presented to a court, or security incident evolution trends. The MAGNETO Common Representational Model is stored in the MAGNETO ontology that is based on the Resource Description Framework (RDF) modelling technique and is available through the Apache Fuseki RDF server that supports the SPARQL query language. The knowledge is described by creating instances of concept classes, such as “Person”, “Event”, “Weapon” that are connected to other instances by relations, such as “isNeighbourOf” (connecting two persons) or “isSuspect” (connecting a “Person” and an “Event” of type “Crime”). MAGNETO delivers two reasoning tool, one relying on a probabilistic approach and the other based on Markov Logic Networks, that create new knowledge by applying rules to the knowledge stored in the MAGNETO ontology. Furthermore, a semantic information fusion service customized for trajectory data stored in the MAGNETO ontology has been developed and integrated, that supports queries to explore and fuse trajectory data from different moving objects such as people or vehicles.

## Integration and Verification

The objective of the Integration and Verification task is to integrate the different services and software components under the common MAGNETO Platform. The appropriate development environment has been set up, while the corresponding methodologies and plans have been put in place to facilitate the development of MAGNETO’s technical components. Following a Continuous Integration approach, MAGNETO components are being implemented either as Docker components or as stand-alone Virtual Machines. A specific testing procedure is being followed by the tool developers in order to verify the proper use of each of the MAGNETO software components and services by providing corresponding unit tests according to the needs of each component. Furthermore, integration tests were also planned in order to have a smooth integration of the software components into the MAGNETO platform. Finally, following the detailed analysis of the various tools utilized by MAGNETO consortium LEAs, the implementation of the external interface tools focused on developing multi-file format support facilitates the evidence interchange between the operational environments of the LEAs with the MAGNETO platform.

## First operational tests on tracks

The MAGNETO technical partners are currently finalizing the first version of the MAGNETO platform to be delivered to LEAs.

The LEAs of our consortium will start a test phase in their own facilities with real data to test the different innovative tools proposed by the consortium. This approach with a real testbed on real data sets will allow the technical partners to get very relevant feedback on their innovations. Two classes of relevant feedback are awaited. The first one on the innovation and interest aspects in the LEAs domain of each of the components of the platform. A second one on the capabilities of the components to deal with real data outside of the lab environment.

The LEAs and the technical partners of MAGNETO are very excited to start this phase in a close to real operational environment!

Follow us on social medias and subscribe to our community to follow the MAGNETO adventure!

### Dr. David Faure

Scientific & Technical Coordinator of MAGNETO project

