

# UKRAINE project identifies promising applications for EGNSS – focus on aviation, agriculture and road

Foster application development through international cooperation, spread broad acceptance of the European Global Navigation Satellite Systems (EGNSS) in Ukraine, create opportunities for both knowledge building and commercial initiatives leveraging on cross-border partnerships. The UKRAINE project is meant to serve all these purposes at the same time, generating benefits for the Ukrainian economy and society, as well as strengthening Europe's position as a major space player with Galileo and EGNOS in the market of GNSS applications<sup>1</sup>.

A key component of the project is the investigation of existing and potential applications of GNSS in many different relevant industries (aviation, maritime and inland waterways, road transport, railways, agriculture and mapping and others) and their prioritization with respect to the positive impact of introducing EGNSS through legislative support.

The following is an overview of the results of the study aimed at identifying the most promising applications belonging to relevant fields for GNSS.

## Aviation

Due to the increased demand for air transportation services, the State Aviation Administration of Ukraine (SAAU) is looking for innovative and sustainable solutions to increase capacity, efficiency and the availability of airports with difficult terrain, while continuing to ensure an appropriate safety level.

In particular, Performance Based Navigation (PBN) is a new concept relying on the use of Area Navigation (RNAV) systems, which are a requirement for the implementation of the main innovations such as Free Routes Airspace (FRA). This application can bring immediate improvements in safety and efficiency, while paving the way for further improvement and innovation, considering that it can be applied in both terminal and enroute airspace.

The implementation of this new technology is a key enabler for many Ukrainian strategic objectives, such as:

- enhancing flight safety by recognition of multi-constellation GNSS navigation with a backup ground-based infrastructure;
- developing an interoperable harmonized CNS/ATM system supported by modern ATM techniques, flow performance metrics and perspective CNS capabilities;
- improving airports' accessibility with GNSS/APV approaches;
- boosting operational efficiency by implementation of Continuous Descent Operations (CDO), Free Routes and ETA concepts; while protecting the environment by reducing fuel emission and noise pollution over sensitive areas.

## Agriculture

With an utilised agricultural area of 418,000 km<sup>2</sup> (i.e. 69% of the total), Ukraine has a tremendous agricultural potential that has a critical role to play in contributing to global food security. The use of advanced technology is even more effective in those sectors of the economy that are characterised by high potential that is yet to be exploited. In this respect, agriculture in Ukraine is a good example with the national companies beginning a widespread adoption of information technology in agriculture. The key areas of application of GNSS are precision farming, improvement of efficiency of soil use, soil quality

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control and seeding control. Moreover, it is noteworthy that the products of strategic importance for the country, namely grain, corn and barley, followed by the growing cultivation of sunflower, are those targeted by GNSS-based technologies. Thus, this matching triggers a virtuous circle which can further accelerate agricultural development in Ukraine.

Farm Machinery Guidance and Automated Steering is a set of tools that provides a solution to the three major obstacles to success in today's market: the availability of timely objective information, the ability to make the right management decision and the opportunity to implement these solutions in practice. All these are achieved through specialised technical hardware and software. This GNSS system increases productivity in all phases of the agricultural activity, from soil preparation to harvesting. GNSS-based systems are quite expensive, but investments can be recouped in a short time thanks to a range of operation improvements significantly increasing business efficiency. In particular, the introduction of these new technologies permits the partial or even total automation of the operations of tractors and other implements, reducing the amount of overlap or of areas left uncovered. Moreover, when these GNSS-based applications are combined with Variable Rate Technology (VRT), they allow for automatic dosing of agricultural inputs (fertilizers, pesticides, seeds, etc.) based on the characteristics of the specific soil composition.

## **Road transport**

The Ukrainian road network has a significant development potential, which would be useful to leverage in order to boost the country's motorization pace. The introduction of GNSS-based applications can support the rationalization of the road network management, accelerating its modernisation through higher efficiency and lower maintenance costs, while increasing transport safety at the same time.

Fleet Management, intended as a vehicle-based system that includes data logging, GNSS-based positioning and data communication to a back-office application, is a very useful innovation that enhances vehicle management, transport management, driver management and mobile workforce management activities, by linking vehicle operations to IT systems of service providers, transport operators and enterprises. The benefit of this application are widespread to clients, who can monitor drivers' compliance to the schedules of resting times defined by law, and to transport operators who are enabled to tackle vehicle theft attempts and to align logistic operations.

Dangerous Goods Tracking is the service aimed at supporting controlling authorities in monitoring the transport of hazardous goods. The knowledge of the position, based on data provided by GNSS, enables the ion of possible safety and security-related threat; it also ensures that goods have been handled and managed correctly throughout the carriage. This sub-sector is very important for Ukraine because of the transportation of toxic wastes, ammunition, nuclear components in the interests of Ukraine and transit of cash-transit vans.

With eCall it becomes possible to trigger an emergency call to the appropriate Public Safety Answering Point (PSAP, i.e.112) in case of a severe accident. When eCall is triggered, a Minimum Set of Data (MSD), including the vehicle's position, is automatically sent to the PSAP. The benefits are straightforward: reduction of response time by emergency services and lowering of after-accident consequences' severity. It has been calculated that eCall enables the reduction in response time by emergency services of 50% in rural areas and 40% in urban environment, which results in a reduction of severity of the consequences of injuries between 2% and 15%. If eCall is introduced, both public and private benefits for Ukraine, which has just implemented 112, are expected to be remarkable.

The Digital Tachograph is a recording device providing enforcers with detailed information to check drivers' compliance to the road legislation, in particular with respect to working hours. EU Regulation 165/2014 has introduced GNSS to record automatically location data to allow the identification of vehicle position at certain points during the working day, enabling drivers to save time by automating certain tasks. The introduction of GNSS also improves the robustness of the device against tampering attempts. Ukraine could offer the same benefits to drivers and authorities by adopting similar provisions.