Earth observation and Earth GNSS data acquisition and processing platform for safe, sustainable and cost-efficient mining operations

Informe

Información del proyecto

Goldeneye

Identificador del acuerdo de subvención:
869398

Sitio web del proyecto

DOI
10.3030/869398

Proyecto cerrado

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17 Abril 2020

Fecha de inicio
1 Mayo 2020

Fecha de finalización
31 Octubre 2023

Financiado con arreglo a
SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials

Coste total
€ 10 838 613,44

Aportación de la UE
€ 8 360 389,95

Coordinado por
TEKNOLOGIAN TUTKIMUSKESKUS VTT OY
Finland

Este proyecto figura en...

22 Noviembre 2024

Periodic Reporting for period 2 - Goldeneye (Earth observation and Earth GNSS data acquisition and processing platform for safe, sustainable and cost-efficient mining operations)

Período documentado: 2021-11-01 hasta 2023-10-31

Resumen del contexto y de los objetivos generales del proyecto

Mining industry's products are mandatory for modern societies It is also economically important for producing countries providing hundreds of thousands of jobs in Europe and the key player in the EU's raw material independence. However, the industry is facing increasing efficiency, cost, regulatory and environmental challenges:

- Exploration challenges: There are fewer high-quality ore deposits left to develop and new deposits are often in remote and difficult-to-access areas. Consequently, the costs, lead times and risks associated with developing and operating new mines are increasing. Future exploration requires sensing technologies that can reach the remaining, more remote locations, or extract more value from existing mines and tailings.
- Mining operations challenges: The global commodities boom in the early 2000s was driven primarily by the rapid expansion of the Chinese economy. However, as China's economy has shifted away from resource-intensive manufacturing, there has been a slowdown in demand growth and consequent fall in commodity prices and mining profits: efficiency and cost reduction has therefore become a higher priority for mining operators. New sensing technologies can increase the efficiency and reduce the costs of mining operations, by allowing geo-referenced, qualitative and quantitative assessments of the mined ore, material flows and equipment tracking.
- Hazard risk management challenges: Recent and tragic tailing dam failures in South America have brought the management of tailings dam across the industry into sharp focus. Going forward, the mining industry will be under increased regulatory scrutiny from both a community safety and an environmental point of view. Better data acquisition and processing methods will enable mining operators to improve risk management, using the fusion of satellites, drone and proximal sensors as well as numerical simulations for advanced geotechnical analysis of open pits/underground

excavations, rock, groundwater, and ground support to increase mine safety, community confidence and environmental outcomes.
- Closure & post-closure challenges: The renaturation of mining areas requires high-resolution monitoring via multi-spectral sensors to monitor vegetation health and detect Acidic Mine Drainage (AMD). The acquired data allows monitoring the response of vegetation to stress factors at a high temporal and spatial resolution and hence, is the basis for an improved management of renaturation. These data acquisition and processing methods are also useful for considering post-mining land use suitability and agricultural capability.

Trabajo realizado desde el comienzo del proyecto hasta el final del período abarcado por el informe y los principales resultados hasta la fecha

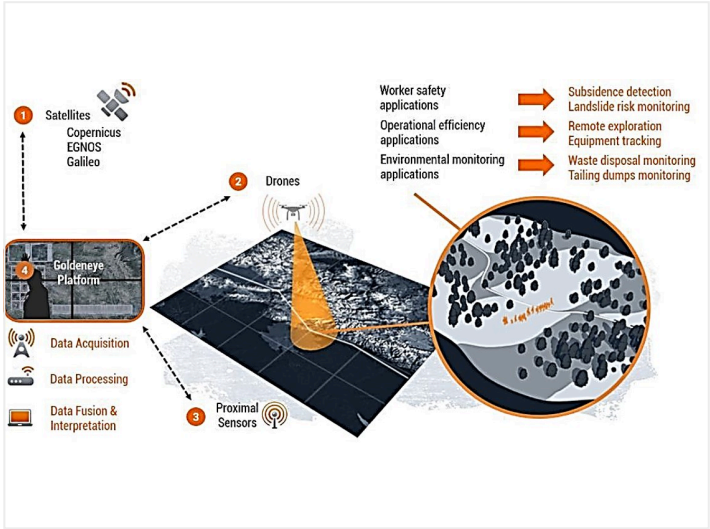
The Goldeneye project implemented a unique combination of remote sensing and positioning technologies, exploiting Earth observation and Earth GNSS data, together with data fusion and processing powered by data analytics and machine-learning algorithms. The platform allows satellites, drones, and in-situ sensors to collect high resolution data of the entire mine, which can be processed and converted into actionable intelligence for safety, environmental monitoring, and overall productivity, allowing more efficient exploration, extraction, and closure. Moreover, the platform can be integrated with other commercial platforms and with standards compliant data sources.Platform tools were demonstrated in five field trials in Germany, Bulgaria, Romania, Kosovo and Finland. Significant time and cost savings as well as environmental footprint reductions could be observed.
Goldeneye totally produced 81 key results items, consisting of wide variety of technology components (sensors and measuring, system components), knowledge, software, and artificial intelligence (AI) platform components needed for Software as a Service (SaaS) implementation. As an example of most significant and as a stand-alone exploitable technology formed by several key results is a VTT-origin startup called Hypermine. In general, Goldeneye commercial vision is based on the idea that there are several routes to bring developed services and technology solutions to the mining market ranging from direct partners direct technology sales to partners AI plaform based services and startups.
Goldeneye was active in social media and also produced two official project videos, two educational courses, and at least 35 refereed scientific presentations and publications. Stakeholder meetings were also arranged, trade fairs and conferences attended (e.g. PDAC and SEC) and the project was presented in Romanian TV and selected as the H2020 success story.

Avances que van más allá del estado de la técnica e impacto potencial esperado (incluida la repercusión socioeconómica y las implicaciones sociales más amplias del proyecto hasta la fecha)

The projects main innovation is the easy to use Goldeneye platform that allows data acquisition from various sources (drones, proximal sensors and satellites), AI-based data processing and interoperability with the different partner platforms. Notably, the platform solves the problem of

working with the combination of the all the different data sets requiring expertise in cloud computing, big data processing and remote sensing by providing the end user an interface that can be operating in natural language. As a result new or improved applications for exploration, mine safety, environmental protection and operations efficiency can be developed. Considering the sensors, the project will develop new drone sensor capabilities, addressing for example data processing, scalability and multisensory flights. In the proximal sensing the advances will focus on novel drill cuttings analysis system, improved optical measurements for exploration and underground navigation systems.
In addition to improve mine safety, environmental protection, as well as operations and explorations efficiency, the projects results are expected to create new jobs to the mining industry technology provider section. In addition, the improved exploration efficiency will help EU ta achieve more independent position in the raw material markets. The introduction of the novel technologies to the mining applications can potentially help attracting young people to work in the industry and furthermore, improved environmental protection and monitoring will help in gaining social license to operate from the general public.

During the field triais in Germany, Bulgaria, Romania, Finland and Kosovo we tested and implemented a unique combination of remote sensing and mineral detection technologies to demonstrate innovative solution in mineral exploration, extraction and post-closure environmental monitoring. The project successfully integrated sensing data from satellites, drones and exploration field data for mineral detection, target assessment, mineral extraction and environmental monitoring and quick decision making. The provided field trials tests demonstrate underground positioning intelligent exploration, mineral extraction and environmental monitoring scenario solutions and contribute for development and optimization of multisource Earth Observation Data platform to improve the complete lifecycle of a mining operation.



Goldeneye Concept Figure

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