UNITED NATIONS
Office for Outer Space Affairs

UNISPACE+50

Assessing synergies between GNSS and Earth Observation: Supporting the SDGs

United Nations Office for Outer Space Affairs
United Nations Office at Vienna
www.unoosa.org

UNITED NATIONS
Office for Outer Space Affairs

UNITED NATIONS
Office for Outer Space Affairs

Overview

- Background
- Joint UNOOSA/GSA study
- The Importance of Synergies
- Summary and Way Forward

UNITED NATIONS
Office for Outer Space Affairs

Background: SDGs

- 2030 Agenda for Sustainable Development came into effect on 1 January 2017
- UN Resolution A/RES/70/1
- The resolution contains a reference to "*earth observation and geospatial information*"
- 17 Goals, 169 targets, 232 indicators (*)
- Goals applicable to developing and developed countries

(*) Please note that the total number of indicators listed in the global indicator framework of SDG indicators is 244. However, since nine indicators repeat under two or three different targets (see below), the actual total number of individual indicators in the list is 232.

UNITED NATIONS
Office for Outer Space Affairs

2030 Agenda: SDGs

All countries and stakeholders are acting in **collaborative partnership to implement the 2030 Agenda for Sustainable Development**.

UNITED NATIONS
Office for Outer Space Affairs

UNITED NATIONS
Office for Outer Space Affairs

UNISPACE+50

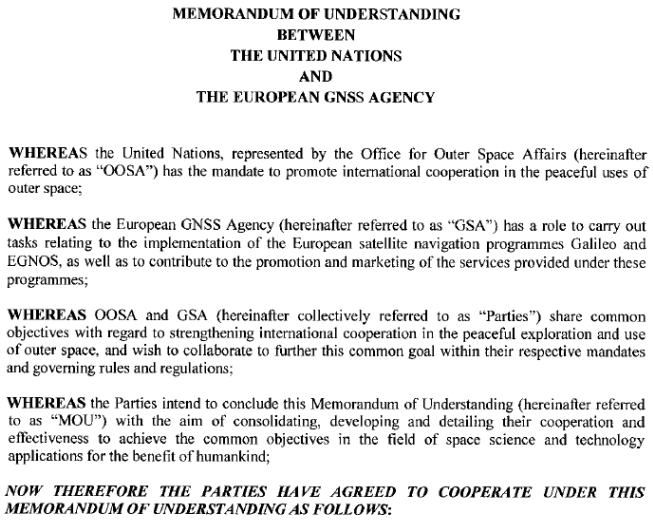
Transforming our world: 2030 Agenda for Sustainable Development

UNITED NATIONS
Office for Outer Space Affairs

„Sustainable development is the greatest challenge that humankind has ever faced“ (Jeffrey Sachs)

UNITED NATIONS
Office for Outer Space Affairs

Background: UN/GSA MoU



MEMORANDUM OF UNDERSTANDING
BETWEEN
THE UNITED NATIONS
AND
THE EUROPEAN GNSS AGENCY

WHEREAS the United Nations, represented by the Office for Outer Space Affairs (hereinafter referred to as "OOSA") has the mandate to promote international cooperation in the peaceful uses of outer space;

WHEREAS the European GNSS Agency (hereinafter referred to as "GSA") has a role to carry out tasks relating to the implementation of the European satellite navigation programmes Galileo and EGNOS, as well as to contribute to the promotion and marketing of the services provided under these programmes;

WHEREAS OOSA and GSA (hereinafter collectively referred to as "Parties") share common objectives with regard to strengthening international cooperation in the peaceful exploration and use of outer space, and wish to collaborate to further this common goal within their respective mandates and governing rules and regulations;

WHEREAS the Parties intend to conclude this Memorandum of Understanding (hereinafter referred to as "MOU") with the aim of consolidating, developing and detailing their cooperation and effectiveness to achieve the common objectives in the field of space science and technology applications for the benefit of humankind;

NOW THEREFORE THE PARTIES HAVE AGREED TO COOPERATE UNDER THIS MEMORANDUM OF UNDERSTANDING AS FOLLOWS:

UN represented by the Office for Outer Space Affairs
Dated 29th June 2016
Cooperation in the following areas:

- Joint studies, in particular concerning GNSS strategic dimension and applications
- User needs assessment (i.e. integration of GNSS and EO, and applications of international interest)
- Pilot projects
- Education in the field of satellite navigation

UNITED NATIONS
Office for Outer Space Affairs

Background: UN/GSA MoU

Preparation of a joint brochure

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE UNITED NATIONS
AND
THE EUROPEAN GNSS AGENCY

WHEREAS the United Nations, represented by the Office for Outer Space Affairs (hereinafter referred to as "OOSA") has the mandate to promote international cooperation in the peaceful uses of outer space;

WHEREAS the European GNSS Agency (hereinafter referred to as "GSA") has a role to carry out tasks relating to the implementation of the European satellite navigation programmes Galileo and EGNOS, as well as to contribute to the promotion and marketing of the services provided under these programmes;

WHEREAS OOSA and GSA (hereinafter collectively referred to as "Parties") share common objectives with regard to strengthening international cooperation in the peaceful exploration and use of outer space, and wish to collaborate to further this common goal within their respective mandates and governing rules and regulations;

WHEREAS the Parties intend to conclude this Memorandum of Understanding (hereinafter referred to as "MOU") with the aim of consolidating, developing and detailing their cooperation and effectiveness to achieve the common objectives in the field of space science and technology applications for the benefit of humankind;

NOW THEREFORE THE PARTIES HAVE AGREED TO COOPERATE UNDER THIS MEMORANDUM OF UNDERSTANDING AS FOLLOWS:

EGNSS and Copernicus: Supporting the Sustainable Development Goals

Building blocks towards the 2030 Agenda

UNITED NATIONS
Office for Outer Space Affairs

Brochure and The Global Partnership

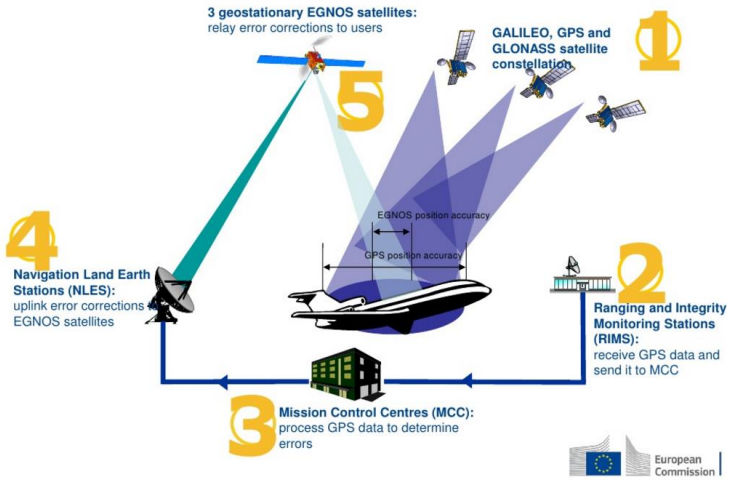
- The study falls into the activities of UNOOSA to promote the benefits of space to demonstrate how the two EU flagship programmes: Galileo (E-GNSS) and Copernicus contribute to the SDGs

- It is an analysis on which SDG targets could be benefited most from the two programmes.

UNITED NATIONS
Office for Outer Space Affairs

Joint UNOOSA/GSA Study

- European Global Navigation Satellite Systems (EGNSS)
  - ***Galileo*** is the EU's state-of-the-art global navigation satellite system under civilian control, providing improved positioning, navigation and timing information everywhere in the world (declared initial services in December 2016)



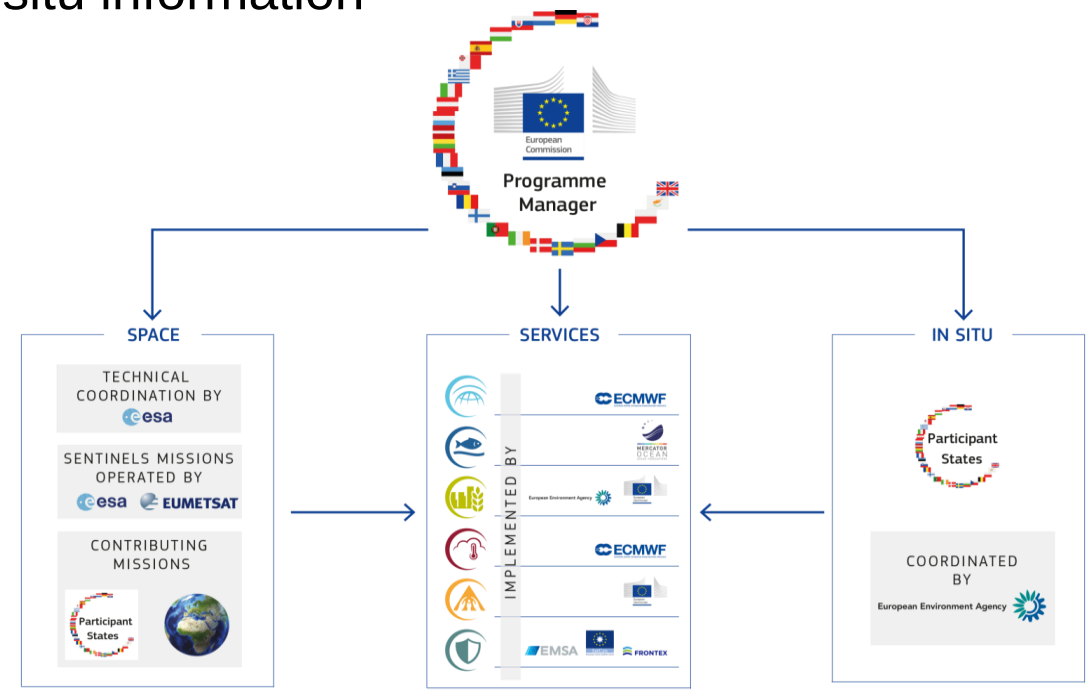
EGNOS

- The ***European Geostationary Navigation Overlay Service*** (EGNOS) is Europe's regional satellite-based augmentation system (SBAS) that is used to improve the performance of global navigation satellite systems. The system started its initial operations in July 2009 and obtained certification for use in safety of life applications in March 2011.

UNITED NATIONS
Office for Outer Space Affairs

Joint UNOOSA/GSA Study

- Copernicus is the Earth observation and monitoring programme of the European Union, looking at our planet and its environment for the ultimate benefit of all European citizens who remain its ultimate owners and beneficiaries, it builds on the data collected by satellites but also in situ information



Copernicus Governance

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies

- The Study has put on relief that several synergies between EGNSS and Copernicus could be exploited:

  - ❑ At **satellite service provision level**, two types of synergies between EGNSS and Copernicus have been identified:
    - Synergies at the **satellite infrastructure level** and in the provision of satellite services;
    - Synergies at **management and organisational** levels;
  - ❑ Synergies across the downstream value chain:
    - Market and technology monitoring;
    - Coordination of downstream stakeholders;
    - Communication and awareness building;
    - Capacity building;
    - R&D supporting innovation in application development; and
    - Funding with a special focus on start-up support.

UNITED NATIONS
Office for Outer Space Affairs

Joint UNOOSA/GSA Study

- Report aims at investigating how EU space technologies support the fulfilment of the SDGs
- The 17 SDGs grouped into two groups based (based strictly on the contribution of Copernicus and EGNSS)

- Significant Contribution Tier SDGs (13 out of 17)
- Limited Contribution Tier SDGs (4 out of 17)

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies

- The combination of the two (Copernicus and EGNSS) will allow both the **monitoring** and the **achievement** of some of the targets that are associated with the Goals:
  - **Monitoring** – enhancing the quality of data collected to help monitor the status of SDG implementation;
  - **Achievement**, which envisages direct support from *EGNSS* and *Copernicus* in achieving specific SDGs.

Example: EGNSS-enabled applications such as precision farming can directly contribute to achieving the “zero hunger” goal in developing countries by offering a cheap, entry-level solution for crop monitoring, while for developed countries it enables precision farming machinery, which further increases the crop production

Precision farming in Minnesota.
Credit: NASA

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies: First Tier

N°	Global Goals for Sustainable Development	EGNSS	Copernicus	Synergies	Examples of applications
1	No Poverty	◑●	◑●	◑●	Natural disaster forecast Crop productivity optimisation
2	Zero Hunger	●●	●●	●●	Crop productivity optimisation Livestock management optimisation
3	Good Health and Well-Being	◑●	●●	●●	Prevention of vector diseases Disability assistance Air quality monitoring Reduction of air pollution through road traffic optimisation eCall emergency response service Wearables for health promotion and disease prevention
6	Clean Water and Sanitation	◑●	●●	●●	Water quality monitoring Meteorological forecasting
7	Affordable and Clean Energy	●●	◑●	●●	Infrastructure monitoring Power grid synchronisation Seismic surveying Solar and wind energy production forecasting
8	Decent Work and Economic Growth	●●	◑●	●●	Supporting global economies GDP growth Lone workers monitoring
9	Industry, Innovation and Infrastructure	●●	◑●	●●	Infrastructure mapping and monitoring Construction surveying Smart mobility
11	Sustainable Cities and Communities	●●	●●	●●	Urban planning Infrastructure monitoring Improvement of city services Air quality monitoring Disaster management Search and rescue operations

Legend: Level of contribution in monitoring/achieving part of a target/indicator ◑◑ Limited Contribution ●● Significant contribution

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies: First Tier

N°	Global Goals for Sustainable Development	EGNSS	Copernicus	Synergies	Examples of applications
12	Responsible Consumption and Production	◑●	●●	●●	Natural resources management Food and dangerous goods traceability
13	Climate Action	●●	●●	●●	Climate change monitoring Disaster management Search and rescue operations
14	Life Below Water	◑●	●●	●●	Mapping and monitoring of natural and protected areas
15	Life on Land	●●	●●	●●	Bio-geophysical land surface monitoring Animal tracking
17	Partnerships for the Goals	●◑	●◑	●◑	International cooperation initiatives

Legend: Level of contribution in monitoring/achieving part of a target/indicator ◑◑ Limited Contribution ●● Significant contribution

The combination of the two system allows the delivery of enhanced services to end users, exploiting the synergies of the two systems results in a **better contribution to the 2030 Agenda for Sustainable Development**

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies

- The analysis shows that all the SDGs are positively impacted by the benefits stemming from the use of *EGNSS* and *Copernicus* applications

- **Out of the 169 SDG indicators, 65 (equal to almost 40%) are directly benefited** from using the *EGNSS* and *Copernicus* services, either supporting the monitoring of the status of achievement of a given SDG or actively contributing to their fulfilment.

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies: Example SDG 1

- Thanks to remote sensing and EGNSS, governments and supranational institutions can:
  - Forecast natural disasters and better coordinate subsequent aid;
  - Maximise the exploitation of natural resources; and
  - Contribute to providing more efficient support to vulnerable people

Solutions integrating GNSS and EO data can achieve yield increases in excess of 10%, while reducing inputs such as fuel, fertiliser and pesticides by up to 20%.

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies: Example SDG 1

Targets	EGNSS	Copernicus	Synergies
1.1	◑●	◑●	◑●
1.2	◑●	◑●	●●
1.3	◑◑	◑◑	◑◑
1.4	◑◑	●●	◑◑
1.A	◑●	◑●	◑◑

Legend: Level of contribution in monitoring/achieving part of a target/indicator ◑◑ Limited Contribution ●● Significant contribution

Space technologies are a key asset contributing to the achievement of SDG 1

EGNSS and Copernicus contribution is linked to 5 out of a total of 7 of the SDG 1 targets

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies: SDG 13

- Climate change and air pollution are closely linked, as they influence each other through complex interactions in the atmosphere:
  - GNSS navigation provides road vehicles with a planning tool that supports route optimisation, leading to a reduction in fuel used and CO2 emitted;
  - GNSS use in aviation enables landings in adverse weather conditions which implies a reduction in delays and diversions, thus resulting in less fuel used;
- The Global Climate Observing System (GCOS) introduced the “Essential Climate Variables” (ECVs) which are specific variables or groups of closely related variables that provide observation-based evidence for a range of applications, linked to climatic conditions, as well as understanding past, current, and possible future climate variability.
  - The Copernicus Climate Change Services (C3S) will cover up to 30 ECVs out of 50 by 2030 using Copernicus

UNITED NATIONS
Office for Outer Space Affairs

The Importance of Synergies: Example SDG 13

Targets	EGNSS	Copernicus	Synergies
13.1	●●	●●	●●
13.2	●●	●●	●●
13.b[1]	●●	●●	●●

Legend: Level of contribution in monitoring/achieving part of a target/indicator ◑◑ Limited Contribution ●● Significant contribution

Space technologies are a key asset contributing to the achievement of SDG 3 and are fundamental to understand climate change

EGNSS and Copernicus contribution is linked to 3 out of a total of 5 of the SDG 13 targets

UNITED NATIONS
Office for Outer Space Affairs

Summary and Way forward

- Governments are expected to take ownership and establish national frameworks for the achievement of the previously introduced 17 Goals

- Space is fundamental in either monitoring or achieving the SDGs

- The Office for Outer Space Affairs works to streamline and voice the contribution of space to the SDGs

UNITED NATIONS
Office for Outer Space Affairs

Summary and Way forward

- The contribution of E-GNSS and Copernicus to the SDGs has been assessed
- All 17 Sustainable Development Goals can benefit from space, in particular E-GNSS and Copernicus significantly contribute to 13 out of the 17
- E-GNSS and Copernicus contribute to 65 targets set under the SDGs

UNITED NATIONS
Office for Outer Space Affairs

Summary and Way forward

- The contribution of Telecommunication satellites is not included in this study

- Considering the contributions of EU related to space, governments have great tools to monitor or achieve the SDGs, but

- IMAGINE IF not only E-GNSS and Copernicus, but also telecommunications is included, and not only at regional level but including all different systems from all countries

UNISPACE +50

UNITED NATIONS
Office for Outer Space Affairs

THANK YOU

UNITED NATIONS
Office for Outer Space Affairs

www.unoosa.org • @UNOOSA