

HUNGARIAN GIS DATA FOR SUSTAINABLE DEVELOPMENT GOALS

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Abstract

The paper presents the Hungarian Society of Surveying, Mapping and Remote Sensing's (MFTTT) contribution to the Sustainable Development Goals implementation of the SDG Target 17.16 „Multi-stakeholder Partnership” in Hungary. In 2017, awareness raising campaign was executed on different professional forum to call attention of the Hungarian geospatial community and stakeholders to how their technologies and services can contribute to supporting the national implementation of SDGs in Hungary. From SDGs aspect, the authors give non-exhaustive review of those common reference and thematic geospatial data together with Earth Observation databases which are operating from former times and can be used to monitor the SDGs implementation in Hungary. Institutional background of the Geospatial Data and Earth Observations, the respective databases and GIS web services show that there are deficiencies in the Hungarian Spatial Data Infrastructure when applying them to serve the performance of SDGs related actions.

Keywords: UN 2030 Agenda, Sustainable Development Goals, Earth Observation, Geospatial Information, Spatial Data Infrastructure, Statistical conformability, Hungary, Implementation

THE UN 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT

Human activities besides their economic and societal impacts affect in an unprecedented manner our environment as well. The crucial importance of the environmental protection was formally recognized widely first by a high-profile international conference organized by the UN, hosted by the Swedish government. Milestones of the four decades follow-on actions leading to the UN Agenda 2030 are given in Table 1.

Table 1. Milestones on the way toward the UN 2030 Agenda

Actions	Location, date	Features
UN Conference on Human Environment	Stockholm, 1972	Formulating the concerns, 113 countries
UN World Commission on Environment & Development	Geneva, 1983	Established by the UN General Assembly Getting a political mandate
Our Common Future	New York, 1987	Definition of SD, Adopted by the UN GA
Earth Summit, UN Conference on Environment & Development	Rio de Janeiro, 1992	Rio Declaration on ED with 27 principles Agenda 21 with 40 chapters, 178 countries
The Millennium Summit	New York, 2000	8 Millennium Development Goals, 2015, 189 countries
World Summit on Sustainable Development	Johannesburg, 2002	Role of EO, GI and their technologies
Rio +20 Conference Earth Summit on Sustainable Development	Rio de Janeiro, 2012	The Future We Want – common vision. EO/GI and their technologies 192 countries

A decision on the Sustainable Development Goals building upon and representing continuation of the Millennium Development Goals was adopted at the Rio+20. The United Nations worked together with governments, the scientific community and the civil society to develop the post 2015 agenda for sustainable development. Mr. Csaba Kőrösi (former permanent representative of Hungary to the UN) played a key role in successful collaboration having co-chaired the Open Working Group tasked with drafting the UN's global goals with Mr. Macharia Kamau.

As a result of their efforts, the 193 member states of the United Nations adopted the 2030 Agenda for Sustainable Development including 17 goals and 169 targets on 25 September 2015. The document was published as entitled *Transforming Our World: The 2030 Agenda for Sustainable Development* (UN, 2015).

Elaborated by the Inter-Agency Expert Group of the UN Statistical Division (IAEG), the UN Economic and Social Council distributed a discussion proposal on SDGs' indicators. The major steps of the approval mechanism of the current 232 indicators associated with the 169 targets include the (1) Preparatory phase by IAEG-SDG, (2) Review and approval by the Meeting of the UN Statistical Committee (UNSTAT in March every year), (3) Approval by the Meeting of the UN Economic and Social Council (UN IAEG, 2016). The list of indicators was accepted at the 47th Meeting of the UN Statistical Commission, 8-11 March 2016.

THE ROLE OF GEOSPATIAL AND EO COMMUNITIES

Implementation of the UN 2030 Agenda provides opportunities and involves responsibilities not only for governments of the UN member countries but also for custodians and stakeholders of a wide range of world communities including the Earth Observations and geospatial ones (EO and GI). The latter's data, infrastructures, services and related technologies provide documentaries recording and monitoring of the SDGs' targets and indicators, and they also offer cost-effective, transparent and verifying methods to support the statisticians and decision. Resolution 70/1 of the UN General Assembly (UN GA, 2015) explicitly emphasizes: "17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts."

Disaggregated by geographic location, this is why the role of EO and GI data and spatial data infrastructure with the related services and technologies are significantly upgraded. This generates impacts on national-level strategy formulation, improves data policies, capacity building and needs for interdisciplinary/multi-agency coordination and collaboration, including public-private cooperation. It is anticipated that the geospatial and EO-related industry will steadily grow generating high-tech jobs providing value-added products and services from local to global markets.

As far as the Earth observation and geospatial information support of the official statistics in monitoring and achieving the 2030 Agenda is concerned, the GEO and UN GGIM publication (GEO UN-GGIM, 2017) and the presentation of Steven Ramage of GEO Secretariat held at the recent European Forum on Geography and Statistics are relevant references (Ramage, 2017). Table 2. identifies the targets and indicators of SDGs for which the EO and GI are operative.

Table 2. Goals of UN Agenda 2030 and their targets and indicators substantially implying the Earth observations and geospatial information (EO Support, 2017)

Target Contribute to progress on the Target, not necessarily the Indicator				Goal		Indicator Direct measure or indirect support to the Indicator									
			1.4	1.5	1	No poverty	1.4.2								
			2.3	2.4	2.c	2	Zero hunger	2.4.1							
			3.3	3.4	3.9	3.d	3	Good health and well-being	3.9.1						
						4	Quality education								
					5.a	5	Gender equality	5.a.1							
	6.1	6.3	6.4	6.5	6.6	6.a	6.b	6	Clean water and sanitation	6.3.1	6.3.2	6.4.2	6.5.1	6.6.1	
			7.2	7.3	7.a	7.b	7	Affordable and clean energy	7.1.1						
					8.4	8	Decent work and economic growth								
			9.1	9.4	9.5	9.a	9	Industry, innovation and infrastructure	9.1.1	9.4.1					
			10.6	10.7	10.a	10	Reduced inequalities								
	11.1	11.3	11.4	11.5	11.6	11.7	11.b	11.c	11	Sustainable cities and communities	11.1.1	11.2.1	11.3.1	11.6.2	11.7.1
			12.2	12.4	12.8	12.a	12.b	12	Responsible consumption and production	12.a.1					
			13.1	13.2	13.3	13.b	13	Climate action	13.1.1						
	14.1	14.2	14.3	14.4	14.6	14.7	14.a	14	Life below water	14.3.1	14.4.1	14.5.1			
	15.1	15.2	15.3	15.4	15.5	15.7	15.8	15.9	15	Life on land	15.1.1	15.2.1	15.3.1	15.4.1	15.4.2
						16.8	16	Peace, justice and strong institutions							
17.2	17.3	17.6	17.7	17.8	17.9	17.16	17.17	17.18	17	Partnerships for the goals	17.6.1	17.18.1			

Strong and well-structured international and institutional organizational infrastructure have been built up to fulfil the difficult task of SDGs. It consists of earlier existing organizations and the SDGs-oriented very new ones in frame of UN. Table 3. gives assignments to some mostly known organizations in the world.

Table 3. Examples of governmental, academic, industry and NGO stakeholders in EO/GI areas supporting the achievement of SDGs directly or indirectly

Items	Examples
Some Earth Observation international institutions	GEO , Intergovernmental Group on Earth Observation, 105 countries 118 members EO4SDGs , GEO Earth Observations for the Sustainable Development Goals CEOS , Committee on Earth Observation Satellites ISDE , International Society of Digital Earth etc.
EO/GI programs of space agencies	ESA (Copernicus, Galilei, ESA Earth Observation Data), NASA , USGEO etc.
UN and SDG-related bodies	ECOSOC , UN Economic and Social Council UNSTAT , UN Statistics Division UN-GGIM , Global Geospatial Information Management, UN Committee of Experts Data4SDGs , Global Partnership for Sustainable Development Data IAEG-SDG , Inter-Agency Expert Group on SDG indicators IISD , International Institute for Sustainable Development

	SDSN , Sustainable Development Solutions Network HLG-PCCB , High-level Group for Partnership, Coordination and Capacity-Building for statistics for the UN Agenda 2030, UN Statistical Commission HLPF , UN High-level Political Forum on Sustainable Development etc.
Global Geospatial Societies/Organisations	FIG , International Federation of Surveyors ISPRS , International Society of Photogrammetry and Remote Sensing ICA , International Cartographic Association IAG , International Association of Geodesy ISO-TC211 , International Standard Organization, Technical Committee OGC , Open Geospatial Consortium GSDI , Global Spatial Data Infrastructure Association etc.
Regional frameworks, programs and alliances in Europe	INSPIRE, Danube Region Strategy, EuroGeographics, UNECE WPLA, EUROGI, EuroSDR, GEE-See, EULIS etc.

HUNGARIAN INSTITUTION AND LEGAL BACKGROUND FOR SUSTAINABLE DEVELOPMENT

Hungary has developed a complex, well-balanced institution and legal system for the implementation of sustainable development laws and policies, including international agreements. (NFFT, 2018).

Institutions

Table 4. Overview on the governmental institution background for Sustainable Development in Hungary

Institutions in Hungary	Roles, rights and responsibilities
National Assembly	Adopting: (a) Constitution with some SD requirements (2011), (b) SD framework strategy (2013), (c) other SD relevant laws (on-going).
President of the Republic	Representing and advocating the commitment to sustainable development within the country and at the international level; Taking part in awareness raising. Dedicated Directorate for Environmental Sustainability assists the Office of President.
National Council for Sustainable Development	Elaborating the national framework strategy on sustainable development; Preparing biennial progress reports on SD in Hungary (including the UN SDG's); Participating in awareness raising; giving opinion on draft rules of law affecting sustainability. Independent, Parliament-based Multi-stakeholder council established by the National Assembly!
Ombudsman for Future Generations	Ensuring effective and coherent protection of constitutional rights; Acting as a policy advocate for sustainability; Investigating the complaints; Initiating review of rules at the Constitutional Court.
Constitutional Court	Reviewing of laws upon petition; Annuling objected laws if found being contrary to the Constitution (SD, concept of the rights of future generations is laid down in the Constitution).
Government, State-managed institutes	Setting policies and regulations in order to implement all goals of international agreements, national strategies and Constitution regarding the SD.
Central Statistical Office	Data collection, maintaining and publishing the SD database; Publishing biannually a report on implementation of SD (SD-Indicators HU, 2016); Managing UN and EU SD indicators.

Civil and academic institutions are active in the Hungarian implementation of the SDGs. Some of them are below.

- As example, two non-governmental Partner Organizations' taking-on responsibilities are as follows:
 - *The National Society of Conservationists–Friends of the Earth* (MTVSZ, 2018) has a wide program in connection with SDGs (Nature Conservation, Agriculture and Rural Development, Environmental Education, Climate Protection, and Regional Policy); they arrange nation-wide meetings on Sustainable Development;
 - *The Hungarian Society of Surveying, Mapping and Remote Sensing* (MFTTT, 2018) is arranging awareness campaigns, giving presentations and publishing papers on the obligations and opportunity for stakeholders to involve the Earth observations and Geospatial data into implementation of the Agenda 2030 for Sustainable Development – these are among the topics the authors give report to you in this presentation.

- A selective number of the Academic institutions and the Universities join the implementation of Sustainable Development Goals by their studies, research and learning programs of relevance.

Legal system, laws and strategies

The effective *Constitution (Fundamental Law) of Hungary* was adopted on the 25 April 2011. This basic document declares fundamental rights and commitments concerning all of the human, social, environmental, and economic dimensions of sustainable development. The Hungarian Constitution is one of the few in the World containing the principles (1) of the rights of future generations; (2) of sustainable development; and (3) of the duty to maintain natural heritage.

The first *National Sustainable Development Strategy (NSDS) of Hungary* was accepted by the government in June 2007. The main objective of the NSDS was to help shift domestic social, economic, and environmental processes (these priority fields are equal to the dimensions of the SD), i.e. Hungary's development onto a path that is sustainable in medium and long-term, taking into account both domestic realities and external and global processes and conditions.

As a consequence of the Kyoto Protocol, the *Act LX of 2007 on the implementation framework of the UN Framework Convention on Climate Change and the Kyoto Protocol thereof* was adapted in Hungary. According to the law, the *Government Decree No. 94/2014. (III. 21.) on the detailed rules of operation of National Adaptation Geoinformation System* was adopted for supporting the respective National Climate Change Strategy.

After the establishment of the National Council for Sustainable Development by the National Assembly in 2008, the Parliament also adopted a decree on the renewing process of NSDS. In March 2013, the Hungarian Parliament adopted the new *National Framework Strategy on Sustainable Development for the period 2012-24* (NFSSD, 2013). Although the new framework strategy was adapted earlier than the UN Agenda 2030, the Hungarian national SD framework strategy is containing all relevant implementation linkages to the SDGs. The compliance was analysed in the 2015 Progress Report of the NFSSD. Preliminary findings suggest a relatively good correlation between NFSSD's goals/tasks and the 83 SDGs relevant in Hungary. The governmental measures to implement the Framework Strategy have been prescribed by *Governmental regulation No. 1888/2016. (XII. 29.)*.

Finally, for higher level implementation of the Agenda 2030 SDGs, the *Governmental decision No. 2091/2017 (XII. 29.)* makes provision for performing the tasks of national relevance for each ministry.

Besides the well-balanced institution and legal system for the implementation of sustainable development, there are deficiencies (1) in regulating the Hungarian implementation of the UN Agenda 2030 SDGs tasks at a level of executive decree (2) and in using the EO and GI for Hungarian monitoring the sustainable development, in general. Due to the above mentioned Governmental decision No. 2091/2017, harmonized ministerial or interdepartmental decrees are expected to be compiled, discussed and issued in the next 6 to 12 months; consequently, these deficiencies mostly are expected or will be overcome.

EO AND GI RELATED SUSTAINABLE DEVELOPMENT FRAMEWORK ACTIVITY

Remarkable Events

During the last period, different events have been arranged in Hungary connected with the 2030 Agenda on the Sustainable Development. The Plenary Meeting of the Executive Committee of the *UN GGIM: Europe* was held in Budapest, 5 October 2016. From Hungary, the Department of Land Administration and Geo-information of the Ministry of Agriculture (which is the prime geospatial data provider in Hungary), the Hungarian Central Statistical Office, from abroad the UN-GGIM Secretariat, EuroGeographics, GSDI, EUROGI, and UNECE representatives joined the Meeting. Katalin Tóth, Deputy State Secretary of the Ministry of Agriculture, expressed her view: „The operation and achievements of the Hungarian Land Administration are well known and acknowledged in the European Union and beyond, consequently we can contribute to the professional issues addressed such as the visions, formulation of regulations and standards” (Tóth, 2016). For example, the support of the achievement of the first two SDGs using GI/EO data, services and technologies in Hungary are provided as follow:

- To benefit the SDGs 1, *No poverty*: Data and infrastructure of Hungarian Land Information System (cadastre, real estate inventory, land user information), all operated by information technological networks and services;
- To benefit the SDGs 2, *Zero hunger*: The Remote sensing based land use and land cover monitoring (CORINE LC), Land Parcel Identification System used for Common Agricultural-Policy subsidy control (MePAR and CwRS), the vineyard GIS (VINGIS) and wide range of EO data acquisition (satellite, airborne, UAV, in-situ).

An SDGs-related conference was arranged by the National Council for the Sustainable Development in cooperation with the Hungarian Society of Conservationists–Friends of the Earth (MTVSZ), 7 February 2017 with the aim to identify the progress and setting up tasks to be done, e.g. the amendment of the National Framework on Sustainable Development document. The MTVSZ organized a forum on sustainable development activity of the United Nations in last decades and a critical discussion on the goals of Agenda 2030.

The Hungarian National Assembly was the very first that ratified the Paris Agreement on Climate Change in 2016 paving the way for the elaboration of the 2nd National Strategy on Climate Change, whereas efforts have been made by the Department on Climate Policy and the Hungarian Space Office of the Ministry of National Development to emphasize the Earth Observation and related issues such as the EU Copernicus programme as well as the utilisation of the national Earth Observation Information System (Zboray, 2017). The document prepared was submitted by the Ministry of National Development to the National Council of Sustainable Development for discussion.

HUNGARIAN EO AND GI STAKEHOLDERS IN SERVICE OF SDGS IMPLEMENTATION

Authorities

The supervisory authority in the field of geodesy, surveying, mapping, remote sensing, land administration, geo-information and earth observation is the Department of Land Administration and Geo-information of the Ministry of Agriculture. This official portal (LandHU, 2018) well represents all its tasks, intercommunications, references and institutions. Its institutions can shortly be described below:

- Since 1 January 2017, the successor of FÖMI, providing a wide range of reference framing, mapping, land data, GI, spatial data infrastructure, remote sensing and Earth observation nation-wide services for users from citizens to private sector and from governmental agencies to academia in national and international context is the Department of Surveying, Remote Sensing and Land Offices at the Budapest Capital Government Bureau.
- Services provided on sub-national level in surveying and land issues are performed by Land offices at the County Government Bureaus and the District Bureaus.

Military mapping and geospatial information management fall within the competency of Geoinformation Service of the Home Defence Forces.

Hungarian Space Office at the Ministry of National Development supervises the space research programs and major projects in Earth Observation and has wide range of international relations in EU and beyond with special emphasis on cooperation with national/regional space agencies (e.g. ESA) and intergovernmental organizations such as GEO and UN bodies.

Sectors and branches having geospatial or Earth observation capabilities having dominant role in implementation of the Sustainable Development Goals are represented by state managed institutions as potential cooperative partners and custodians of the reference and the thematic spatial data to be provided in the frame of the National Spatial Data Infrastructure. The sectors in question are the Water Management, Transportation, Meteorology, Geology and Geophysics, Energy, Soil, Environment Protection and Nature Conservation, Physical planning, etc. Detailed presentation of the respective institutions is out of scope of this paper.

Other stakeholders

Civil professional societies in GI and EO are the Hungarian Society of Surveying, Mapping and Remote Sensing (MFTTT), the Hungarian Association for Geo-information (HUNAGI) and a Gita Hungary Society. In standardization the Hungarian Standardization Body, Working Group on Geo-informatics MB818 played role.

On market actors of the GI industry (private sector from start-ups up to SMEs): There are many players who will be potentially involved in the achievement of SDGs taking active part in the target and indicator monitoring and/or reporting to the Central Statistical Office (KSH), which is the reporting body to the UN.

Scientific and research labs, academic institutions, R+D workshops and the institutions of the higher education sector (Universities, Colleges) of our GI/EO profession have significant importance in supporting the SDGs' implementation. They are strongly interested in driving the international relations, cross-border or international projects and programs.

Hungarian Geospatial data and Earth Observations in service of SDGs implementation

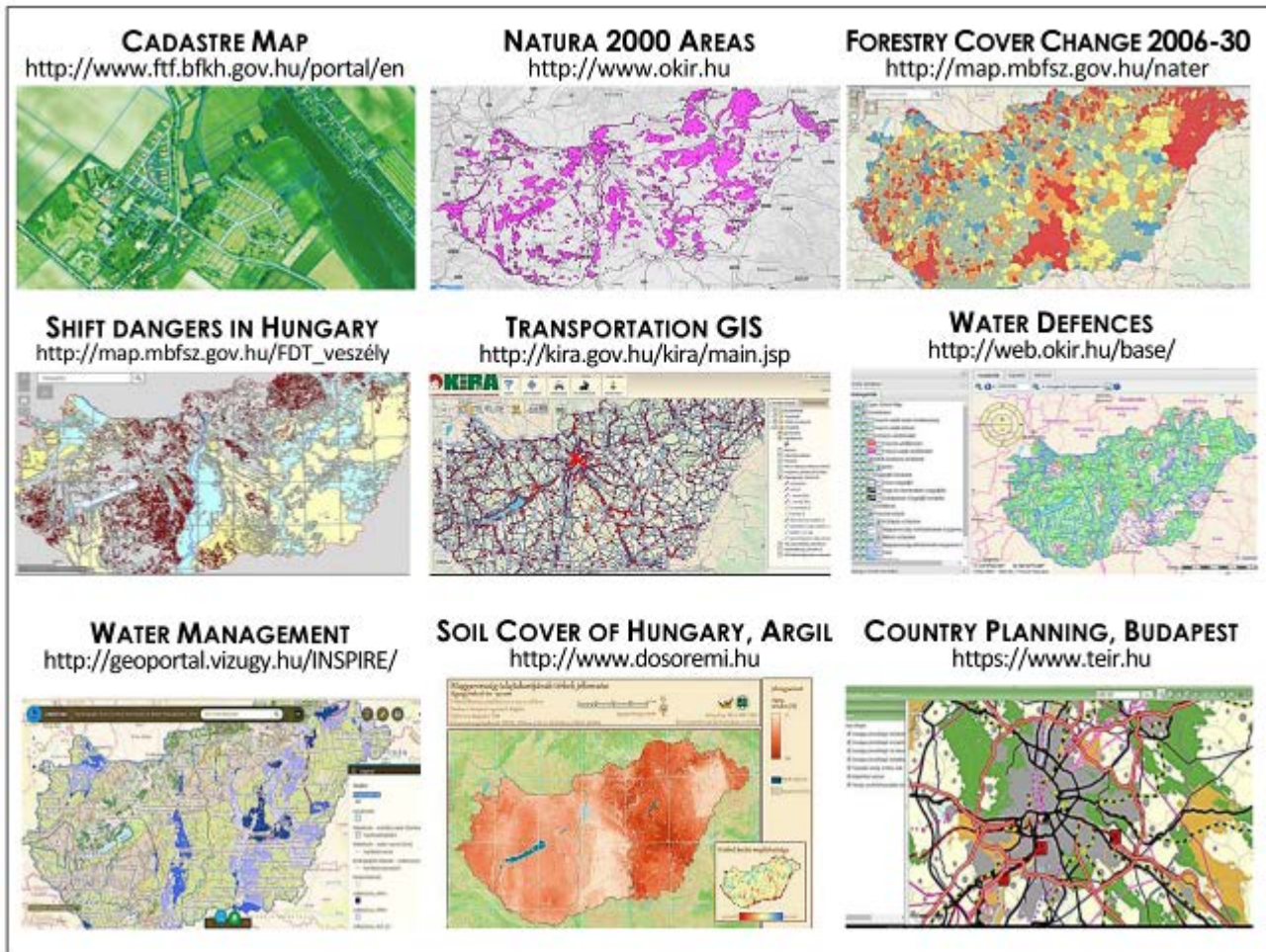
Below, many Hungarian GI and EO data sets are enumerated, some of them specified. Due to purpose and extent of the paper, both the enumeration and the specification may not be fully exhausted. Apparently, these data sets support

different/multiple goals, targets and indicators of Agenda 2030, as illustrated in Table 2. However, the data sets' support functions in, effects on and linkage with the goals, targets and indicators are not exposed here, whether they are enumerated or explicitly specified.

Geospatial and Earth observation data of the Department of Geodesy, Remote Sensing and Land Offices, Government Office of the Capital City Budapest (FTFF.BFKH Portal, 2018):

- *Reference systems*, Vertical and Horizontal Network, Hungarian GNSS Active Network, Control points
- *Geographical names*: Hungarian Gazetteer, FNT
- *Administrative boundaries* of Hungary, MKH
- *Unified National Cadastre* (Mihály et al, 2009); Taking care of IT Systems of Unified Land Registry, Farmer's and Land Lease Register, also manage the nation-wide processing of Land Administration Data, the development and operation of Land Information Systems and data warehouses, the provision of connections and continuous data-exchange with other IT systems. Responsible for storing, managing and serving the State Base Data (Land Registry, Land Lease Registry, and Farmer's Registry). Development for National Land Fund Management Organization.
- *Topographic maps* (rasterised and vectorised)
- *Elevation data*, DEM
- *Land cover, CORINE LC series*: The CORINE Land Cover (CLC) inventory was initiated in 1985 (reference year 1990). Updates were produced in 2000, 2006, and the latest in 2012. It consists of an inventory of land cover in 44 classes. CLC uses a Minimum Mapping Unit (MMU) of 25 hectares (ha) for areal phenomena and a minimum width of 100 m for linear phenomena. The time series were complemented by change layers, which map changes in land cover with an MMU of 5 ha. CLC2012 data sets were created between 2012 and 2014 within the frames of the GIO-Hungary project, fully financed by the EEA.
- *Aerial photos and Orthoimagery*, 1/3 of the country each year; Digital aerial photo archive online service;
- *Land use*, partly, see Unified National Cadastre
- *Agricultural and aquaculture facilities*: LPIS-Hu (MePAR), CwRS, VINGIS, NÖVMON per year
 - Detection and monitoring of damages to agricultural production by using remote sensing (2001, 2004, 2010, 2013, 2015, 2016)
 - GIS Register of Vineyards, VINGIS
 - Hungarian Land Parcel Identification System (*LPIS-Hu*) and Control with Remote Sensing (*CwRS*):
 - From 2004 to this day they provide yearly registering and monitoring GI and EO data sets for Hungarian geospatial and administrative support to the farmers during the procedure of area-based subsidy applications in the EU Common Agricultural Policy.
 - *LPIS-Hu in numbers, 2017*:
 - 451 730 physical blocks, average block size: 20.6 ha,
 - participants: 173 000 farmers, 4100 orthophotos, 26 thematic layers.

Figure 2. Samples from thematic geospatial information systems used in Hungary



THE ENGAGEMENT OF STAKEHOLDERS CAMPAIGN IN HUNGARY

The Multi-stakeholder partnerships are part of the Sustainable Development Goal 17. The Resolution 70/1 of the UN General Assembly describes the related tasks:

„17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries

17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships”

Accordingly, in March 2017, an awareness raising campaign was launched by Sz. Mihály, G. Remetey-Fülöpp and T. Palya, the volunteer members of the Hungarian Society of Surveying, Mapping and Remote Sensing (MFTTT), actually the former and the present national INSPIRE delegates as well as the national correspondent to the Group of Earth Observations (GEO) and liaison of the Global Spatial Data Infrastructure Association (GSDI) to the Working Group of Information Systems and Services (WGISS) of the Committee of Earth Observation Satellites (CEOS).

This action is in line with the firm commitment of the President of the 71th Session of UN who by taking his office on 13 September 2016 expressed his commitment to strengthen momentum for SDGs implementation on the first place by “Raising the global public’s awareness of the critical importance of SDG implementation. Now, the best start is to begin it with awareness raising to engage the stakeholders” (Thomson, 2016).

Presentations and Papers

Table 5. Awareness raising campaign of MFTTT to engage stakeholders at domestic and cross-border conferences and meetings on EO/GI/SDI for SDGs participated by representatives of governmental organisations, professional civil societies, academia, private sector (start-ups, Nano- and SMEs) as well as students. (The documents are downloadable from the repository Mihály et al, 2017g)

Presentation or paper	Communities attracted	Participants
<i>Day of the European Surveyors and Geoinformatics</i> Budapest, 22 March 2017 (Mihály et al, 2017a)	Surveyors, experts in geoinformatics; Policy makers, market actors, professors, students, members of civil societies	180 pers.
<i>GIS Open 2017</i> Székesfehérvár, 11-13 April 2017 (Mihály et al, 2017b)	Land Administration, surveying, mapping, remote sensing, experts in geoinformatics; professors, students, researchers	150 pers.
<i>Transylvanian XVIIIth Meeting of Surveyors, EMT</i> Tusnádfürdő, 18-21 May 2017 (Mihály et al, 2017c)	Geodesists, Surveyors, experts in cadastre and geoinformatics, private sector of Transylvania and Mather-country Hungary	140 pers.
<i>VIIIth GIS Conference and Exhibition</i> Debrecen, 25-26 May 2017 (Palya et al, 2017)	Experts in geoinformatics and remote sensing, professionals of higher education, policy makers	150 pers.
<i>31st Roving Conference of MFTTT</i> Szekszárd, 6-8 July 2017 (Mihály et al, 2017d)	Experts in land administration, surveying, mapping, remote sensing, geoinformatics; Policy makers, civil societies' members	192 pers.
<i>Mini Conference, 70th Anniversary of Prof. B. Márkus</i> Székesfehérvár, 11 July 2017 (Mihály, 2017)	Experts in geoinformatics from universities, students, private sector, governmental agencies and civil professionals	35 pers.
<i>Fény-Tér-Kép (Light-Space-Image) Conference</i> Gárdony, 12-13 October 2017 (Mihály et al, 2017e)	Experts in photogrammetry, remote sensing, Earth Observation, image processing and geoinformatics	100 pers.
<i>Meeting with the SD representatives of the National University of Public Service.</i> Budapest, 7 November 2017 (Mihály et al, 2017f)	Experts of 'Good State and Governance', state efficiency indicators, SD in water governance, climate change, food security, social capital, culture of sustainable living	4 pers.
<i>Paper in International Scientific Journal MMM-GI</i> , December 2017 (Mihály et al 2017h)	Experts in geospatial and Earth observation, stakeholders concerned in SD, High Level Political Forum of monitoring of SDGs	na.
<i>Day of the European Surveyors and Geoinformatics</i> Budapest, 21 March 2018 (Mihály et al 2018a)	Surveyors, experts in geoinformatics and Earth observation; Market actors, students, professors, students, members of civil societies	130 pers.
<i>VIIth Conference of Zielinski Szilárd Civil Engineering College</i> Budapest, 4 May 2018 (Palya, 2018)	Students of Civil Engineering, Technical University of Budapest	30 pers.
<i>7th International Conference on Cartography & GIS</i> , Sozopol, Bulgaria 18-23 June 2018 (Zentai et al 2018)	International experts of Cartography and GIS	196 pers.
<i>Paper in "Geodézia és Kartográfia", Hungarian journal of surveyors and cartographers</i> , July 2018 (Mihály et al 2018b)	Hungarian experts in Geodesy and Cartography	na.

Wider Visibility of the EO/GI for SDGs-Related Awareness Raising in Hungary

The GSDI Association (which was Participating Organization in GEO between 2008-2018-, had liaison with CEOS WGISS, reached special consultative status with UN ECOSOC and still supports the UN Global Geospatial Information Management (UN GGIM) by being active in its Geospatial Societies and Academic Network). Through the GSDI the Hungarian efforts promoting the EO/SDI for SDGs were mentioned in the GSDI's Liaison Reports and presented for the CEOS WGISS plenaries hosted by NASA and RADI in 2017 (GSDI, 2017a) and (GSDI, 2017b). These activities were highlighted in the column Insider's View of the GIM International magazine in its September 2017 issue (Remetey-Fülöpp, 2017). By invitation of the organisers of the 2nd Nexus Conference on Climate-Water-Food-Energy held in Chapel Hill between 16 and 18 April 2018, a contribution was submitted for the Chapel Hill Message as follows:

“The availability, accessibility and usability of sectorial data has vital importance for the inter-sectorial approach of the interlinked multi-node environment of water, energy, food and climate domains. The Nexus effectively supported by the infrastructures of Earth observation and geospatial data and interoperable services from local to national and from regional to global enabling the effective achievement of the Sustainable Development Goals by facilitating the monitoring and reporting on the indicators of goals and targets of the UN 2030 Agenda. Awareness raising of the stakeholders including governments, NGOs, academic institutions and private entities are crucial for their early engagement.”

As explanation it was mentioned, in Hungary, the potentials of EO/Spatial Data infrastructures for the implementation of 2030 Agenda were promoted in a series of awareness raising activities of the Hungarian Society of Surveying, Mapping and Remote Sensing and new actions are envisaged advocating their use in Nexus-approach as well.

A summary of SDGs-related actions MFTTT has been reported to the GEO EO4SDG team by Dr. Remetey-Fülöpp in August 2017 and 2018, respectively. The 2018 Progress Report of the GEO EO4SDG, cited the MFTTT achievements as follow:

“Hungary was another country that submitted its Volunteer National Review report at the 2018 HLPF. Efforts aiming to emphasize opportunities and challenges for geospatial data stakeholders in the SDG context in Hungary include activities by a committed team of volunteers mandated by the Hungarian Society of Surveying, Mapping and Remote Sensing (MFTTT) to contribute to the implementation of the SDGs by identifying and promoting the use of geospatial and EO data. These efforts, inspired partly by EO4SDG and the Global Spatial Data Infrastructure Association, have focused on enhancing multi-stakeholder partnerships – for instance, between the MFTTT, the Hungarian Space Office, and the Hungarian Central Statistical Office, in support of geospatial/EO integration in national SDG monitoring and implementation.”

If delegated by the Hungarian Space Office to the forthcoming CEOS WGISS and GEO XV Plenaries in October 2018, it might ensure further opportunities to exchange experiences with experts of other similar national awareness raising efforts.

Additionally, we have the intention to contribute to the Global Day of Action (25th of September 2018) via the “We Act4SDGs” campaign (<http://www.weact4sdgs.org>)

The MFTTT Leadership Supports the Actions of the Volunteers

Performance of the MFTTT awareness raising campaign 2017 was reported to the Managerial Board of Hungarian Society of Surveying, Mapping and Remote Sensing (MFTTT) on its 12 December 2017 meetings in Budapest. The Society President Prof. József Ádám and the Managerial Board accepted efforts of the three volunteer members of MFTTT and declared that continuation of the campaign is still actual and important on both national and international level – see Order 17/2017. (XII. 12.) of the MFTTT Managerial Board:

(https://www.mfttt.hu/mftttportal/index.php/letoltes/eloadasok/doc_view/555-ib-hatarozatok-2017).

FOLLOW-ON ACTIONS

The envisaged steps towards the achievements of tangible results in the engagement of stakeholders include meeting with experts of the Sustainable Development and Resources Research Centre at the National University of Public Service. In their periodically published Good State and Governance Report (NUPS, 2017) they are focusing on developing state efficiency indicators related to state reform priorities. Beside this, they are conducting research on sustainable development in areas of water governance, climate change, food security, social capital, culture of sustainable living. The aim is to exchange of information and to discuss the feasibility how Earth observations and geospatial information could support their monitoring.

Further actions are anticipated with Earth observation experts of the Hungarian Space Office Ministry of National Development, where the multi-agency and interdisciplinary project Earth Observation Information System (FIR) will be supervised (Zboray, 2017). Recently the HSO moved to the Ministry of Foreign Affairs and Trade). Based on the deliverables of the previous GEO Week, held in Washington DC, between 24-27 October 2017, the Strategic Implementation Plan of the GEO Initiative 18: Earth Observations in Service of the 2030 Agenda for Sustainable Development (EO4SDGs) (GEO, 2017) will be reviewed and discussed with emphasis on the issue, how the existing and enhanced geospatial data infrastructure could support target indicator monitoring and reporting. The Hungarian experiences in awareness raising in the 'EO/SDI/GI for SDGs' context is also considered as contribution to the SDG Chapter of the Manual of Digital Earth of ISDE (www.digitalearth-isde.org).

SPATIAL DATA INFRASTRUCTURE FOR GOOD SERVICE TO IMPLEMENTATION OF SDGS

Missing of Hungarian NSDI is a Possible Reason for Degraded SDGs Implementation

The purpose of Directive 2007/2/EC – known as the INSPIRE (Infrastructure for Spatial Information in Europe) Directive – is to lay down general rules aimed at the establishment, management and maintenance of the Infrastructure for Spatial Information in the European Community and of its computerised, Internet-based services, and to establish this infrastructure between 2009 and 2020. This is to ensure that (a) the enforcement of EU Community policies, (b) the coordination of the environment, management and feedback activities and (c) the political mechanisms of actions be smooth, simple and efficient. The INSPIRE is highly beneficial for the UN Agenda 2030 policies as well.

Harmonisation of the spatial data, their interoperability and the data policy in Hungary is incomplete, therefore, cooperation between the databases may end in problems. Hungary does not have a nationally harmonised National Spatial Data Infrastructure. Belonging to several ministries or ministerial back offices, each field manages the data within their own scope of action in accordance with their legal requirements but no rule is in force regarding their harmonization. Further, with the exception of certain data themes, the Hungarian data policy does not allow free data uses at the moment, which often prevents cooperation between different sectors of the State.

We must establish Hungarian National Spatial Data Infrastructure, one basic element of which are the INSPIRE rules as given above. The other concern for that is to enable Hungary making good geospatial and Earth observation services for harmonized performance of the country's engagements in the Sustainable Development Goals implementation.

The establishment of such National Spatial Data Infrastructure will allow efficient and coordinated use of the spatial data and the spatial information systems by the Government and different stakeholders. This is indispensable for ensuring proper decision-preparation, for managing emergency situations, for establishing a better environmental status, for improving the quality of State services and for establishing a better service-providing State, all supporting the implementation of SDGs. Establishment of the National Spatial Data Infrastructure is necessary on the governmental level with the cooperation of the different Ministries and the Hungarian Central Statistical Office, with the involvement of the academy, the educational institutions, the private sector and the civil society organizations. It needs at the same time implementation of a more favourable data policy at national level.

CONCLUSION

The Hungarian Society of Surveying, Mapping and Remote Sensing and its volunteer members successfully contributed to the implementation of Target 17.16 "Multi-stakeholder Partnership" of Agenda 2030 SDGs by their 2017-18 awareness raising campaign executed on different professional forums calling the attention of the Hungarian geospatial community and stakeholders to how their technologies and services can support the national implementation of SDGs in Hungary. This is appropriate for reporting to UN High-level Political Forum on Sustainable Development in the next Voluntary National Review of Hungary on the Sustainable Development Goals of the 2030 Agenda.

For future active and effective Hungarian participation in implementation of the Agenda 2030 SDGs, the supportive geospatial and Earth observation data, services and stakeholders are to be involved and utilized in Hungary at a level and enhancement higher than before. For this reason, different measures are to be taken in Hungary: (a) continuation of the engagement of GI and EO stakeholders campaigns, (b) strengthening the cooperation with the UN and SDG-related bodies, (c) realizing the codification works, i.e. decrees formulated and issued to regulate the GI and EO data services for and stakeholders participation in Hungarian actions of fulfillment of the SDGs, (d) measures are needed for proper operation of the national Spatial Data Infrastructure and associated partnerships of the stakeholders of the interlinked sectors, (e) these are inevitable to ensure effective and synergetic support by geospatial data and Earth observation integrated with statistical information to achieve the Sustainable Development Goals.

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Membership: Hungarian Society of Surveying, Mapping and Remote Sensing; Vice-chair of QKEN (Quality Knowledge Expert Network) at EuroGeographics; Hungarian member of the INSPIRE Maintenance and Implementation Group.



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Membership: Hungarian Society of Surveying, Mapping and Remote Sensing (President 2007-2011, Vice-president 2011-2015); Geodetic Scientific Committee of HAS; Chairman of GI Standards' WG of Hungarian Standardization Body; Hungarian Representative to EuroGeographics and to FIG Commission 3.

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Publications: Over 100 presentations and papers published in journals, conference proceedings, websites and digital repositories. Editorial board member of international journals (IJDE, GIM, MMM-GI). Recent works on Digital Earth technologies and GI/EO for SDGs.

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