

Build Back Better Cities with Implementation of Geospatial and Building Information Modelling Technologies



WFEO / FMOI

The World Federation of Engineering Organizations

Dr. Marlene Kanga AM
WFEO President 2017-2019
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Engineering for **Sustainable Development**



Algeria
Argentina
Australia
Bahrain
Bangladesh
Belize
Bolivia
Brazil
Bulgaria
Cameroon
Canada
Chile
China
Chinese Taipei
Colombia
Costa Rica
Croatia
Cuba
Cyprus
Czech Republic

Ecuador
Egypt
Ethiopia
Fiji
France
Germany
Ghana
Greece
Honduras
Hong Kong, China
Hungary
India
Iraq
Italy
Ivory Coast
Japan
Jordan
Kenya
Korea
Kuwait

Lebanon
Libya
Macedonia (FYROM)
Madagascar
Malawi
Malaysia
Malta
Mauritius
Mexico
Moldavia
Mongolia
Montenegro
Morocco
Nepal
New Zealand
Nigeria
Pakistan
Palestine
Peru
Poland

Portugal
Puerto Rico
Qatar
Romania
Russia
Rwanda
Saudi Arabia
Senegal
Serbia
Sierra Leone
Singapore
Slovakia
Slovenia
South Africa
Spain
Sri Lanka
Sudan
Switzerland
Syria
Tanzania

The Philippines
Tunisia
Turkey
Uganda
Ukraine
United Arab
Emirates
United Kingdom
United States
Uruguay
Yemen
Zambia
Zimbabwe



Engineering and the UN Sustainable Development Goals



- A key objective of the World Federation of Engineering Organizations is to **advance the UN SDGs through engineering**
- We need to build capacity to understand how technology and engineering can be used for sustainable development
- The report on the use of geospatial engineering has the objective of **building capacity for the implementation of this advanced technology** with case studies from around the world.

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The WFEO WGIC UN GGIM White paper: “The value of Integrated Geospatial and Building Information Modelling (BIM) solutions to advance the United Nations Sustainable Development Goals (Agenda 2030) with specific focus on resilient infrastructure”

- **Collaboration between World Federation of Engineering Organisations (WFEO), World Geospatial Industry Council (WGIC) and UN Committee of Experts on Global Geospatial Information Management (UN-GGIM).**
- **Project initiated in 2019, completed in 2020.**
- **Brings together experts and leaders from around the world.**
- **Demonstrates the importance of geospatial information.**
- **Builds capacity by demonstrating implementation of geospatial and building information technology.**
- **Identifies critical challenges to implementation.**
- **Recommends on approaches for successful implementation based on the UN-GGIM Framework.**



White Paper

The value of Integrated Geospatial and Building Information Modelling (BIM) solutions to advance the United Nations Sustainable Development Goals (Agenda 2030) with specific focus on resilient infrastructure

Download at: <https://www.wfeo.org/wfeo-wgic-unggim-white-paper-geospatial-engg-sustainable-development/>



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The UN Global Sustainable Development Report 2019: Science and Engineering and the Lever and Sustainable Cities as the Pathway

- The UN Global Sustainable Development Report has identified **science and engineering as one of four levers** to accelerate sustainable development.
- **Urban and peri-urban environments** have been identified as **one of six pathways** that can accelerate transformation for sustainable development.

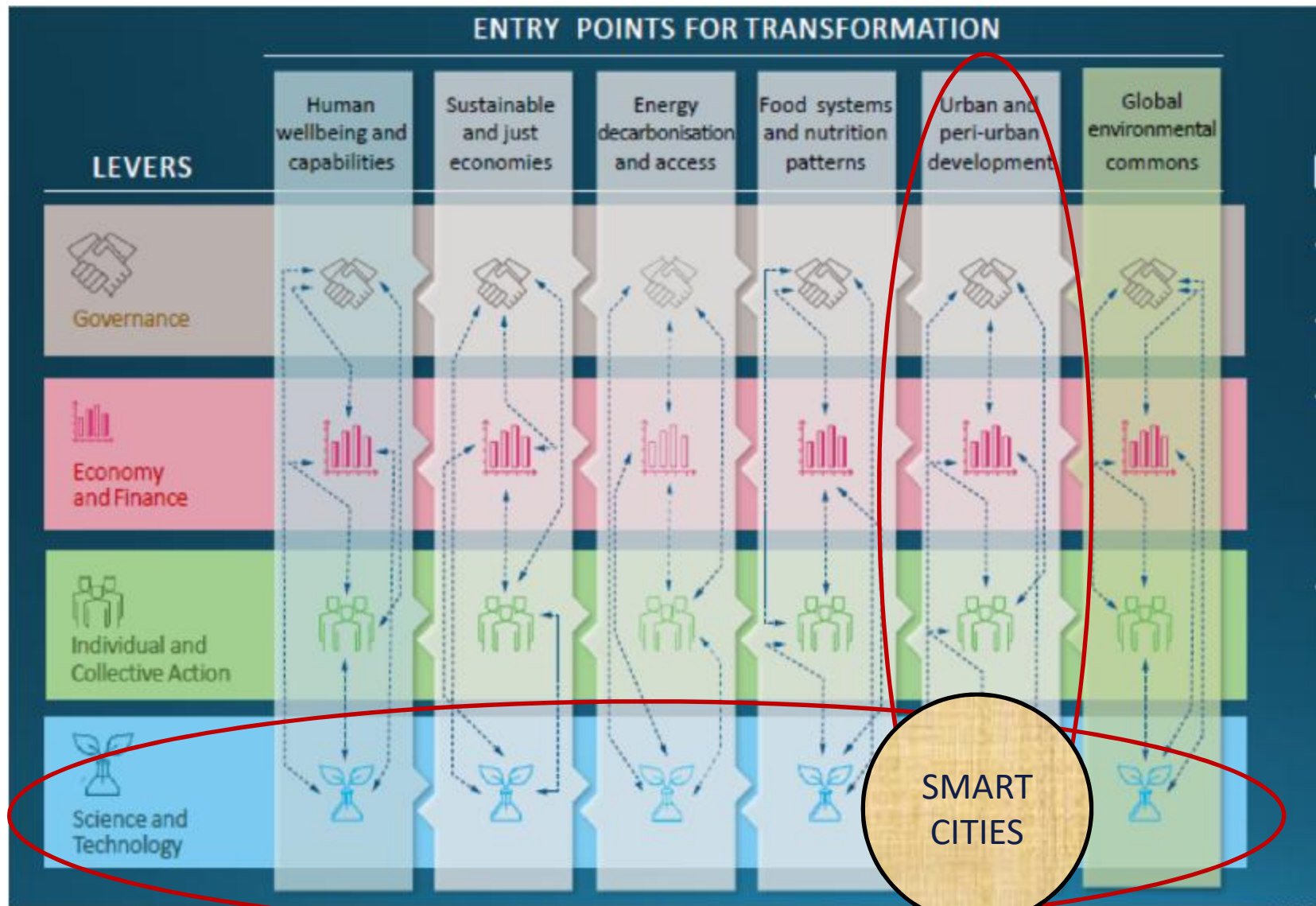
See: https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf



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Science and Engineering as the Lever Urban and Peri-urban environments as the transformation pathway



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Key messages for **sustainable cities** from UN Global Sustainable Development Report 2019

- 1.** Sustainable cities are central to achieving all 17 Sustainable Development Goals, because by 2050, cities will contain approximately 70 per cent of the world's population and produce 85 per cent of global economic output.
- 2.** Urban development should be well-planned, integrated and inclusive, accessing technology for cities and sharing good practices.
- 3.** Sustainable Cities should prioritise access to jobs and affordable housing, health care and education, sustainable transport, attractive public spaces for all.
- 4.** Cities should promote sustainable consumption and production and consider environmental impacts.
- 5.** Sustainable and liveable cities have a close connection between people and nature, to enhance human health and well-being, protect biodiversity, and strengthen climate change resilience.

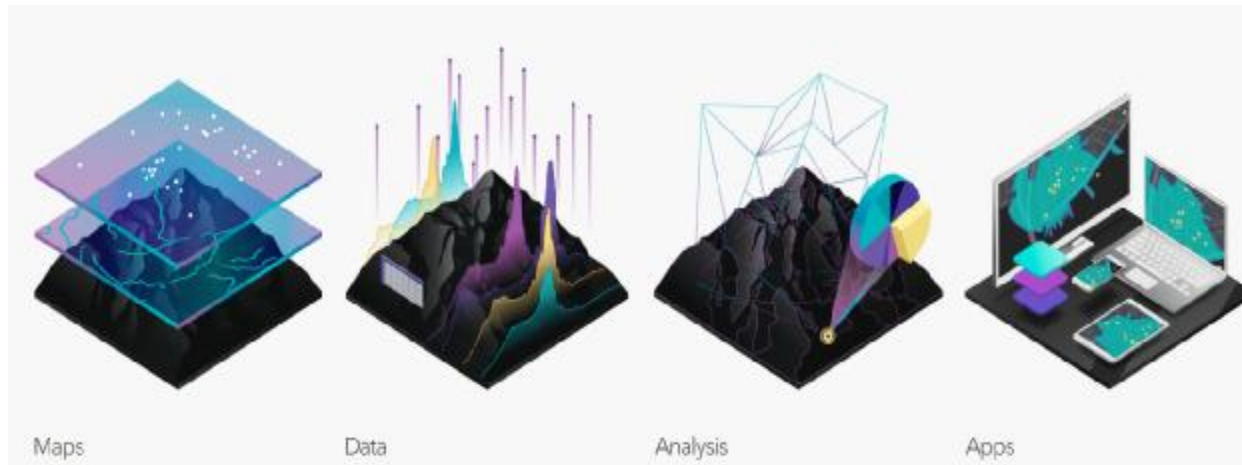


Image Source:
www.greenmatch.co.uk

See:
https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf



Importance of Geospatial Information



Source: www.esri.com

- Geospatial Information reflects the physical world in which all human, economic and environmental activity takes place.
- It provides the digital version with information that enables a digital economy.
- Geospatial information describes the physical location of geographic data and links to other associated data.
- Geospatial information is presented in many forms and mediums including maps, satellite imagery and aerial photography.
- Geospatial information tells us what happens where and enables decisions about critical infrastructure and services linked to people's needs to **BUILD BACK BETTER CITIES.**



Geospatial information in sustainable cities

Infrastructure, utilities and services

- Land administration and property ownership data
- Urban Planning and land use
- Transport networks and hubs
- Health infrastructure (hospitals)
- Education facilities (schools, universities)
- Water networks and facilities
- Nature reserves and parks
- Natural Disaster prone areas
- Population and income data and demographics
- Telecommunications and digital data (mobile, broadband)



Image Source: www.greenmatch.co.uk

Social and economic policies

- Smart transportation
- Smart Energy use
- Environmental management
- Waste management
- Citizen information and engagement
- Crime investigation
- Health and Education
- Affordable housing
- Recreation and Social services



Importance of Building Information Modelling



Source: Telehouse TN2
UK, www.cundall.com

- Building Information Modelling (BIM) enables the development of a digital twin of a construction project – office building, hospital, sports stadium, school or university, airport, railway station etc. and enables all information to be brought together in digital format to enable a 3D model.
- The digital model enables architect, engineers and construction (AEC) professionals to plan, design, construct, and manage buildings and infrastructure.
- BIM allows different options to be considered and analysis of impacts of various designs and materials on building operations and efficiency.
- It facilitates collaboration and communication between specialist teams, costly mistakes can be avoided.
- It enables sustainable and energy efficient design and reduces material resource consumption and to meet the needs of people and **BUILD BACK BETTER CITIES**

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Case Study: Geospatial Information in Lisbon Portugal for drainage management and flood mitigation

Downtown Lisbon Flood Mapping
using digital twin
Source: City of Lisbon



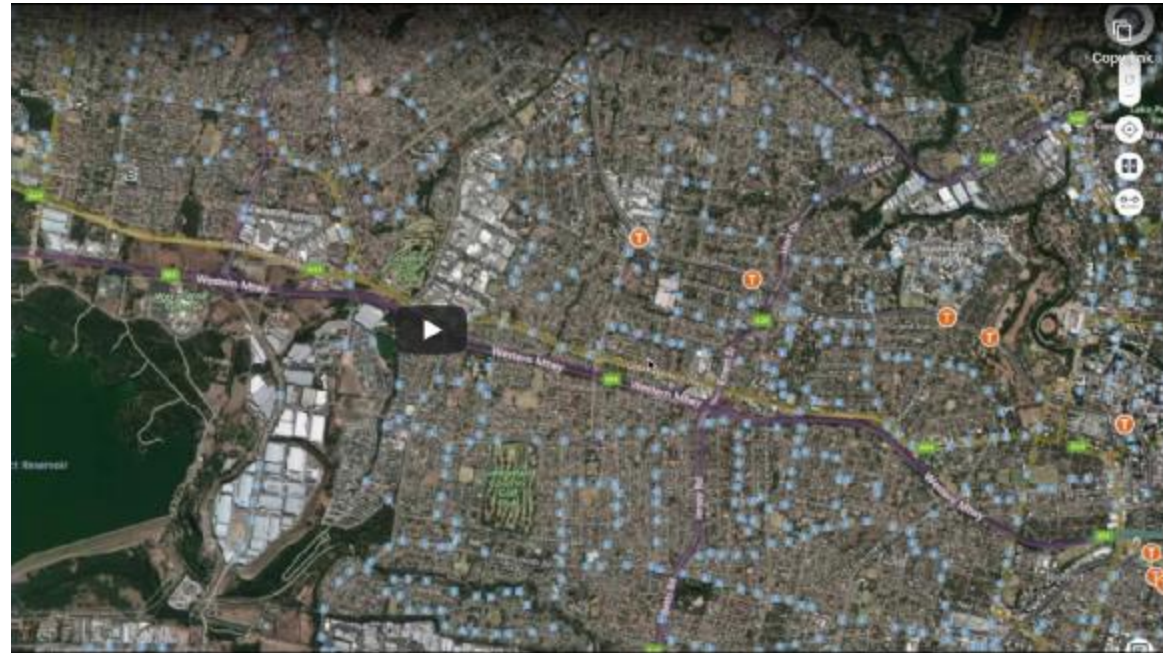
- Geospatial data includes terrain information, mapping of water, sewerage and stormwater networks, real-time sensors, video surveillance, public reporting.
- Modelling of city's water and stormwater networks and predictive analysis of capacity limitations in flood events.
- Enabled the development of appropriate planning for infrastructure, increase in existing capacity and emergency response.
- Greatly reduced events that resulted in significant inundation.
- Important for mitigation climate change impacts with sea-level rise.

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Case Study: Geospatial Information for Digital Twin for Sydney Australia

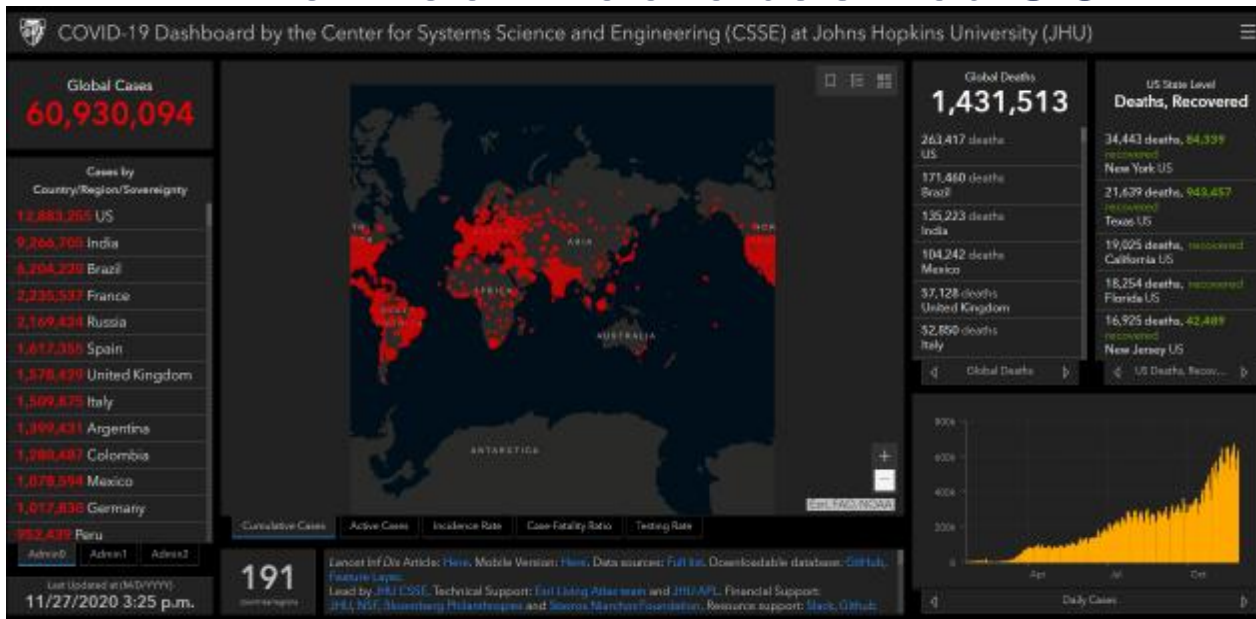
See Live data and the twin at:
<https://www.spatial.nsw.gov.au/what-we-do/projects/digital-twin>



- Transform urban planning and design using Spatial Digital Twin based on 3D and 4D digital spatial data of the built environment – today and tomorrow.
- integrates data sets from across the government including:
 - real-time transport data, above and belowground utilities (electricity, gas, water, broadband), building information, property data, health infrastructure, 22 million trees with height and canopy attributes, almost 20,000 km of roads, and 546,206 buildings.



Case Study: Geospatial Information and smart mapping of health data such as COVID-19 cases



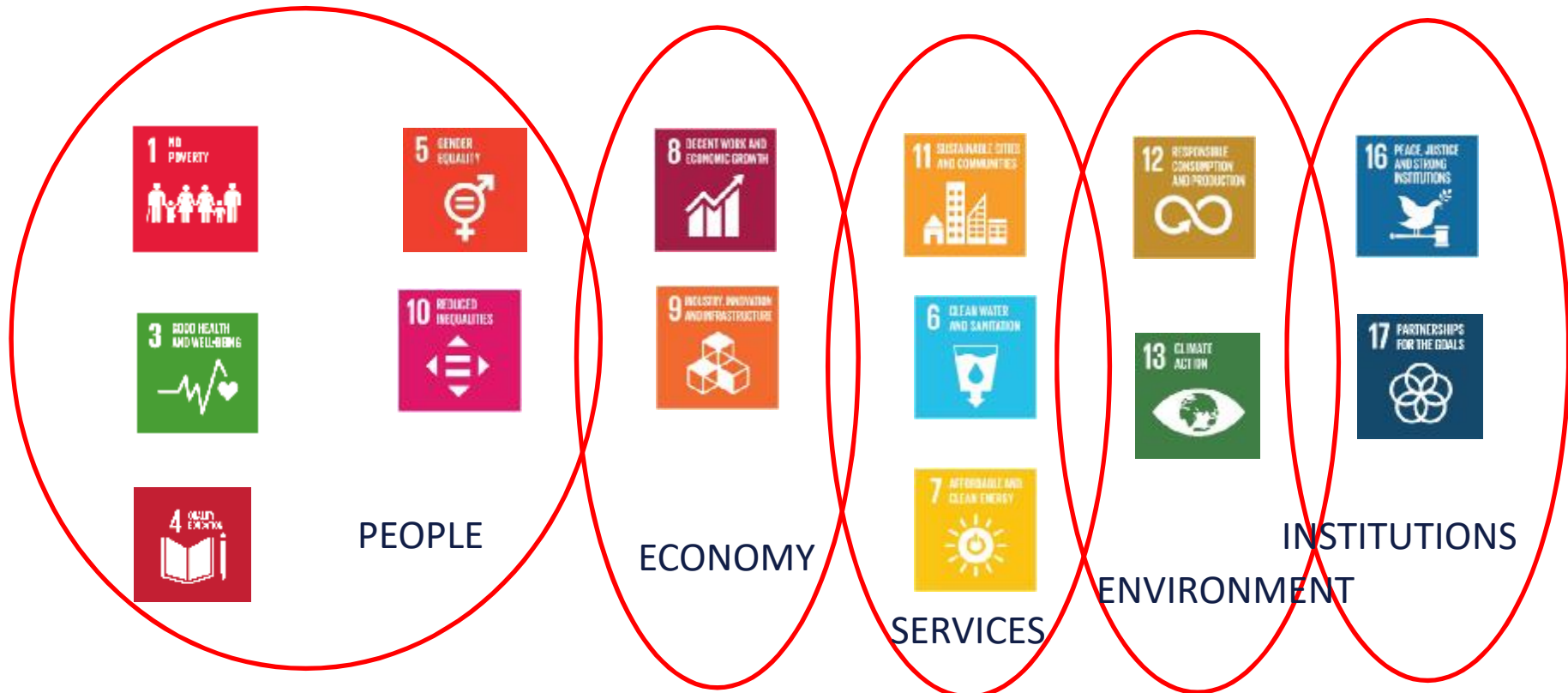
See Live data at:
<https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>

- Geographical Information System (GIS) used to track COVID-19 cases in cities.
- Variety of data sources including credit card transactions, mobile phone location to track and trace locations of confirmed cases.
- Spatial information enables policy makers to implement travel bans and events and other lockdown policies.
- Medical services such as hospitals are supported based on location and trends in cases.

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Build Back Better and Smarter Cities with Geospatial and Building Information Management for Sustainable Development



Cities are essential for sustainable development, economic growth and resilience. Geospatial technologies and Building Information Modelling are important enablers, leveraging innovative technology to accelerate sustainable development and to **BUILD BACK BETTER** in a post COVID-19 world.





***Engineering* for Sustainable Development**

- **Participation**
- **Influence**
- **Representation**



**The world's engineers
united in rising to
the world's challenges.
For a better, sustainable
world.**



The World Federation of Engineering Organizations
Fédération Mondiale des Organisations d'Ingénieurs

www.wfeo.org
@wfeo

info@wfeo.org