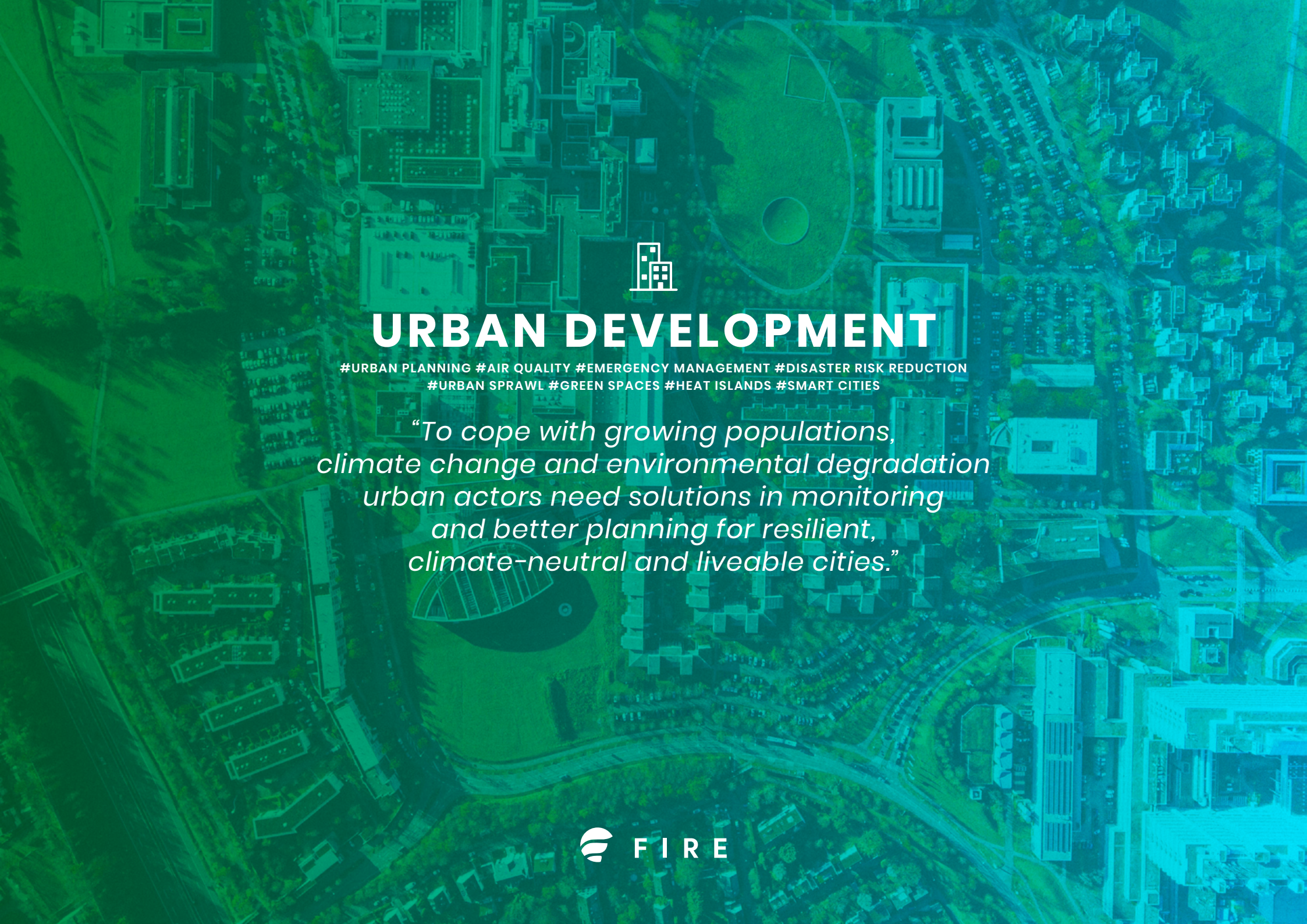

URBAN DEVELOPMENT

#URBAN PLANNING #AIR QUALITY #EMERGENCY MANAGEMENT #DISASTER RISK REDUCTION
#URBAN SPRAWL #GREEN SPACES #HEAT ISLANDS #SMART CITIES

“To cope with growing populations, climate change and environmental degradation urban actors need solutions in monitoring and better planning for resilient, climate-neutral and liveable cities.”

FIRE

TODAY

WHERE ARE WE NOW?

The current state-of-play in the sector. Maturity of EO and its contribution to addressing the challenges of the sector.

POLICY

- 75% of the EU's population lives in urban areas; 68% of the world population is projected to do so by 2050.
- Urban areas are largely contributing to the consumption of **resources and pollution** of the environment while themselves exposed to increasing risks associated with **disasters**.
- City planners and municipalities require solutions to **monitor** assets and conditions and to **anticipate** future developments and impacts.

Main relevant policies and initiatives:

- Urban Agenda of the EU
- OECD Principles on Urban Policy
- United Nations Sustainable Development Goals

EO MARKET MATURITY

- **Revenues** from EO data and services sales in 2020 exceeded €300m and are expected to exceed **€760m by 2031**.
- There is a **lack of turnkey solutions** applicable to any area without high customisation and integration efforts.
- An initial market for EO data and services in urban development is developing, with **policies and emerging challenges driving further uptake**.

R&D

- Many research initiatives tackling urban challenges **include EO data** in their approach.
- **Urban resilience** is in focus with solutions developed for managing climate related issues, e.g. **flood risks** or **heat islands**.
- Further research addresses **data fusion**, enabling integration of data from multiple sources to, for example, map cities or allow comprehensive monitoring.

TOMORROW

WHERE DO WE WANT TO BE?

Guiding aims and priorities for the future as defined through the FIRE consultation process with sectoral users and EO professionals.

URBAN RESILIENCE

- Urban actors need to prepare against **disasters and extreme events**.
- With sufficient data, the **risks and impact** of events can be **assessed and responded** to with immediate measures or used for prevention and mitigation support.

SMART CITIES

- **Connectivity** of data sources, and **analysis** and **exploitation** of data will allow for efficient and **sustainable planning** and operations.
- **Mapping** and **simulation** of complex systems such as cities and monitoring their performance enables **smarter cities**.

GREEN CITIES

- **Green spaces** mitigate challenges such as heat, air quality and general quality of life.
- EO data supports the design of **sustainable urban spaces** and infrastructure, monitoring its impact and monitoring the health of green spaces.

CONTROLLED GROWTH

- EO data puts urban planners in control of how settlements evolve, avoiding uncontrolled **"urban sprawl"** and anticipating future demand.

EMPOWERED URBAN STAKEHOLDERS

- EO empowers planners, public authorities and citizens and enables **better informed decisions**.

HOW TO GET THERE?

Selected actions to be taken by the community of practitioners (both EO and non-EO) to achieve the envisaged future.

01 INTERFACES FOR ANALYSIS-READY EO DATA AND INFORMATION

While end users in urban applications may have a certain level of expertise in analysing EO data, that expertise may not suffice to **extract and process raw EO data** to a state where it can be used by non-experts. More **analysis-ready data is required**, available in **interoperable** formats ready to integrate into the information systems and workflows of urban stakeholders.

MID-TERM
2-5 years

IMPACT

End users	HIGH
EO service providers	HIGH
Multipliers	MEDIUM
Governance actors	MEDIUM

WHY

- Increased **uptake** of EO use among urban stakeholders.
- Increased **business opportunities** for EO data and EO service providers.
- Better **enforcement of key policies**.

HOW

Marketplaces or platforms specifically for data supporting urban applications must be in place to enable urban stakeholders to access, procure and integrate data into their processes and systems.

Standardisation initiatives to ensure interoperability of pre-processed data, including standardised interfaces between platforms and user applications.

WHO

EU institutions · Sector professionals · Copernicus Services · End users · Researchers, academia

HOW TO GET THERE?

Selected actions to be taken by the community of practitioners (both EO and non-EO) to achieve the envisaged future.

ROADMAP ACTIONS

02
EO DATA INTEGRATION WITH BUILDING INFORMATION MODELLING TOOLS

Building Information Modelling (BIM) enables cost savings, efficiency gains and improved quality and environmental performance of the built environment. The wider use of BIM also in the public sector is encouraged and increasingly becoming **mandatory**. Integrating EO data in the tools that **generate and manage digital building models** would benefit the accuracy and degree of detail.

SHORT-TERM
1-2 years

IMPACT

End users	HIGH
EO service providers	HIGH
Multipliers	MEDIUM
Governance actors	MEDIUM

WHY

- Increased **use** of EO through application integration.
- Improved **performance** and **sustainability** of buildings and building maintenance.
- **Efficiency gains** and **cost savings** in planning and construction of buildings.

HOW

Standardisation of data formats for required variables to model buildings to ensure wide adoption.

Technical (application) **interfaces** between BIM tools and data platforms through which the respective data is made available.

Providers of EO data and services need to provide sufficient **pre-processed data** covering land use, atmosphere and climate globally and frequently.

WHO

EU institutions

EO service providers

HOW TO GET THERE?

Selected actions to be taken by the community of practitioners (both EO and non-EO) to achieve the envisaged future.

03 IN SITU INTEGRATION

Satellite data may require calibration through **in situ sensors** on the ground. In situ sensors range from sophisticated ground stations to simple fixed or mobile devices. Creating a holistic and accurate view on topic of interest requires the **integration and validation of various sensors** and systems on the ground and in orbit.

MID-TERM
2-5 years

IMPACT

End users	HIGH
EO service providers	HIGH
Multipliers	MEDIUM
Governance actors	MEDIUM

WHY

- More **accurate** and **complete** data and information.
- **Inclusion** of multiple stakeholders including citizens.
- Higher **accessibility** and **utilisation** of available information.

HOW

- Data generated by a large variety of devices requires **standardisation** to enable **integration and fusion of data**.
- Communication protocols and interfaces between devices and systems must be standardised and secured.
- Data coming from both controlled and uncontrolled environments must be **validated and calibrated**.
- Data **accessibility** for key stakeholders for further analysis or utilisation requires interfaces, dedicated portals or dashboards.

WHO

EU institutions

Researchers, academia

End users

HOW TO GET THERE?

Selected actions to be taken by the community of practitioners (both EO and non-EO) to achieve the envisaged future.

04 URBAN RESILIENCE SOLUTIONS

Land use in urban areas combined with climate change and other factors increasingly reveals **vulnerabilities** of cities to **extreme events**, such as **heat** or **floods**. Cities require solutions to **monitoring** such events to allow for immediate **response** and analyse conditions to **predict** events and enable longer-term **prevention** and **intervention**.

MID-TERM
2-5 years

IMPACT

End users	HIGH
EO service providers	HIGH
Multipliers	HIGH
Governance actors	MEDIUM

WHY

- **Prevention** or **mitigation** of destructive and life-threatening events.
- Improvement of **health and wellbeing** of citizens.
- Positive economic effect of **damage prevention**.

HOW

Enhance capabilities to **analyse land use features and environmental conditions** in urban areas based on remote sensing and in situ data.

Develop solutions which allow for **simulating** the impact of mitigating measures to enable planning of resilient structures and cities.

(Near) real-time capabilities of data and information for **emergency response** are desired.

WHO

EU institutions

EO service providers

Regional/national authorities

HOW TO GET THERE?

Selected actions to be taken by the community of practitioners (both EO and non-EO) to achieve the envisaged future.

05 DIGITAL TWINS

Cities are complex structures and proper planning and operations of truly "**smart cities**" requires data on different levels from an entire metropolitan area down to individual neighbourhoods and buildings. **Digital Twin simulations** are key to enable planning smart cities. EO data must be integrated to provide major contributions to **data-rich models** of cities.

MID-TERM
2-5 years

IMPACT

End users	HIGH
EO service providers	HIGH
Multipliers	HIGH
Governance actors	HIGH

WHY

- Improved **planning** and decision-making in complex environments.
- **Cost savings** from reduction of bad planning or design.
- Visual and data-rich **decision support**.
- Enabling **new business models** and improved processes for different sectors serving urban spaces.

HOW

Develop solutions that utilise a multitude of EO sensors to **map built environments and features** on and below the surface as well as climate data.

Service providers need to be able to **integrate/fuse data** and to process it into accessible and comprehensive information.

Computational and analytical capabilities for processing data, modelling and simulations must evolve and scale.

WHO

EU institutions

EO service providers

HOW TO GET THERE?

Selected actions to be taken by the community of practitioners (both EO and non-EO) to achieve the envisaged future.

06 PUBLIC PROCUREMENT INNOVATION

Public Procurement must be **transparent, efficient and accessible**, and shall result in useful investments. Solutions are required that enable municipalities, businesses competing for contracts, and citizens paying for– and potentially benefiting from– procured goods and services etc. to **plan** procurement of urban development, and **monitor progress** and **compliance**.

MID-TERM
2-5 years

IMPACT

End users	HIGH
EO service providers	HIGH
Multipliers	HIGH
Governance actors	MEDIUM

WHY

- **Market pull** for EO solutions in planning and monitoring construction and post-construction.
- **Business development** for EO service and platform providers.
- **Cost savings** in permission and compliance checks.
- Improved **return of investment** through better informed decisions and more transparent processes.

HOW

Provide solutions utilising geospatial data to **assess feasibility and cost** of urban development projects.

Implement tools to **monitor performance and compliance** of construction, integrated in procurement workflows.

Turn public authorities and administrations into **anchor clients** for EO services.

WHO

EU institutions | EO service providers | Sector professionals | End users

HOW TO GET THERE?

Selected actions to be taken by the community of practitioners (both EO and non-EO) to achieve the envisaged future.

ROADMAP ACTIONS

07 HUMAN SETTLEMENT MONITORING

Growing settlements require solutions to monitor and prevent **uncoordinated development**. Cities must be able to monitor change in land use in a frequent manner with sufficient resolution to distinguish types of land use and the environmental performance of usage.

MID-TERM
2-5 years

IMPACT

End users	HIGH
EO service providers	HIGH
Multipliers	HIGH
Governance actors	MEDIUM

WHY

- **Market pull** for data from new satellite constellations.
- Improved information basis for **sustainable cities** and increased utilisation of EO data for sustainability goals.
- **Business development** for EO service providers.

HOW

Provide **frequently updated data** with **sufficient resolution** for land use and emissions through more capable satellites/sensors and/or techniques to enhance existing data.

Further evolve **data processing capacities** to provide detailed and accurate information on land use and associated emissions and other impacts.

Integrate **accessibility and interoperability** into data and information design to enable integration in municipalities' information systems.

WHO

EU institutions | EO service providers | Copernicus Services | End users

... to know more ...

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