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UrbanTEP – Earth Observation Based Services for the Urban Community

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With the increasing volume of information from satellites observing Earth, the technical and methodological prerequisites of users in science and applications are becoming more demanding and complex for generating demand-driven products while exploiting the full potential of large Earth observation (EO) data archives. Since 2014, the European Space Agency (ESA) is addressing this challenge with the concept of Thematic Exploitation Platforms (TEPs), aiming to create an ecosystem of interconnected platforms providing thematic EO-based data and services for currently seven thematic sectors.

The built-environment and urban sector is addressed with the Urban Thematic Exploitation Platform (UrbanTEP; urban-tep.eu), acknowledging that urbanization and sustainable settlement growth are key global challenges. The linkages to socio-economic development, health, environment, greenhouse gas emissions, climate change and other sectors are deep and multi-faceted. EO based services and resulting information products and other spatial datasets have successfully found their way into planning and decision-making processes that address the urban ecosystem. While a range of downstream services are based on solitary and effortful processing and visualization solutions, the platform-based approach has proven to be a game changing technology, being capable of revolutionizing service provision, workflows and information products.

UrbanTEP is a collaborative system, which focuses on EO data provision, processing and other spatial products for delivering multi-source information on trans-sectoral urban challenges on various scales. It is developed to provide end-to-end and ready-to-use solutions for a wide spectrum of users in the public and private sector. The core system components are an open, web-based portal connected to distributed and scalable high-level computing infrastructures and providing key functionalities for:

- high-performance data access and processing (IaaS – Infrastructure as a Service),
- modular and generic state-of-the art pre-processing, analysis, and visualization tools and algorithms (SaaS – Software as a Service),

- customized development and sharing of algorithms, products and services (PaaS – Platform as a Service), and
- networking and communication.

The facilitation of EO service acceptance and uptake by the urban community, as well as the onboarding of third-party service providers are essential to PaaS solutions. UrbanTEP is therefore in the process of expanding the range of service solutions and the interconnection with other service providers. The concept of “City Data Cubes” is introduced for urban use cases and algorithm hosting capabilities (“algo-as-as-service” functionalities) are improved by adopting the OGC Common Architecture standard. In addition, the data analytics and visualization capabilities of UrbanTEP provide functionalities for a user-driven derivation of key urban indicators based on the above-mentioned multi-source data collections. The provision of premium urban information products, like the World Settlement Footprint (WSF) outlining built-up areas globally, allows users and service providers to derive customized demand-driven EO-based products.