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Citizen Observatories: A Standards Based Architecture

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A number of large-scale research projects are currently under way exploring the various components of citizen observatories, e.g. CITI-SENSE (http://www.citi-sense.eu), Citclops (http://citclops.eu), COBWEB (http://cobwebproject.eu), OMNISCIENTIS (http://www.omniscientis.eu), and WeSenseIt (http://www.wesenseit.eu). Common to all projects is the motivation to develop a platform enabling effective participation by citizens in environmental projects, while considering important aspects such as security, privacy, long-term storage and availability, accessibility of raw and processed data and its proper integration into catalogues and international exchange and collaboration systems such as GEOSS or INSPIRE.

This paper describes the software architecture implemented for setting up crowdsourcing campaigns using standardized components, interfaces, security features, and distribution capabilities. It illustrates the Citizen Observatory Toolkit, a software suite that allows defining crowdsourcing campaigns, to invite registered and unregistered participants to participate in crowdsourcing campaigns, and to analyze, process, and visualize raw and quality enhanced crowd sourcing data and derived products.

The Citizen Observatory Toolkit is not a single software product. Instead, it is a framework of components that are built using internationally adopted standards wherever possible (e.g. OGC standards from Sensor Web Enablement, GeoPackage, and Web Mapping and Processing Services, as well as security and metadata/cataloguing standards), defines profiles of those standards where necessary (e.g. SWE O&M profile, SensorML profile), and implements design decisions based on the motivation to maximize interoperability and reusability of all components. The toolkit contains tools to set up, manage and maintain crowdsourcing campaigns, allows building on-demand apps optimized for the specific sampling focus, supports offline and online sampling modes using modern cell phones with built-in sensing technologies, automates the upload of the raw data, and handles conflation services to match quality requirements and analysis challenges. The strict implementation of all components using internationally adopted standards ensures maximal interoperability and reusability of all components.

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