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Integration of different applications to assure oceanographic data quality, data exchange and outputs in frame of Croatian referral centre for sea

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Institute for oceanography and fisheries, Split together with The Center for Marine Research of the Ruđer Bošković Institute become at the end of year 2018 official referral centre for sea of Croatian ministry for enviroment and energy for period of 6 years. One of important task for referral centre is to collect, manage and use various oceanographic data. Most important data use cases are: creating national indicators, creating MSFD indicators, fulfilling reporting obligations toward European Environmental Agency (EIONET), reporting data to various European projects (EmodNET, SeaDataCloud) and improving national monitoring by historical data analyses.

During past years, if frame of various projects and tasks many different applications are developed for different purposes. Since 2002 development of applications include relational database with web interface. In this paper we will present model for integration this different applications into one integrated and efficient data management system.

List of applications and components:
-Oceanographic referral database, cruise summery report containing cruises and measurements metadata.
-Application for tracking and analysing research vessel movement based of automatic station data.
-System for collecting and publishing real time data from automatic stations and systems.
-State of marine environment, aquaculture and fisheries indicators database, containing national and MSFD indicators.
-Application for managing, validation and analyses of data from Croatian national MSFD monitoring, general web based raw data management.
-Application and database for collecting and managing fisheries data.

All applications are created with same technology.To provide integration we have to:
-Run all applications onto same database instances or provide database links.
-Extend and harmonize database structure for data exchange.
-Provide automatic and semiautomatic integration with external data dictionaries.

Example of data flow within integrated system:
-In referral cruise summary report part, cruise is planned and parameters defined. Parameters are synchronised with external parameters list (SeaDataCloud).
-After cruise, theoretical locations are synchronised with real locations from research vessel automatic station, and time of measurements are precise defined.
-Metadata about measurements are passed to application for raw data insertion. Parameters are custom grouped, and parsing from uploaded files is possible.
-After data validation,raw data is aggregated and passed to indicator database, graphs with trends are created automatically according predefined rules.
-Aggregated and disaggregated data are created for reporting purposes according to matching data dictionaries.

Whole integrated system operates only with web interfaces, with some parts under authentication, and some public available parts.