

# MAJISYS

## A time series management system

### INTRODUCTION

Most time series data sits fragmented, unedited, duplicated or inaccessible across multiple systems throughout an organization IT infrastructure. Collecting, processing, managing and disseminating information using conventional tools including printed forms, spreadsheets and desktop GIS applications, which differ from user to user, is an approach that is prone to errors, it results in lengthy workflows and, most importantly, it limits the options for data exploitation by stakeholders. Such data management practice is commonly the bottleneck for organizations in their decision-making processes.



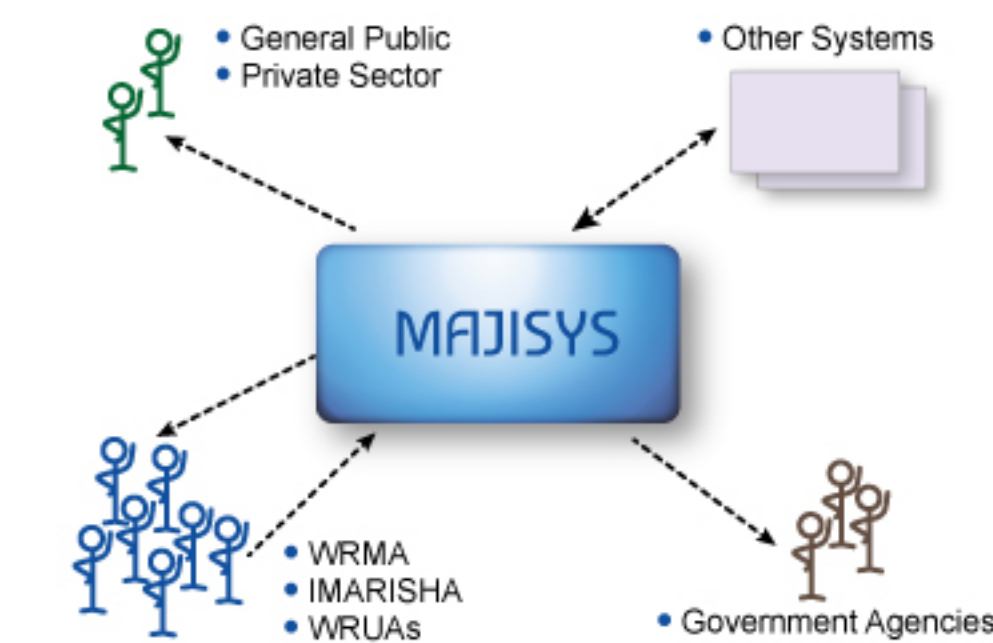
### MAJISYS

The Open Source Software stack as implemented in MAJISYS

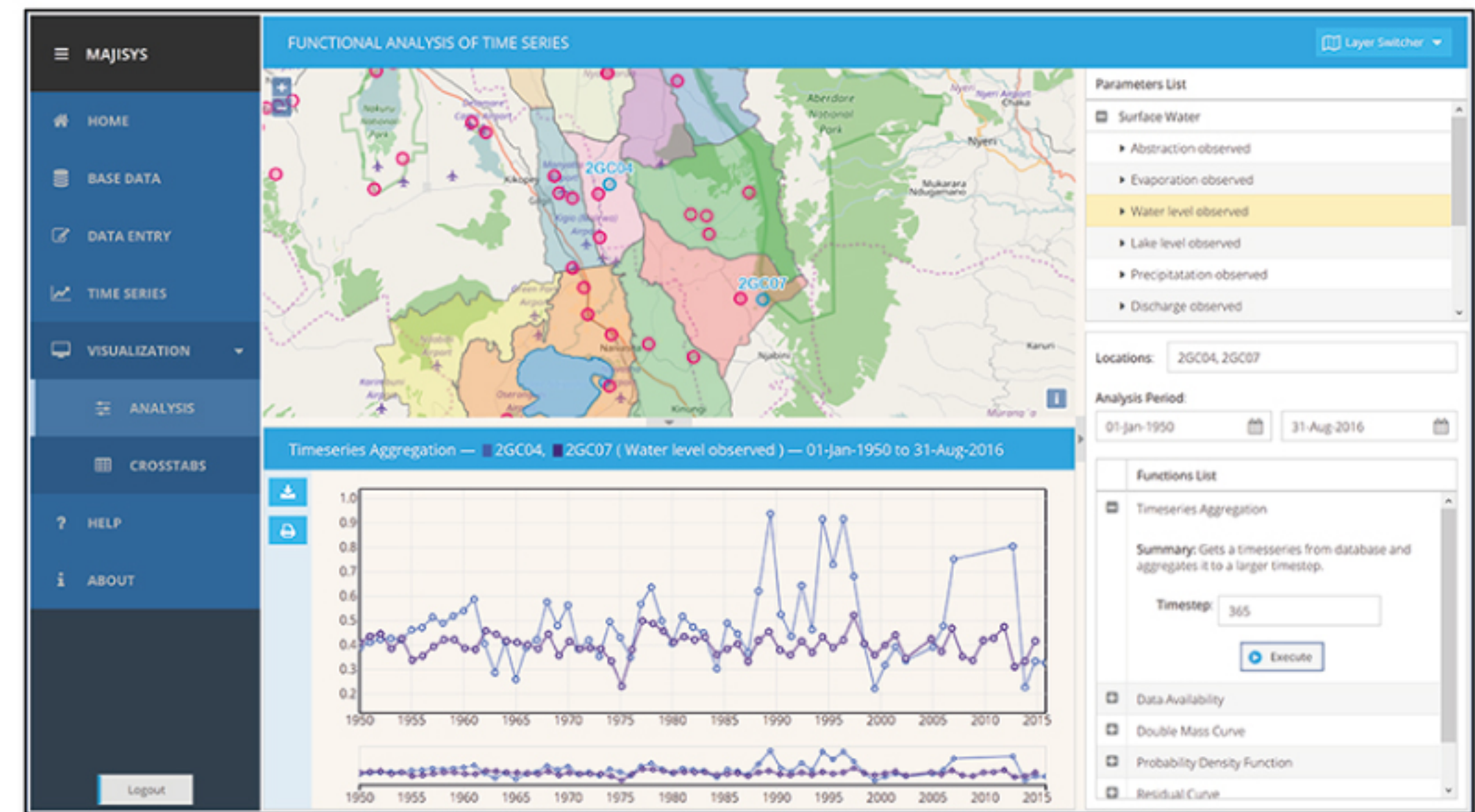
MAJISYS, the time series management system tailored for user needs, addresses these issues by providing a web-based, user friendly interface to all the organization time series data.

Main characteristics of MAJISYS include:

- Supports monitoring activities by streamlining data collection and analysis.
- Increases access to information on water resources to stakeholders via Web interfaces.
- Generates data for the execution and validation of accurate scenarios for planning and allocation of, e.g., water resources.
- Provides access to real-time information for decision making.
- Based on a modular and extendable architecture.
- Fully based on Open Source Software and Open standards.



Players in the MAJISYS system.



The MAJISYS interface, version 1.0

### IN A NUTSHELL

- MAJISYS is a modern, easy-to-use, extendable, user configurable free and open source (FOSS) web-based platform to share, process, analyze and visualize times series data.
- MAJISYS is developed to provide institutions dealing with natural resources, water and climate a professional tool to perform their task more efficient and cost effective.

- MAJISYS allows data sharing among institutions.
- MAJISYS can be linked to many water and ecological models using Delft-FEWS.
- MAJISYS will be linked to GeoNetCast that allows bridging ground based and satellite observations.
- MAJISYS aims to become a vibrant open-source community that develops further functionality.
- MAJISYS is supported by Deltares, ITC and Upande



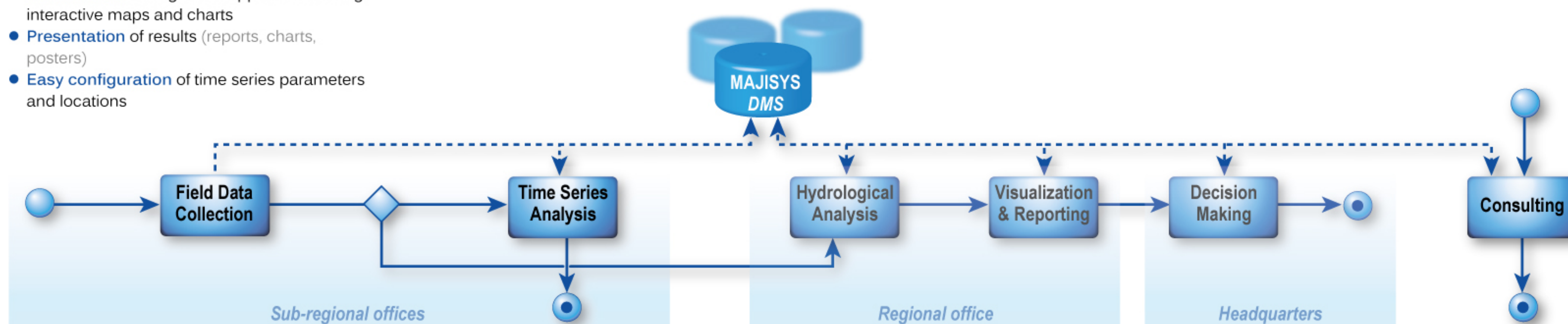
## FUNCTIONALITY

- **Collection** of observations and geographical data
- **Imports and exports** via Excel CSV or JSON
- **Generation of model** inputs, e.g., ground water, surface water
- **Hydrological Analysis**, e.g., double mass curve, data density plot, flow duration curves
- **Standardize access** using web services and based on open standards
- **Visualization** through web applications using interactive maps and charts
- **Presentation** of results (reports, charts, posters)
- **Easy configuration** of time series parameters and locations

## ARCHITECTURE

MAJISYS is based on a modular architecture where different components communicate and interact with each other via compliant service interfaces. This is achieved by using a layered architecture, where a layer is defined as a very coarse-grained group of components put together to address one specific concern of the system. Since MAJISYS components connect,

interact and exchange messages through standardized interfaces, it is possible for MAJISYS to assimilate and accommodate changes in components or to incorporate new ones that might occur, for example, as a result of technology life cycles, such as new software versions. This component-based approach substantially simplifies the maintenance of the system.



## DATA ENTRY

The Data Acquisition module provides the interfaces to support various time-series data acquisition and editing methods including:

- 1) webforms,
- 2) upload of logger files,
- 3) direct readout of telemetric systems and
- 4) smartphone based data collection.

Delft-FEWS operates in the background, supporting the import of many different file types. Delft-FEWS has data validation rules that are highly configurable in parameter, space and time. Delft-FEWS is also used to link MAJISYS to specialized hydrological models.

## DATA ANALYSIS

The Hydrologic Analysis module supports an ever expanding set of hydrological analysis tools that are used in analysis, planning, reporting, mapping and modelling tasks; to understand water resource availability holistically through integrated views of various data sources and to provide the basis for, for example, water allocation and permitting. All functionality of the hydrological Analysis module can be tailored to the specific requirements of an individual organization. Moreover, extra functionality can be added to this module using open interfaces such

as the OGC Web Processing Service (OGC-WPS) interface. Such functionality can be developed in house or by external parties.

## DATA DISSEMINATION

The Data Dissemination module handles the provision of services to stakeholders or other systems. The dissemination options include: Standardized OGC services that can be used via Application Programming Interfaces resulting on interactive maps, charts, etc. A Web viewer enables non-expert users to

visualize, analyze time series and then use the results to determine the status of water resources, permit information (e.g. status, validity), etc. The Web viewer also allows users to generate customized products and visualizations that can be shared with third parties. A granular user-based access control system controls who can access the data and the actions they can perform. A no-login guest may see aggregate data, whereas the senior hydrologist may edit and delete data.