

Sava GIS

ISRBC Community Objectives

Sava GIS will be primarily composed of contributing geographic systems of the ISRBC Parties, ranging from primary data collection systems to systems that make use of creation and distribution of information products and service. Sava GIS system will empower GIS systems of the ISRBC Parties so that the overall system becomes much more than the sum of its components. This synergy will be developed as each contributor system should support a common standards and data specification agreements thus making information and products being shared in a more accessible, comparable, and understandable way.

The information technology components will ensure smooth data flow between the Parties aiming collectively to achieve FASRB objectives as service-based communication will be evolving.

Technology Objectives

The information technology objectives are as follows:

- To enable Sava GIS, based upon user requirements and build on existing geo-information systems, as well to define components for Sava GeoPortal in order to consolidate a view on water management issues by promoting a use of standards and references, intercalibration, and data integration;
- To enable Sava GIS to define and update common rules and interoperability arrangements to which ISRBC Parties agree to adhere, including data specifications for collecting, processing, storing, maintaining and disseminating shared data, metadata and information products;
- To enable Sava GIS to facilitate Sava River Basin-wide data/information management and common information services by promoting data sharing principles respecting international recommendation and instruments.

Drivers

Architecture of Sava GIS will be largely driven by:

1. Use of service oriented architecture (SOA) to provide real time access to distributed data sources and information via web-services as the user requires;
2. Adoption of interoperable standards for sharing geospatial information resources.
3. Development of information technology components that enable upload and register of (meta-) data, or metadata harvests, as well as to ensure that spatially and temporally enabled catalogue of registered services support custodians of water information in the ISRBC countries, to make their data available for sharing via standards based web services ;
4. Development of server side tool components that are specific for the Sava GIS (mapping services, report tools, visualisation tools, etc.) and its contributors.

Benefits

Sava GIS will be primarily focused to support realisation of an integrated and sustainable a water management issues at regional and basin-wide scale, whilst enhancing a national water management information systems focused on water sector-specific needs. In this context, investments into national GIS systems already yield substantial societal benefits, but those benefits will be increased through the collective actions enabled by the Sava GIS.

Sava GIS will improve knowledge sharing, reduce duplication of efforts, direct ISRBC community toward the best available data and improve the overall quality of geospatial information at river basin level.

Implementation of Sava GIS will be focused in following benefit areas (see **Figure 1**):

1. Integrated River Basin Management;
2. Flood Management;
3. Accident Prevention and Control;
4. Navigation Safety Management;
5. Sediment Management.

Sava GIS will be the key to wider economic benefits accruing from implementation of the FASRB goals, Water Framework Directive, Flood Directive and other water management and planning issues including:

- A basis and method by which changes and improvements resulting from the FASRB can be assessed;
- Provide ISRBC with on-going access to water availability, water use, water quality, water protection measures and other important integrated information at river basin level;
- Spreading and reporting information gathered for the implementation of FASRB goals and subsequently displaying under SAVA GIS will be used in the water management assessments as performance indicator;
- Allow future assessments to be made as a matter of routine. The availability of transparent information and knowledge on water resources will improve decision making processes and build public trust and confidence in the overall work of the ISRBC;

- Creation of horizontal and vertical integration opportunities to easier and faster discovery of, access to, share of and use information on corresponding water resources' information over time;
- A step towards uniform international terminology and common understanding on sustainable water resources management;
- System based on common concept, standards, and geoinformation system network of the ISRBC Parties.
- Added value to the GIS systems and tools that are already available in the ISRBC countries or will be available;
- Clarification of critical geographic and knowledge gaps in the water management domain;
- Improved understanding of where further investments are required to deliver FASRBC outcomes.

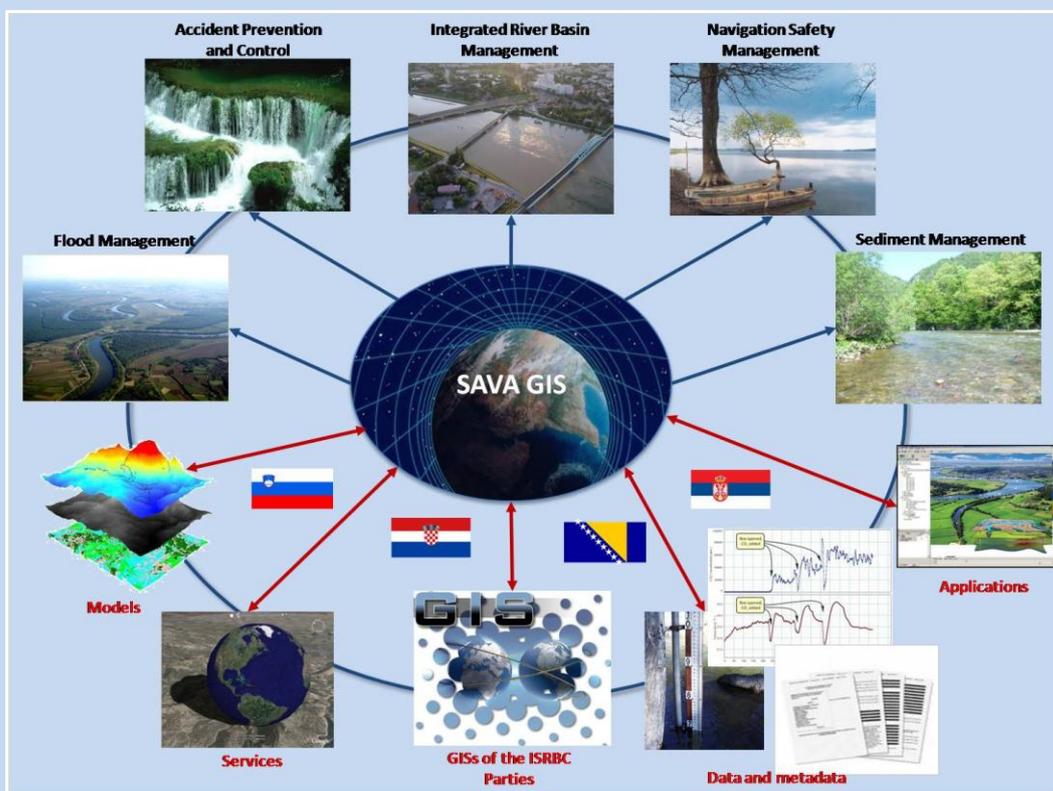


Figure 1: Sava GIS Benefit Areas

By sharing successes with its Parties, Sava Commission, international community and public will earn a level of respect and trust from those not yet exposed to its benefits.

Actions

To be able to deliver reliable coherent and reliable information which will aid Sava Commission and Beneficiary countries to maximise the benefits delivered through Sava RBM plans, Sava GIS shall elicit following actions:

1. Parties shall enable a single uniform Sava GIS repository where metadata and data containing information of importance for Sava River Basin will be provided. All Sava River Basin-relevant datasets shall be available for the ISRBC all the time;

2. Secretariat shall initiate refinement and harmonisation of data to conform agreed specification and application schemas. The intended level of harmonisation will be achieved by using proposed data specifications independent of the source data specification used in ISRBC Parties and/or institutions, use of common metadata profile and edge/content matching in the border areas. This should be subject of a bilateral consolidation between the Parties;
3. Parties shall perform creation, collection, and updates of relevant datasets in accordance to agreed specification and standards;
4. Parties shall provide harmonised and consolidated Sava GIS data that will be virtually centralised via Sava GeoPortal and stored in common Sava River Basin geodatabase that will reside in ISRBC Secretariat or hosted at one of the ISRBC participating institutions. A common geodatabase will serve for analysis purposes and storing data provided in a traditional way rather than via services;
5. Secretariat of the ISRBC shall initiate procurement of hardware and software to support establishment and hosting of Sava GIS databases and Sava GeoPortal in the Secretariat of ISRBC.
6. Enhancement of the network infrastructure in the Secretariat of the ISRBC is required to ensure adequate communication facilities and secure continuous data flow between the Parties;
7. Secretariat of the ISRBC shall organise technology transfer and trainings on Sava GIS functionalities.

Key Implementing Issues

In order to allow for better management of the implementation process, the two parallel streams should be performed under the backing of the ISRBC. These streams should be focused on:

- Strengthening capacity of the Secretariat, or one of the Water Management Agency which already has GIS system established, to run and manage Sava GeoPortal and
- Supporting ISRBC Parties in extending GIS capacities to be able to achieve goals defined in FASRB and Sava GIS Strategy.

The following issues are pointed as of high relevance requiring common understanding and agreement to proceed with the implementation:

- Sava GIS will be based on INSPIRE interoperability components and standards. The interoperability at Sava River Basin-level will be achieved through data conformity and integrity allowing ISRBC users to discovery information and utilise results of Sava GIS data processing and analysis;
- INSPIRE theme's specification on Hydrography, Protected sites, Transport Network (water transport), Administrative Boundary, Coordinate Reference System and Geographical Names form a "backbone" of Sava GIS;
- SAVA GIS will also include following FASRB-related themes: i) Sava core, ii) Sava RBM- WFD-related, iii) Sava Specific including: Navigation Safety, Accident Prevention and Sediment Management, and iv) Sava Supporting or Background themes;
- Sava GIS may include additional or derived datasets in order to achieve FASRB and WFD goals;

- Sava GIS will provide supporting facilities to water resources planning and management through:
 - Metadata creation, collection and publishing;
 - Sava GeoPortal, as a standalone web- and map-based applications for managing discovering, querying and visualising data;
 - Decision support system;
 - Smooth and transparent data flow between Parties.

Implementation Plan

The Sava GIS establishment will be divided into three phases:



- First implementation phase (2010-2012) work package (WP1) will be focused on the setup of the core Sava GIS functionalities: Sava GeoPortal, tools, services and products in line with the preparation of the Sava River Basin management Plan. It should be stressed that not all services will be established in the first phase taking into the account that implementation of the agreed standards, data and metadata specification adjustment, set-up of datasets repositories in the participating countries will take some time after being agreed and confirmed by the Parties at the end of Initial Phase.
- Second implementation phase (2013-2015) work package (WP2) will be oriented to the development and implementation of the advanced tools, mapping and reporting services as well as basic application and/or decision support system. This will include: i) Report services - query access and generating report/content by using predefined 'set of report' templates; ii) Advanced Mapping Service - a map product based on the area of interest filter or attribute filter and or spatial operations (buffer, union, intersect etc), and iii) Content Management System Catalogue Service - a common spatial and temporal mechanism to search and access information about static content (reports, diagrams etc) managed within Sava GIS through the contents of metadata.
- In third phase (2015-...) a common data model will be extended to accommodate additional themes and datasets. The most advanced service component such as dynamic reporting and mapping, on-line monitoring and observing, advance decision support systems, will be established. This will include: i) Query builder and search and aggregation tool to assist users in constructing queries and making selections; ii) Queries that allow the user to make dynamic selections and extractions of data; iii) Dynamically production of graphs and charts within the viewer according to selections made by the user; iv) Statistics and correlation of data on the basis of hydrological units (water stretches, water bodies and catchment areas), countries and SRB, and parameters (pivot table comparisons); v) Various assessments or "layers" (e.g. assessing compliance to various directives); and vi) Comparisons analysis across the Sava River Basin.

Quantifiable and Measurable Performance Indicators

To be able to justify Sava GIS is successfully implemented a quantifiable and measurable performance indicators should show that system is:

- **Delivered as promised**—produced all the stated deliverables;
- **Completed on-time**—completed within the approved schedule;
- **Completed within budget**—completed under the approved budget;
- **Delivered quality**—deliverables met all functional, performance, and quality specifications;
- **Achieved original purpose**— achieved its original goals, objectives, and purpose;
- **Met all stakeholder expectations**—a complete expectations of each key stakeholder were met, including all client acceptance criteria, and each key stakeholder accepts the project results without reservation;
- **Maintains "win-win" relationships** — needs of the project are met with a "people focus"- Participants on successful projects should be enthusiastic when the project is complete and eager to repeat a similar experience.

Verifiable Performance Indicators

Verifiable performance indicator that will prove successful implementation of Sava GIS will include, but not limited to:

- Necessary equipment (hardware, software, communication infrastructure) configured, tested and operational;
- Standards, procedures and protocols adopted and in use;
- Sava GIS data harmonised according to agreed specification and application schemas;
- Sava GIS datasets filled with the data and metadata repositories accessible via services;
- Applications, tools, services as well Sava GeoPortal for discovering, viewing and mapping information being developed and tested;
- Sava GIS system operational;
- User documentation prepared and available for end users;
- Plans and programs for training prepared and executed.

Funding

The creation and growth of the Sava GIS functionalities and GeoPortal contents will require more than a one-time software purchase. The principal costs will be related to the allocation of organisational supporting structures, technologies and staff time that are necessary to support functioning of geospatial information portal over the time.

Whilst Sava GIS will realise cost benefits for the ISRBC community by increasing the efficiency of the basin-wide information distribution and standardising the quality of geospatial information used, it will also involve ongoing line-item management costs.

Principal cost items will include the following:

- Establishment and maintenance of organisational arrangements and internal workflows that may be necessary to implement common spatial infrastructure in general and to host and support Sava GIS and GeoPortal operations in particular;
- Development and implementation of:
 - Physical database model;
 - Applications, tools and services for data harmonization;
 - Initial data load in the databases and
 - Sava GeoPortal and other web GIS services and tools.
- Hardware and underlying software;
- Staff time for Sava GIS and Sava GeoPortal installation including programming for the ISRBC specific customisations;
- Staff time to undertake Sava GIS and GeoPortal content management;
- Staff time to undertake Sava GIS and Sava GeoPortal operations management;
- Staff time to prepare and maintain data services and associated metadata;
- Technical training on Sava GIS and GeoPortal management and use.

Sava GIS Solutions

Depending on the location of infrastructure and availability of adequate staff to administer and maintenance Sava GIS, the four solutions are possible:

1. Infrastructure placed in the Secretariat of the ISRBC. Administration and maintenance of Sava GIS is hand over by the Secretariat of the ISRBC;
2. Infrastructure placed in the Secretariat of the ISRBC. Administration and maintenance of Sava GIS hand over by an external service provider;
3. Sava GIS infrastructure hosted internally (within ISRBC) by one of the Parties' institution (Water Management Agency). Administration and maintenance of Sava GIS hand over by the same institution;
4. Infrastructure, administration and maintenance of Sava GIS provided by the external service provider.

First 1 is not only the cheapest solution but has following intangible advantages:

- Offer higher degree of control.
- Provide ability to oversee the entire process and technologies at basin level,
- Lower risk of loss the focus and direction
- Low risk to have difficulties in managing relationship with external partner (ISRBC Institution),
- Unified, consistent and continuous approach on the Sava GIS needs related to operating, maintenance, control and upgrade.
- Managerial simplicity, since there is no treat in dealing and managing external difficulties and opportunities,

- From the operational point of view, it will be more efficient since Secretariat of the ISRBC in the organisational structure have defined position of Special Advisor for Information System. It can not be expected that the institution of the Party will employ person who carry out only duties and responsibilities related to the Sava GIS operation.
- Brings innovative capacities and add value to Secretariat and ISRBC as whole.

The first option - Infrastructure, administration and maintenance of the Sava GIS provided by Secretariat of the ISRBC, is the best and the most effective solution.

It is also **proposed** to use **Alfresco Software as the optimal solution for the Sava Content Management System.**