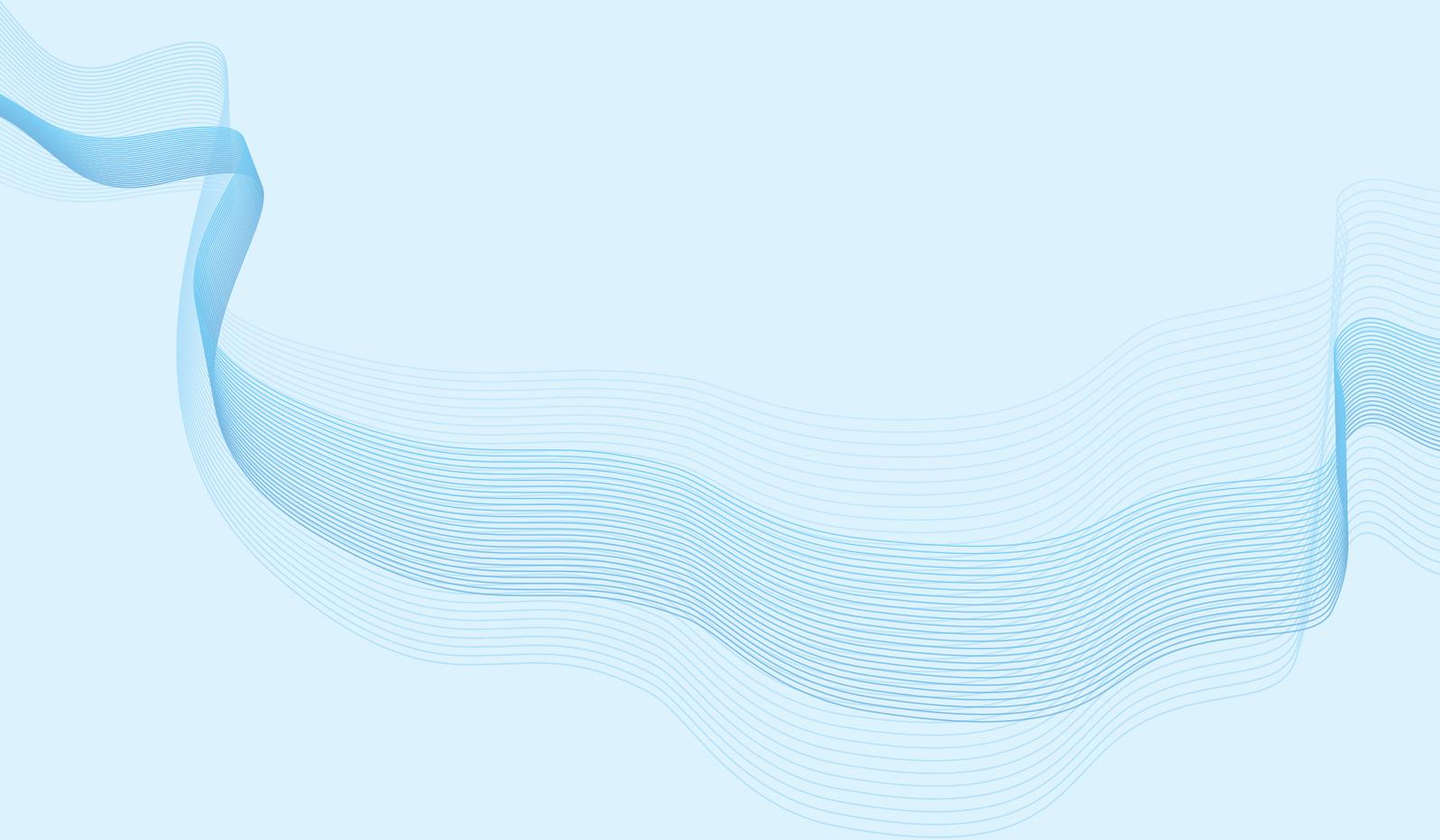


ESTABLISHMENT AND
OPERATION OF AN

IAWD ASSET MANAGEMENT REGIONAL SERVICES HUB

FOR SELECTED WATER UTILITIES
IN THE DANUBE RIVER BASIN

Belgrade | September 2015.



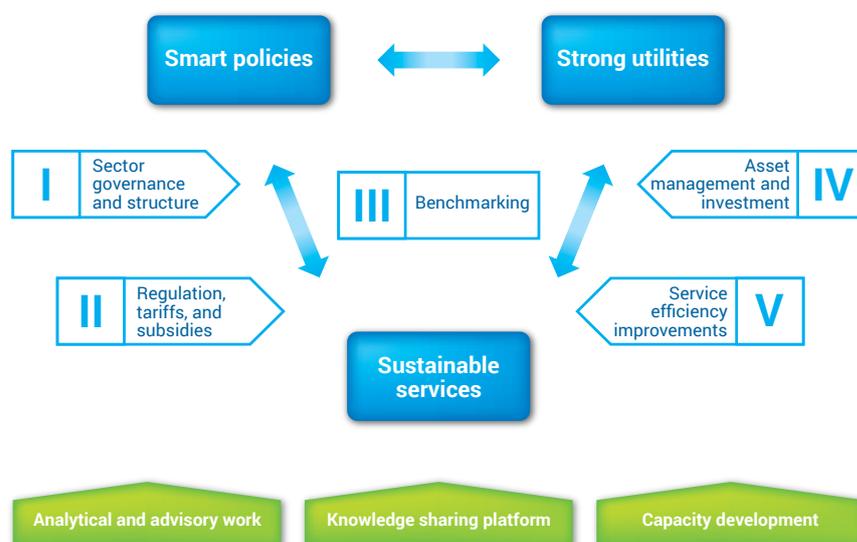
ESTABLISHMENT AND OPERATION OF AN IAWD ASSET MANAGEMENT REGIONAL SERVICES HUB FOR SELECTED WATER UTILITIES IN THE DANUBE RIVER BASIN

As part of the Danube Water Program, the International Association of Water Supply Companies in the Danube River Catchment Area (IAWD) launched a project with the main objective of creating greater awareness and improving Asset Management practices for the Water Utilities in the Danube region.

Water Utilities in the Danube Region are primarily Water Supply Companies owned by the Municipalities.

To achieve the set objective, IAWD created a knowledge hub for Asset Management (AM) which over a period of 18 months assisted and guided 17 Water Utilities of four countries in the region, namely Bosnia and Herzegovina, Serbia, FYR Macedonia and Montenegro, in carrying out Asset Management

practices. The main output of the hub was the formation of the Asset Management Service Centre and the completion of Management Reports aimed at combining and processing information from both the Commercial and Technical Departments of the selected Utility Partners and providing the Management of these utilities, on a regular basis, with comprehensive reports on all AM aspects of operations.



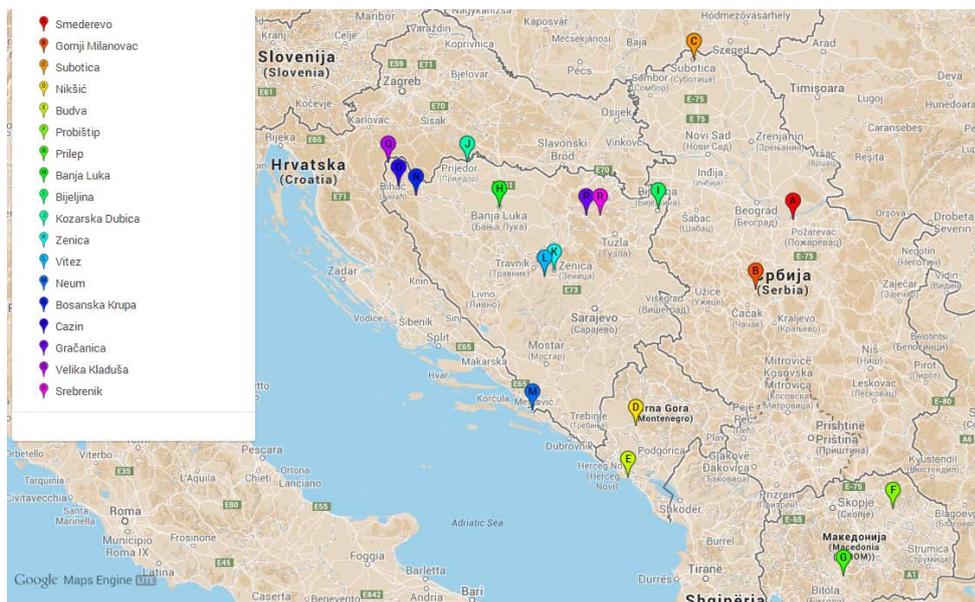
PROJECT OBJECTIVES



The AM hub utilizes the resources and experience of Belgrade Water Works (BWS) in infrastructure asset management in order to provide Asset Management (AM) services to Utilities in neighboring countries and the Danube Water Program target countries.

The outcomes from this project include direct results for the utility partners, and products on Asset Management that will be made available for further dissemination to other Danube Water Program (DWP) Partners. To achieve the objective, the AM Management Service Centre includes the following activities:

- ▶ Assistance in creating a GIS based Asset register of the Water Supply Network
- ▶ Dissemination of a methodology and management assistance in the generation and interpretation of Management Reports at all levels based upon technical and commercial inputs, formulating appropriate decisions.
- ▶ Utility performance assessment, through the involvement of industry experts to help analyse the Utility's performance and to identify appropriate remedial and proactive activities
- ▶ Support for regular System audits, identifying problem areas both with regard to usage of the system and business procedures.



UTILITIES PARTICIPATING IN THE PROGRAM (PHASE I)

Initially a call for utilities from the Western Balkans to participate in the program was launched. The utilities were selected based upon a set of criteria developed by the Asset Management Service Centre (i.e. mix of sizes, commitment of the utility etc.). Although the number of Utilities was initially limited from 10 to 15, all Utilities who expressed interest to participate in the program were invited to join the first activities. The water utilities range in complexity and population from small (11,000) to medium size (225,000).

An agreement was drawn between each participating Utility and the DWP that clearly define the responsibilities of each party involved. The responsibilities of the Utilities included:

- ▶ Commitment to the project by top management
- ▶ Participation of at least two middle level Utility management members
- ▶ Participation in all events organized including Workshops, Seminars etc.
- ▶ Participation and contribution to the formulation of the Utility Assessment and recommendations.
- ▶ Active contribution to the achievement of the agreed targets per each Phase.
- ▶ Willingness to report performance data to the sector information system
- ▶ Payment of EUR 500/ 1,000 (once-off payment)

PROJECT IMPLEMENTATION STRATEGY

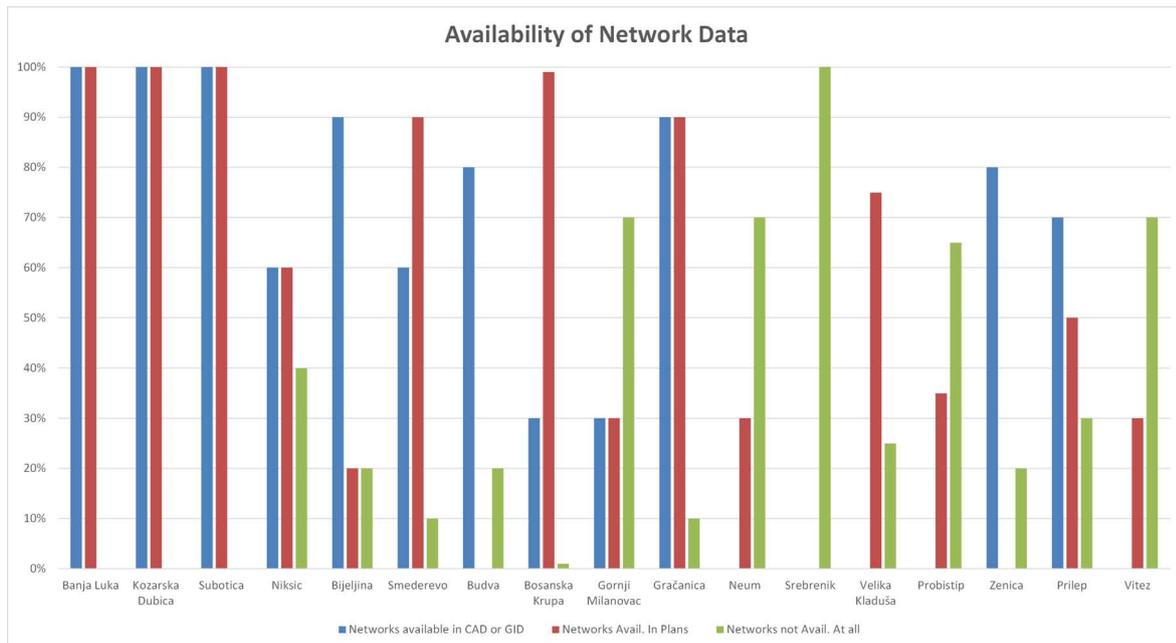
Under the original approach three Management Reporting services were included in the project, namely:

- ▶ **Asset Register Evaluation Report (Phase II):** The minimum requirement for proper Management Reporting is an accurate representation of all the transmission and distribution networks, at least with regard to the main operation of the bulk supply and correct discretization of the hydraulic and mass balancing zones. This report evaluates the information in the current Asset register, identifies changes that must be made and identifies areas that need further investigation with the objective of (a) Achieving an accurate representation of all the transmission and distribution networks. (b) Preparing the Asset register to be properly used for a NRW-Audit and for Hydraulic Analysis for optimisation of the network.
- ▶ **Commercial Data Evaluation (CDE) Report (Phase III)** has as main objective to ensure data quality of Commercial data through data validation, evaluation, and exception lists and discrepancies. This includes missing or inconsistent data in the

Billing systems of the Water Utilities. In addition, it includes a detailed analysis of water consumption and consumers' behavior, analyzing reasons of commercial losses and identify problematic meters, connections and meter readings, towards the reduction of apparent losses in unaccounted for water.

- ▶ **Un-Accounted for Water (UFW) Analysis Report (Phase IV)** has as main objectives (a) efficient monitoring of bulk meter operation and monthly evaluation of bulk meter readings. (b) UFW analysis of Mass Balancing Zones (MBZs) using the IWA (International Water Association) methodology.

The Phases described represent a logical progression of Management reporting in the Utilities. Depending on the sophistication and commitment of the Utilities it was expected that each participating Utilities will progress through Phase II. The progression to Phases III and above depended upon the commitment of the Utility and the speed of completing tasks in the course of the project. It was also anticipated that the CDE and UFW Management Reporting stages will be feasible to a maximum of three Utilities given the resources available.



Adjusted Implementation

The preliminary assessment of the participating Utilities confirmed the initial assumptions regarding the project's implementation strategy. Only a few Water Utilities had the potential to proceed to the CDE and UFW stages.

It was also clear from the replies to the initial questionnaires that the building of validated Networks Asset Register was the most serious problem faced by the majority of the Water Utilities in the region. The lack of a validated network asset registry manifests in high percentages of NRW, high operational costs and high costs for network rehabilitation.

Based on the initial assessment of the Utilities, the Utilities were classified in three groups.

- ▶ **Group I (4 Water Utilities):** These Water Utilities reported that most of their network data were captured and as a result had a lower level of discrepancies. They also had considerable GIS and AM knowledge and they were expected to run through Phase I faster than the rest. The AM Hub was in a position to know with accuracy the problems in the network assets registers only once the actual data were imported, analysed and classified. Depending on the level of discrepancies then their zoning was analysed, verified and corrected.

- ▶ **Group II (6 Water Utilities):** These Water Utilities had collected more than 60-70% of their network data and were using some form of CAD/GIS. In principle they had to go through the same exercise as Water Utilities of Group III but not to the same extent. It was not expected that any of them would proceed into Phases III and IV. However, some of these Water Utilities had an abnormally high level of unbilled consumption that warranted further investigation. Phase III could be very beneficial for them provided it is accompanied by commercial rehabilitation (e.g. faulty meter replacement). The process would depend on the output of the analysis and the AM Hub recommendations.

- ▶ **Group III (7 Water Utilities):** These Water Utilities had more than 25% to 80% of the networks unknown, or they had networks only in hard copy plans and they had very little knowledge/use of GIS/CAD systems. As a result training on GIS systems was provided to these Utilities during the Jahorina Workshop. A free GIS software (Quantum) was installed and training material was provided.

INITIAL PERIOD ACTIVITIES

Following the selection of the participating utilities, the assigned personnel of each Utility completed a questionnaire to allow the AM Hub to assess the Utility's capacity and systems. The questionnaire included general and operational questions classified in 4 categories, i.e.:

- ▶ Availability of Data
- ▶ Existing Computerized Systems
- ▶ Engineering Operations in terms of Zoning / Bulk Metering / Leakage control
- ▶ Assessment Questionnaire that utilizes Hydro-Comp's Utility Assessment model.

Availability of Data

The most critical sets of questions were related to the availability of data and the use of systems CAD/GIS. The questions on availability of network data queried if the data were available in (1) CAD/ GIS environment (2) In Hard Copies - Plans (3) Not at all. The results are shown in the Figure below.

Based on network data availability and the use of CAD/GIS systems the Water Utilities were classified into three groups/clusters.

- ▶ Group I (4 Water Utilities): These Water Utilities had gone through extensive network data capture exercises and it is considered that they had collected most of their data. They had active GIS/ CAD systems/units.
- ▶ Group II (6 Water Utilities): These Water Utilities had collected more than 60-70% of their network data and were using some form of CAD/GIS.
- ▶ Group III (7 Water Utilities): These Water Utilities had more than 25% to 30% of the networks unknown, or they had networks only in hard copy plans and they had very little knowledge/use of GIS/CAD systems.

Some of the Water Utilities were difficult to be classified at the initial stage, without more detailed interviews and a better understanding of their actual data.

Existing Computerised Systems

The results of the questionnaire on the use of IT systems shown that:

- ▶ Almost all the Utilities had some form of billing system with many of these systems being "homemade" systems.
- ▶ All the Water Utilities of Group I and II had some form of GIS /CAD systems. On the contrary, most of the Water Utilities of Group III did not have any GIS or CAD systems/experience.
- ▶ Only one Municipality, out of the 17 had a computerized Maintenance Management system and/or a Complaints Management System.
- ▶ With the exception of Banja Luka no other Municipality has an Asset Management system.
- ▶ Only one Municipality, out of the 17 has a NRW Management system (however it is not being used as network data is not available).

In general, the results indicate a very low level of computerisation primarily due to the lack of network asset information.

Engineering Operations (Zoning/Bulk Metering/Leakage)

The results indicate that most of the Water Utilities are involved in some form of leakage detection activities; however, without proper mapping of the actual network assets, the exercise has very limited effect. Some of the questionnaire replies regarding the operations and management of zoning indicate that the Utilities do not fully understand or appreciate the importance of zoning and training will be needed to address this problem, i.e.

- ▶ Many Utilities (9 out of 17) reported that they do not know or do not manage their pressure zones.
- ▶ Most Utilities (11 out of 17) reported that they did not have DMA zoning.
- ▶ Some of the Utilities that reported that their DMA zones are being monitored, either did not have telemetry or did not have bulk meters.

UTILITY ASSESSMENT REPORTS (UAR)

A one-page questionnaire regarding macro indicators of water supply operations of each Municipality was analysed using Hydro-Comp's/EDAMS Utility Performance Model. The model analyses the town planning, commercial and technical macro indicators together with certain assumptions based on Hydro-Comp's expert's opinion to yield a volume and revenue balance and a set of performance indicators that were then used as a basis to calculate expected performance improvements after certain remedial activities have been performed.

Analysis is done using an expanded version of the IWA (International Water Association) classification for non-revenue water. The classification is based on a NRW breakdown reflecting an understanding of all the different problems of NRW with regard to required remedies, including both commercial and technical problems relating to network or institutional aspects. For each component a detailed volume and revenue calculation is carried out satisfying an overall mass and revenue balance and indices within acceptable and expected limits.

The report includes two main sections:

1. Assessment of Current Condition

- ▶ Assumptions & Analysis
- ▶ Consumption Analysis
- ▶ Water Balance
- ▶ Revenue Balance
- ▶ Key Performance Indicators

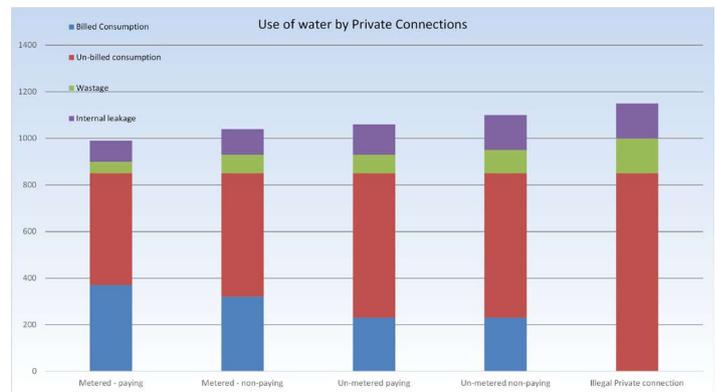
2. Achievable Recovery

- ▶ Assumptions for Recovery through rehabilitation and capital works
- ▶ New Works required for recovery
- ▶ Effect of recovery on water balance
- ▶ Financial Implications of Recovery
- ▶ Effect on Key Performance Indicators.

The initial assessment indicated high levels of NRW for all the Water Utilities in the range of 40% to 60% and high levels of leakage and unbilled consumption. These results confirm that the Utility problems are not only technical but also commercial and that parallel actions will have to be implemented in term of commercial rehabilitation programs.

Municipality	Assessment Questionnaire								
	Data Reliability	Model Balanced	NRW (%)	ILI	Leakage (%)	Unbilled Cons. (%)	Unbilled Wastage/Int. Leakage (%)	Bad debts (%)	Average actual consumption per private connection (l/day/conn)
Banja Luka	70%	yes	43%	7.0	20%	22%	1%	1%	1,420
Kozarska Dubica	95%	yes	52%	3.7	39%	11%	1%	2%	278
Subotica	80%	yes	45%	3.3	19%	15%	4%	7%	389
Bijeljina	80%	yes	55%	2.7	17%	34%	3%	1%	414
Prilep	100%	yes	59%	8.5	37%	19%	2%	2%	450
Gornji Milanovac	100%	yes	60%	4.8	30%	18%	4%	8%	493
Zenica	80%	yes	39%	7.1	27%	5%	1%	5%	1,055
Srebrenik	80%	yes	32%	0.8	11%	11%	6%	5%	227
Velika Kladuša	100%	yes	53%	1.4	19%	29%	2%	3%	478
Probstip	100%	yes	64%	15.0	16%	33%	7%	8%	389
Smederevo	80%	yes	60%	4.1	16%	22%	7%	14%	714
Gračanica	80%	yes	42%	1.7	19%	14%	4%	5%	126

From the above Table it can be also seen that most Utilities provided the necessary information that allow the balancing of production versus consumption and the calculation of the NRW. However, for some of them the initial information were of questionable accuracy.



Based on the Questionnaires, Utility Assessment Reports (UAR) were prepared and translated in the local language. The reports were presented to the Utilities during the AM Hub team site visits, covering assessment of current condition and achievable recovery.

By end of March 2015 the Utility Assessment Reports were completed for most of the Utilities with the exception of five that did not provide reliable information.

NETWORK DATA AM REPORTING

Different types of AM reports were designed and delivered depending on the sophistication and AM knowledge of the various Utilities. These reports included:

- ▶ GIS Data Evaluation Reports (Group III)
- ▶ Basic AM Reports (Groups I, II, III)
- ▶ Network Data Validation Reports-NDV (Group I)

GIS Data Evaluation Reports

GIS Data Evaluation Report is designed for checking topology of network data and key asset attributes, for Utilities that captured AM data within basic GIS environment. This is, actually, preparatory work for introducing the second type of reporting, namely Basic AM Reports. Network topology was created based on converted data in order to verify connectivity of captured data. Specific types of engineering zones generated include Hydraulic Zones, Water Balancing Zones (DMAs) and Pressure Zones. Key attributes were analyzed for identification and reporting of missing or wrong data, for all point and line network elements. Analysis is concluded with guidelines and recommendations for elimination of system errors. This kind of Report is delivered to the Utilities Budva, Bijeljina, Bosanska Krupa, Gornji Milanovac, Gračanica, Neum, Srebrenik and Velika Kladuša.

Basic AM Reports

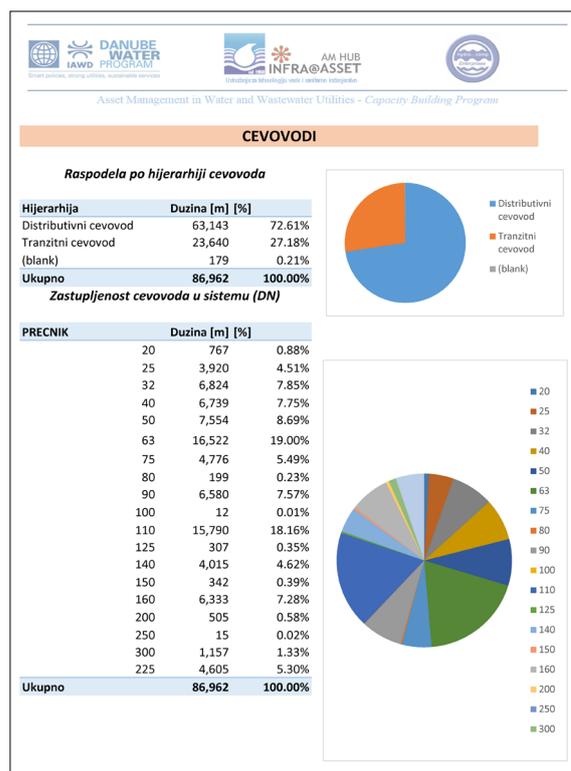
The Basic AM Report is a first look on captured network elements from the GIS-centered AM Register. The Report deals with the structure of network elements and quality aspects of captured asset data.

Reporting process is designed to be a practical, simple and in a direct way Utilities to 'produce' a Report on achieved level and status of the AM register. Based on predefined data structure AM Hub prepared reports in EXCEL template format and Utilities were trained to produce their own Reports.

Basic AM Reports were created for Group II Utilities during the 3rd Workshop. Template and explanation material were also delivered to all Utilities.

Network Data Validation Reports

The reports outline network data evaluation problems identified in the analysed utility networks. The reports were produced for the Utilities of the most advanced



group (Group I) that includes (a) Banja Luka (b) Kozarska Dubica (c) Niskic, and (d) Subotica. Utility data were migrated from the legacy systems to the EDAMS Network Data Management system using shapefiles format. The problems identified were classified as:

- ▶ Missing technical information on the legacy GIS layers
- ▶ Issues that require clarification and network connectivity problems
- ▶ Required changes in the format of the original legacy data to meet the conditions and requirements of the network data management system.

The reports address issues on:

- ▶ Data Conversion
- ▶ Attribute Data & Connectivity for System Components, i.e. Reservoir Sites & Reservoirs, Pump Stations & Pumps etc.
- ▶ Attribute Data & Connectivity for Water Pipes and issues related to Materials & Diameters used
- ▶ Comments on the existing Meter Chambers & Bulk Meters
- ▶ Attribute Data & Connectivity of Valves, Borehole Sites and Hydrants
- ▶ Problems in Zoning, i.e. lack of zone valves, islands

The Network Data Validation Reports (NDV) were delivered to the four Utilities of the main group, i.e. Banja Luka, Kozarska Dubica, Niskic and Subotica and the corrected network data were uploaded on the cloud.

COMMERCIAL DATA EVALUATION

This analysis should be executed at a Utility on a regular basis to identify discrepancies in the commercial database and also monitor the progress of addressing such discrepancies.

It should be noted that the results of the analysis reflect the status of the information in the billing system and not the actual status on the ground. Consequently the discrepancies identified should be investigated in the field; such investigation will either indicate a problem in the field, such as a stuck meter that has to be replaced or a fault or lack of information in the database, such as lack of meter readings.

To make the exercise more effective it is important to update the billing databases with information known to the meter maintenance department, such as the meter size and the meter installation date. False information in the billing system with regard to these two parameters will result in misleading results.

The reports include a comprehensive evaluation of the status of the commercial information and address the following:

- ▶ Consumption Analysis (Billed (Metered) Consumption Analysis, Actual Consumption Analysis –per Consumption Category, Consumption behaviour Analysis)
- ▶ Consumer Analysis (per Consumption bands, High Consumers, "Suspect" Residential Consumers.)
- ▶ Meter Analysis (Meter Model/ type, Meter Size, Consumption Analysis per Meter Make /size, Suspect Undersized / Oversized meters, Stuck Meters)
- ▶ Commercial Analysis (Commercial Losses, Commercial Rehabilitation – Activities Required, Benefits from commercial rehabilitation)
- ▶ Commercial Analysis Discrepancies

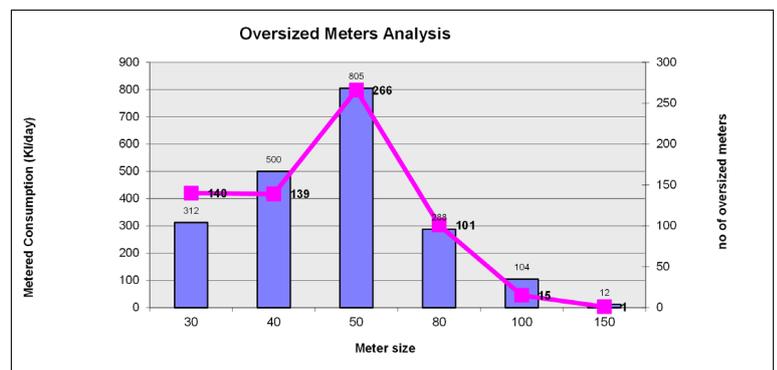
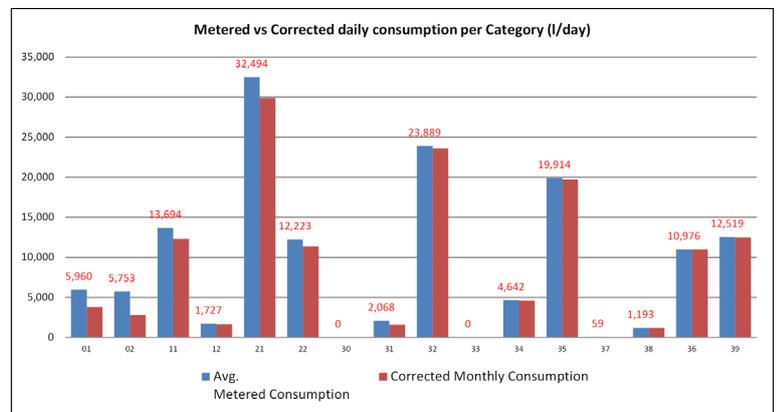
The findings of the Commercial data evaluation must be used to compile an action plan for rehabilitating the appropriate commercial components.

The original contract covered the development of a Commercial Data Evaluation (CDE) report for only one Utility. Banja Luka was selected as the Utility for delivering the CDE report. Raw data were processed by Hydro-Comp and a series of clarification questions

were sent to the Commercial Department over the period from September 2014 to January 2015. The results of the analysis were presented during the 3rd Workshop (21st-22nd April 2015 in Belgrade, Serbia). The Commercial Date Evaluation (CDE) became the main topic of the conference with Banja Luka results used as a 'live' example of the methodology.

A number of participating Utilities recognized the usefulness of the Commercial Data Evaluation (CDE) Report. IAWD decided to allocate additional financial resources to prepare CDE Reports for further two Utilities of Group I (the most advanced Utilities): Niksic and Kozarska Dubica. This decision was perceived to have a strong positive influence on the future work of the Utilities.

Utilities Niksic and Kozarska Dubica sent requested Commercial data with explanations to AM Hub. The CDE analysis was concluded end of August and reports were delivered to the Utilities.



OPERATION OF THE AM CLOUD SERVICE

The original contract did not cover any provision of AM software for operation over the cloud. Hydro-Comp Enterprises decided to offer to the Water Utilities of Group I for the duration of the contract access to the EDAMS Network Asset Management system over the cloud. Through Cloud computing, EDAMS applications and data reside on secure remote servers that are accessed via the Internet.

The decision was prompt by requests from many of the Utilities for continuous access to their data in addition to the static reports as a way to implement on-going improvements.

The AM Hub from 1st of December 2014 was hosting the Utility data for the 1st group of Utilities. The initial results of the usage of the cloud service are shown in the Table below:

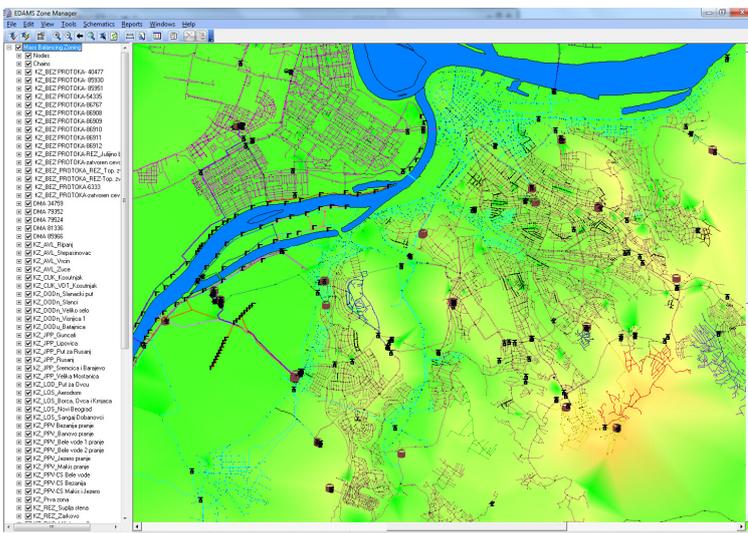
	Dec- Jan		Feb-March		April-May	
	Number of sessions	Duration (hours)	Number of sessions	Duration (hours)	Number of sessions	Duration (hours)
Banja Luka	46	16	20	12	25	14
Kozarska Dubica	14	0.5	8	1	10	2
Niksic	22	7.5	15	5	9	6
Subotica	18	0.25	18	1	50	2

Banja Luka and Niksic were the champions in the usage of the system as they entered 46 and 22 times in a month and remained logged in for more than 16 and 8 hours respectively.

A number of activities followed up from November 2014 onwards including:

- ▶ Maintenance of cloud infrastructure
- ▶ Maintenance of software and Utility data on the cloud.
- ▶ Updating of security information and access rights for users
- ▶ Publishing of access data to the Utilities

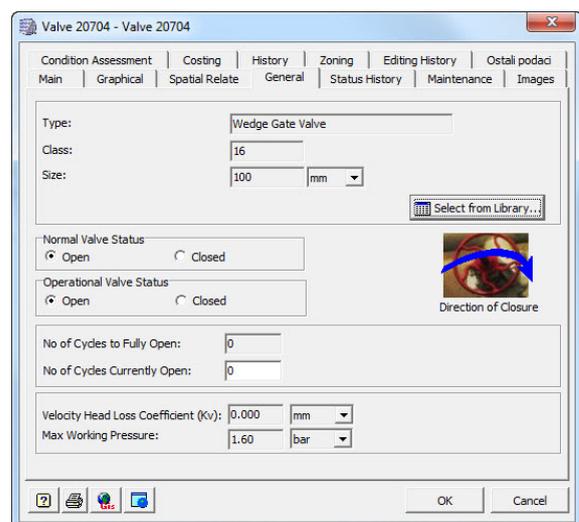
The cloud service was consistently used by the Utilities engaged. In parallel, new corrected data from the Utilities were being uploaded on the cloud.



Cloud solution alternative provides major benefits for Utilities, i.e.:

- ▶ Better utilization of resources.
- ▶ Frees administrative resources by outsourcing non-core applications
- ▶ Reduces IT capital requirements with an elastic pay-as-you-go operating expense model
- ▶ Improves data protection with affordable backup and disaster recovery

Adopting the cloud solution model makes it more accessible to those employees and users who need access to it, without increasing the vulnerability of your data. For geographically distributed companies, this enables remote sites to easily integrate their data with the primary site.



CONFERENCES / WORKSHOPS

The AM Hub was responsible for the trainings, presentations, organization of the workshops, and translation during events, organizing the site visits of the AM Hub Team to the Utilities as well as Utilities visit to AM Hub

Five workshops were organised during the project:

- ▶ Initial Workshop – Introductory Meetings (14.04.2014)
- ▶ Workshop I - Jahorina, Bosnia and Herzegovina (25.06 - 26.06.2015)
- ▶ Workshop II - Belgrade, Serbia (03.11.2014)
- ▶ Workshop III - Belgrade, Serbia (24.02. - 25.02.2015)
- ▶ Final Workshop - Belgrade, Serbia (15.09.2015)

Jahorina Conference/ 1st Workshop

During the period 25th and 26th of June 2014 the AM team organised the 1st Conference/Workgroup with the participating Utilities in Jahorina, Bosnia & Herzegovina. Activities during the conference included:

- ▶ Presentations on overall AM methodology
- ▶ Training on Asset Management
- ▶ Group sessions
- ▶ Presentations and one to one meetings with the participating Utilities

The workshop was very successful with all the participating Utilities in the program attending the conference. The workshop was set over 2 days, with the 1st day dedicated to presentations, separation of the Utilities into groups and short introductory presentations by the Utilities themselves.

2nd AM Workshop (Belgrade)

The 2nd Asset Management Workshop was organized on the 3rd of November 2014 in Belgrade, Serbia. Activities during the conference included:

- ▶ Current Project Status
- ▶ Commercial Data Evaluation – Explanation & Examples
- ▶ Discrepancy Data Evaluation – Asset Registers Verification
- ▶ Network Asset Management Principles – Recap

3rd Workshop: Asset Register utilisation

The 3rd workshop was held as planned on 21th – 22th April 2015. in Belgrade, Serbia.

The original program was modified due to the completion of the Banja Luka Commercial Date Evaluation (CDE) report. The main topic of the conference became the Commercial Date Evaluation process with Banja Luka as live example of the methodology. The duration of the presentations on Unaccounted for Water (UfW) Analysis and Operation & Maintenance were reduced in time.

Special attention was dedicated to practical AM reporting exercises. A template developed by the AM team was implemented for the second and third group of Utilities. The group created their first version of AM Report.



TRAINING MATERIAL

GIS Training Material

A series of video tutorials were developed to assist Utilities with capturing of information. The tutorials are listed below.

1. Video Tutorials – New pipe entry in existing network model (QGIS)
2. Video tutorials – Points entry from excel into QGIS
3. View control: working with ortho-photo background (QGIS)

Presentations

A number of presentations on all the topics of the Workshops and of the project were uploaded on the cloud and were made available to the Utilities.

Guidelines/Instructions issued

In order to build AM registers, a number of guidelines/work instruction were issued to the Utility AM teams, such as:

- ▶ Guideline/Instruction for network folder connection
- ▶ Guideline /Instruction for importing background maps (Q-GIS)
- ▶ Guideline /Instruction for usage of Hyperlinks (Q-GIS)
- ▶ Guideline /Instruction for printing maps (Q-GIS)
- ▶ Guideline /Instruction for Basic AM Report

VISITS FROM / TO UTILITIES

The visits were designed so that the AM Hub team keeps personal contact with the Utilities, encourages them, assists them with their activities and audit the work progress.

In addition, Utilities visited regularly the AM Hub in Belgrade to resolve actual issues or to refine some project steps.

2 Provera topologije

Pre gore navedenih provera potrebno je ustanoviti da li su uneti cevovodi dobro povezani ili postoje izolovana ostrva u sistemu. Sistem vodosnabdevanja Bijeljina sa oblastima koje nisu povezane sa ostatkom mreže prikazan je na Slici 1.

Slika 1. Prikaz VDS Bijeljina sa naglašenim oblastima koje nisu povezane na sistem

Analizom povezanosti elemenata je utvrđeno 26 oblasti koje nisu povezane na ostatak sistema vodosnabdevanja. Ukoliko ove oblasti nisu odvojeni sistemi potrebno je izvršiti proveru veza između ovih oblasti i ostataka sistema. Prilog ovog izveštaja čine SHP files oblasti koje nisu povezane na sistem.

Prilog: SHP files (Oblasti.rar)

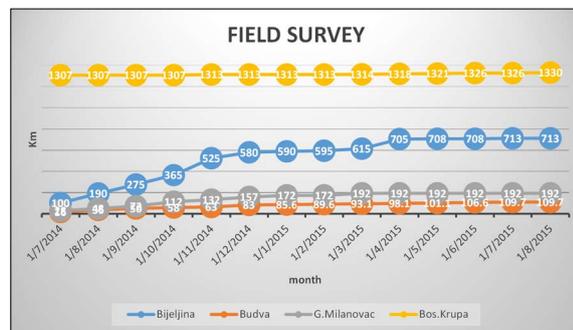
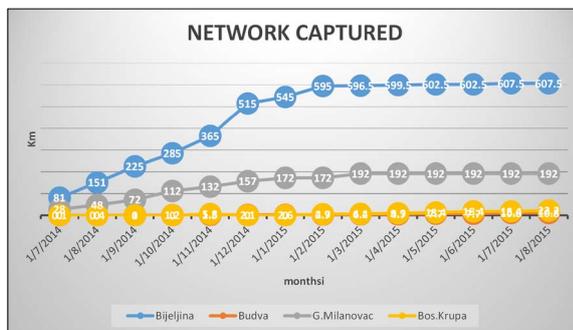


MONITORING THE PROGRESS OF THE UTILITIES

The progress of the Utilities was closely monitored on a monthly basis by Management reports and a series of KPI that were calculated.

The calculated KPI covered a wide range of issues, such as:

1. General AM Hub Services Indicators
 - ▶ No of employees that attended Workshops
 - ▶ Access of AM Hub Services - On line, by Phone, by Email
2. Operation of the AM Cloud Service - Number of sessions and Duration (hours)
3. Utility Assessment & Recommendations
 - ▶ Collection & Validation of Utility Operational data
 - ▶ Preparation of Utility Assessment reports
4. Water Networks - Assets Register Evaluation Phase
 - ▶ Imported data to AM Cloud based GIS / Setup in EDAMS
 - ▶ Data Collection Progress- Field Survey, Network Captured, Consumers Captured
 - ▶ Data Validation - Connectivity Problems, Attribute problems,-Zoning Problems



#	Indicators	Unit [No / %]	TOTAL
1	General AM Hub Services Indicators	Overall	
1.1	No of employees that attended Workshops	No, % of total	51
1.2	Access and use of AM Hub Services - On line	no of log-ins per Utility per month	4
1.3	Access and use of AM Hub Services - Phone	No. & duration(min) of phone calls per Utility per month	49
1.4	Access and use of AM Hub Services - Email	no of e-mails received/sent per Utility per month	59
2	Operation of the AM Cloud Service	Overall	
2.1	Number of sessions	no. of entries	100
2.2	Duration (hours)	no of hours	24.25
3	Utility Assessment & Recommendations	Overall	
3.1	Collection of Utility Operational data	% of total (18)	17
3.2	Validation of Utility Questionnaire data	% of total (18)	13
3.3	Preparation of Utility Assessment document	% of total (18)	13
3.4	Presentation and Agreement to Recommendations by Utility	% of total (18)	12
4	Water Networks - Assets Register Evaluation Phase	Per Municipality	
4.1	Imported data to AM Cloud based GIS / Setup in EDAMS	as % of available GIS/CAD data	4
4.2	Data Collection Progress- Field Survey	Total Number of maps completed during field survey stage/ total no of maps OR network length (km)	3167
4.3	Data Collection Progress - Network Captured	Total Number of maps completed during data capture stage/ total no of maps OR network length (km)	1673
4.4	Data Collection Progress - Consumers Captured	Total Number of maps completed during data capture stage/ total no of maps OR Consumers captures (No)	31077

DISSEMINATION ACTIVITIES

Many efforts were made during the project for the dissemination of activities and for enhancing the AM Hub visibility. These included:

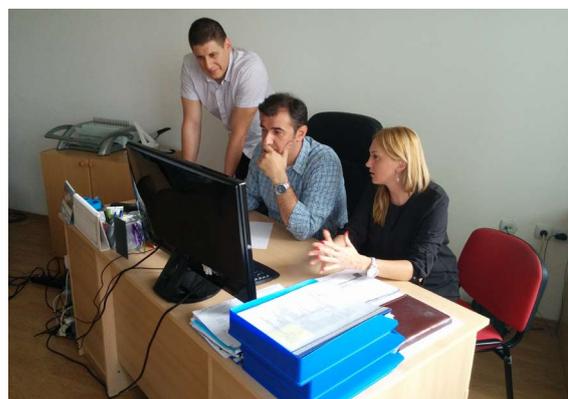
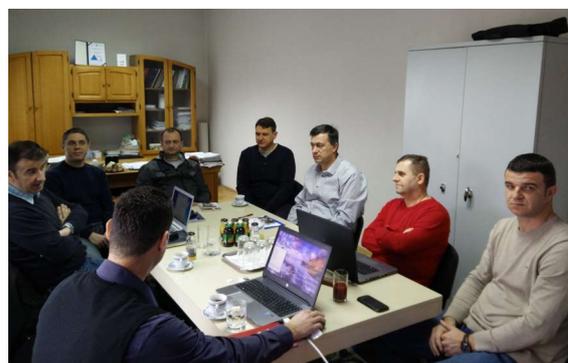
- ▶ Production of AM Hub Newsletters (both in English & Serbian)
- ▶ Production of leaflet for Belgrade Water Forum 2014 Bulletin (in Serbian)
- ▶ Preparing informal attendee in Belgrade Water Forum 2014 where AM Hub people promoted AM activities during the Conference / Exhibition

Specific activities included also:

- ▶ The AM Hub team participated in the second Balkans Joint Conference and Exhibition entitled "Water and Energy", in Tirana Albania, between 5-7 November 2014 with a paper by Dr. P. Kolovopoulos and A. Sotic entitled "Establishment and Operation of an IAWD Asset Management Regional Services Hub".
- ▶ Participation in Meeting of the Working Group on Asset Management in Skopje on 27th January 2015. Meeting was organized as a part of activities under the Grant Agreement between GIZ ORF (Open Regional Fund for South East Europe and IAWD).
- ▶ Participation to Second Meeting of the Working Group on Asset Management. Meeting took place in Belgrade on the 26th of February 2015
- ▶ Participation to NALAS Task Force in Solid Waste and Water Management. The group held its meeting in Bijeljina, Republic of Srpska, Bosnia and Herzegovina, on 18th March 2015. Experts coming from local governments and NALAS member LGAs discussed Task Force priorities for 2015, identified approaches for utilization and dissemination of the Task Force's project products, discussed challenges in the solid waste and water management sector throughout South-East Europe and identified priority project initiatives to address those challenges.
- ▶ Participation to Utility Benchmarking HUB for Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Slovenia and Serbia, which organized its first annual Benchmarking workshop on 18 - 20 March 2015 in Belgrade. The workshop marked end of performance assessment phase and the start of the performance improvement phase. At the same time the workshop marked the beginning

of performance assessment for the utilities newly registered for participation in the HUB according to methodology of the European Benchmarking Co-operation.

- ▶ Participation in Danube Water Conference, held in Wien, AT, from 6-8 May 2015. AM Hub representatives-participated in the Danube Water Conference (DWC). They were also invited in the Asset Management working Group meeting (6th May). The AM Panel was organized on the Conference opening day (7th May) with respective contribution of DWP program participants.



ESTABLISHMENT AND
OPERATION OF AN
**IARD ASSET
MANAGEMENT
REGIONAL
SERVICES HUB**
FOR SELECTED WATER UTILITIES
IN THE DANUBE RIVER BASIN



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Smart policies, strong utilities, sustainable services

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