

# IWA International SAM Forum 2021

18 Nov 2021 / BELGRADE / SERBIA



## WATER FORUM 2021 Conference and Exhibition

### Regional AM Pioneering

Maja Medenica, M.Sc CE

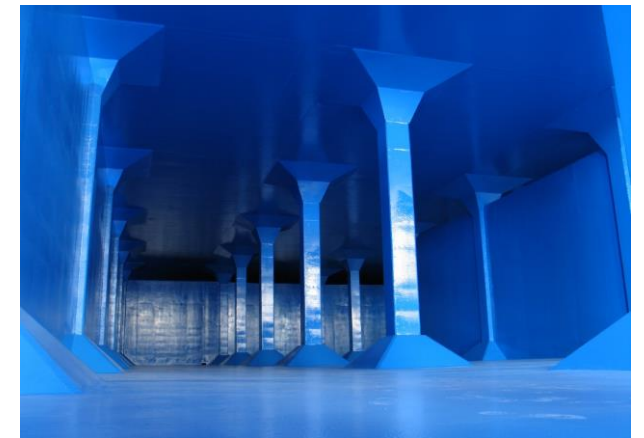
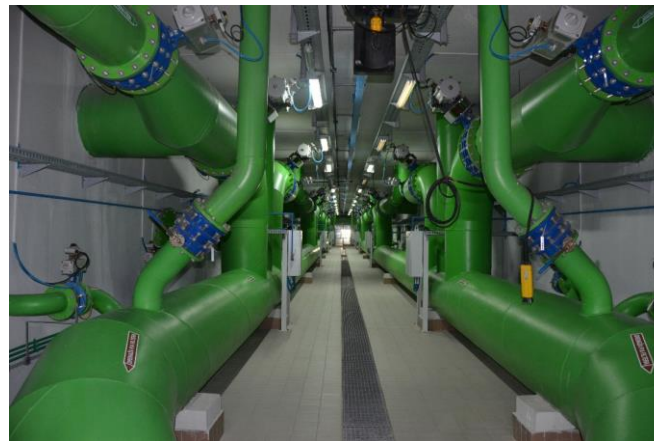
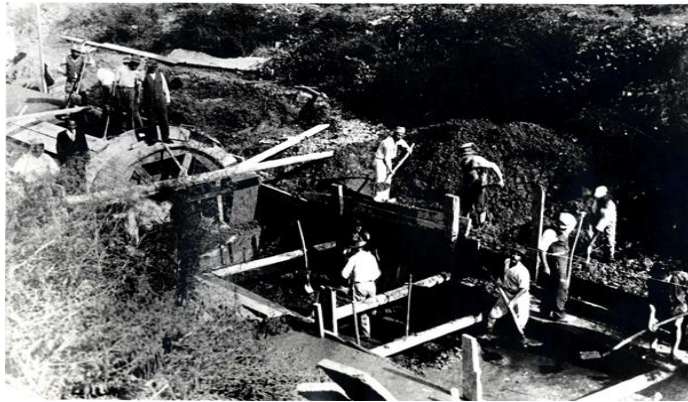
PUC BWS Asset Management Center Head

# Agenda:

- BWS introduction
- Belgrade AM concept
- Step by Step approach
- AM Achievements & Benefits
- Belgrade UTVSI AM Hub

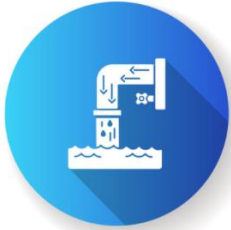
# Belgrade waterworks and sewerage

Founded in 1892



Today: Service for 1,500,000 consumers

# Belgrade waterworks and sewerage facts



*Water network*  
**7.185 km**

Distance between  
Belgrade and New York



*WTP capacity*  
**13.640 l/s**

Serbia w/o Belgrade consume  
8.172 l/s



*Water meters no.*  
**196.827**

100% of water consumers have  
individual water meters



*Consumers no.*  
**1.576.372**

Specific consumption for households  
as in Paris, Bern and Seoul



*Sewer network*  
**2.700 km**

Distance between Belgrade and  
Lisbon



*CO2 Emission*  
**140.000 t**

Forest on 25.000 ha absorb  
this emission of CO2

# Belgrade AM concept

- ❑ **FASEP - French project BWS 1st pressure zone (2005 to 2006)**
  - Water network data collection, capturing and analyses
  - Data capturing and analysis
  
- ❑ **KFW Project - Institutional support program 4 largest Serbian Utilities (2006 to 2009) Belgrade, Nis, Novi Sad and Kragujevac**
  - Data collection and data integration
  - Process and methodology upgrade
  - Organizational changes for Utility business improvement
  
- ❑ **From 2009. onward**
  - BWS has profound and enhanced AM concept within Utility
  - Dissemination of knowledge in the Region



# Belgrade AM concept



- Everything starts with the asset management registry, which is a unique central database and is connected to all other relevant databases
- Since the 2006, BWS started with Asset Management methodology within the Utility
- Asset Management Registry was formed - unique central database, with more than 1 Milion attributes

# Step by step approach

## □ Data model

- All relevant BWS department and sections was consulted in Data model creation: Billing and collection, Water network, Technical, Metering, Development, Financial,...
- Important information for daily usage was included

Attributes	
Water pipes	
AC	
OBJECTID	594
Diameter [mm]	32
Material	AC
Class	
Depth	100
Year of construction	1950
Operational	Yes
Visinska zona	<Null>
Condition	Critical
Roughness coefficient	<Null>
Digitization Method	Preliminary Plot
Data source	Teren
Note	1950-1960
Closed	No
Hierarchy	Secondary network
Owner	Utility
Hydraulic zone ID	Zona1
Pipe lenght	<Null>
DMA ID	Zona1
Pressure zone ID	Zona1
Asset ID	<Null>
GlobalID	{558D2050-3D26-498A-9...
Guid	62b54c6d-cca0-4907-87c...
SHAPE_Length	66.730928

Attributes	
Control valves	
1	
OBJECTID	1
Ref	<Null>
Type	PRV
Inlet pressure [bar]	10
Outlet pressure [bar]	5
Q [l/s]	3
Year of construction	1980
Operational	Yes
Condition	Moderate
Digitization Method	Preliminary Plot
Data source	Teren
Note	<Null>
Closed	No
GlobalID	{FD5698DF-23ED-480B-8...
Downstream pipe ID	3812b649-51e5-4d9b-8a...

Attributes	
Reservoirs	
Vis	
OBJECTID	8
Name	Vis
Ref	<Null>
Shape	Circular
Volume [m3]	2200
Reservoir bottom level [mamsl]	80
Top water level [mamsl]	85
Ground elevation [mamsl]	75
Number of chambers	1
Year of construction	1980
Operational	Yes
Digitization Method	GPS
Data source	Izvedeno stanje
Note	<Null>
Closed	No
GlobalID	{78A68843-F378-458C-914D...

# Step by step approach

## □ Data acquisition –field map



## Step by step approach

### □ Human resources

- Support and understanding of **top management** is the most important
  - Almost **all departments** were involved
- More than **30 employees** in the field data collection
  - **Students** were engaged for the field data capturing and office work
- **BWS AM Center** was established in 2009.
  - **Consistency** of AM team in BWS
- Around **100 employees** on daily basis using AM Registry
  - **Trainings** for the new staff and regular annual trainings



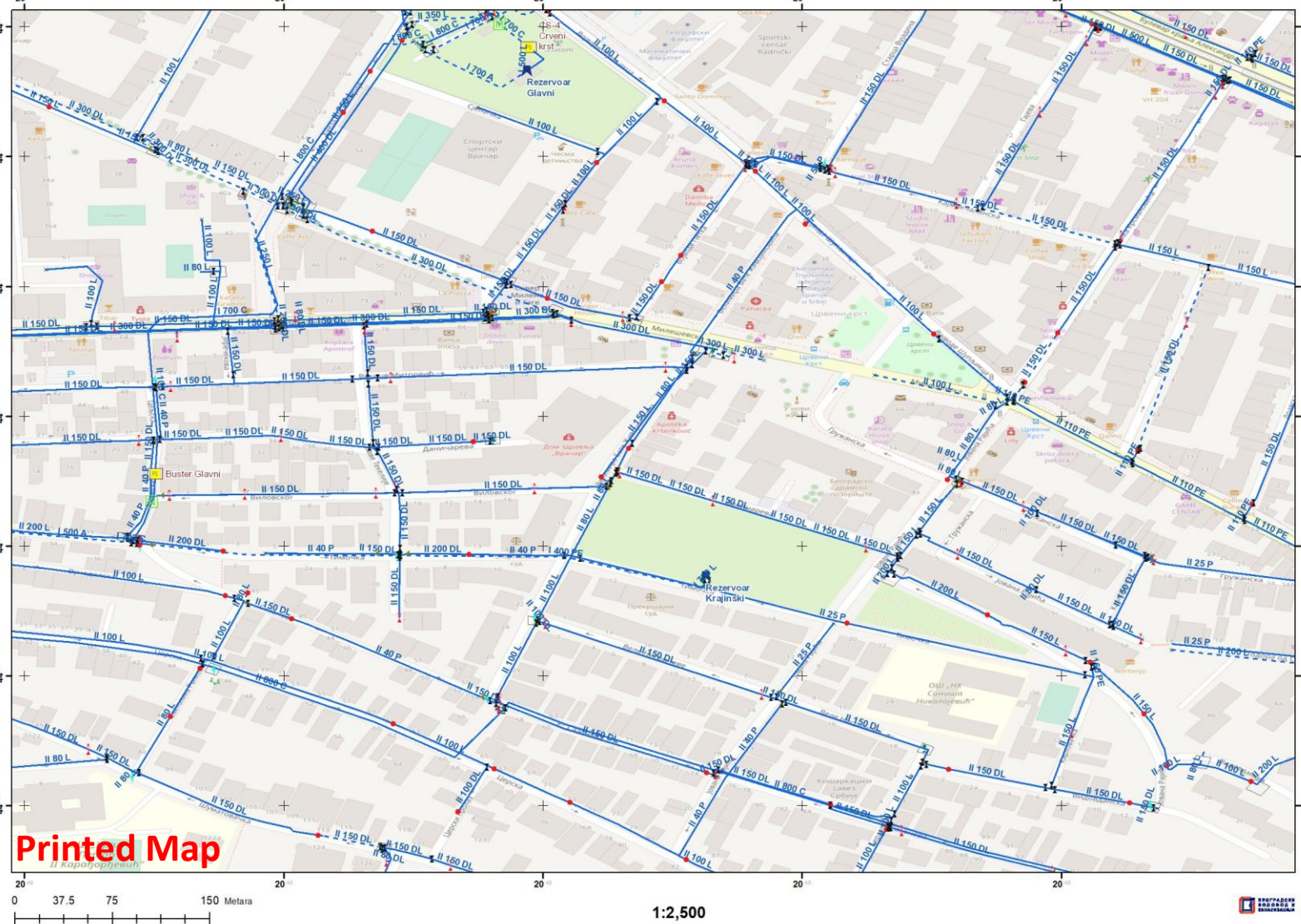
# Step by step approach

Datum: 8. 11. 2021.

SADRŽAJ MAPE

Slojevi

- VODOVODNA MREŽA
  - BVK MREŽA
  - PRIKAZ VODOVODNOG SISTEMA
  - RGZ MREŽA 2006
- KANALIZACIONA MREŽA
  - BVK MREŽA
  - RGZ\_MREZA\_2006
- DIGITALNI KATASTARSKI PLAN
  - Katastarska\_parcela
  - Objekat
- OSTALI PODACI
  - MREZA OPTICKIH KABLOVA
  - VODOVODNI POGONI I REONI
  - KANALIZACIONI POGONI I REONI
  - NEDOSTAJUCA INFRASTRUKTURA
  - IZOHIPSE
  - ZONE SANITARNE ZASTITE
  - PODELA NA DETALJNE LISTOVE
    - BVK\_500
    - BVK\_1000
    - BVK\_2500
- GEOREFERENCIRANI POTROSACI avgust
  - Potrosaci



WEB GIS

Printed Map

# AM achievements & benefits

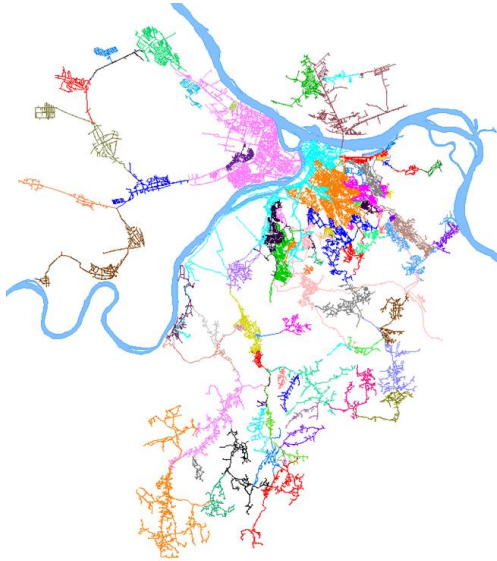
- Empower of **BWS employees capacity**
  - Storing **historical knowledge** and data of employees
- **Improved knowledge** of own system
  - **Data integration in BWS**(network, O&M, commercial, etc.)
- **Better internal coordination** within the company
  - Established sound **technical tool** for decision making support
- Level of **service improvement**



# AM achievements & benefits

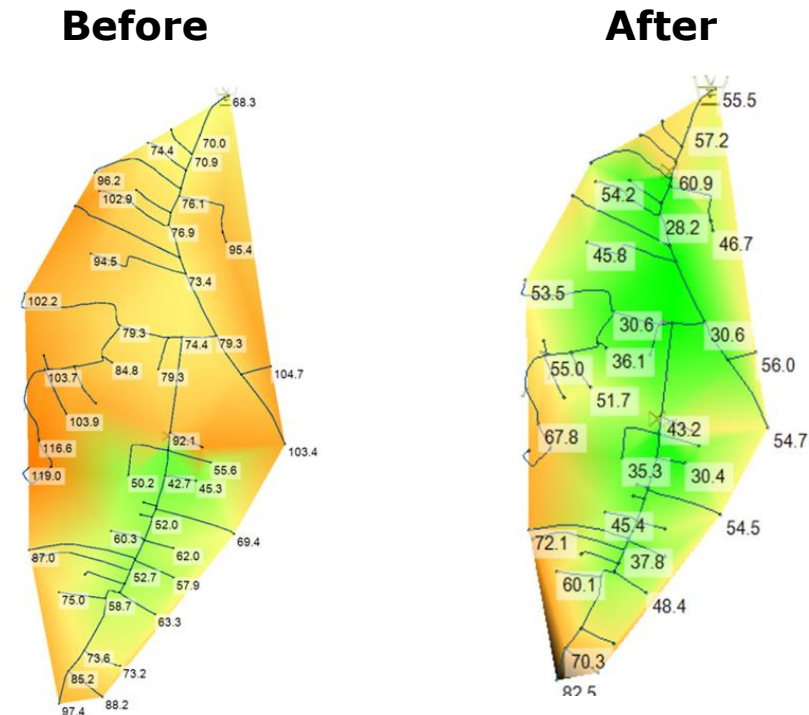
## Water loss reduction

- System divided into **76 DMAs**
- NRW calculated and analyzed for each DMA



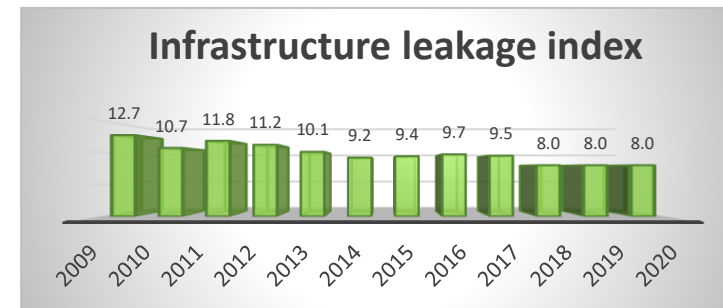
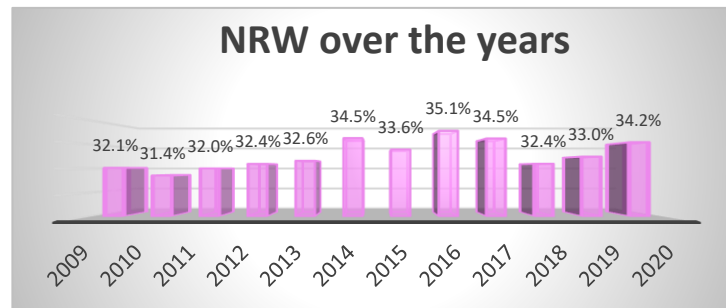
- Necessary - HM based on accurate flow and pressure measurements → provides right tools for measure adoption

- **Reducing leakage** in network requires reducing pressure in network
- **Reducing commercial losses** requires better consumer control and consumption measurement



# AM achievements & benefits

- Pressure management optimization leads to reducing the number of failures and increasing energy efficiency
  - Primary goal:** loss reduction
  - Final goal:** improving water supply to vulnerable areas and increasing system stability
- **Water loss strategy** was developed in 2020.



- **Important facts** – using accurate data and communication with the relevant departments



# AM achievements & benefits-Reporting

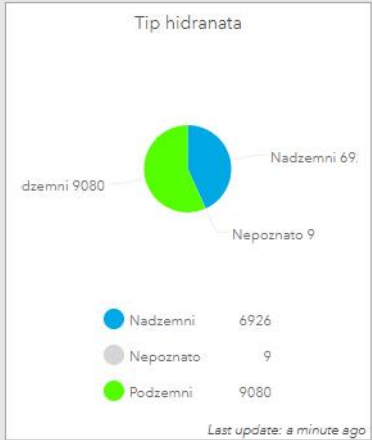
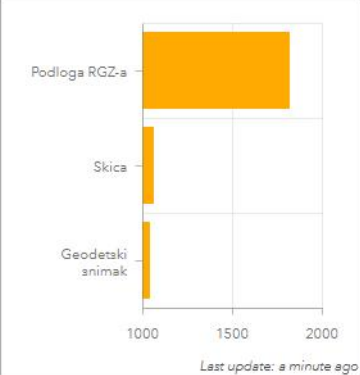
Ukupna dužina cevovoda sirove vode  
**125.5 km**  
Last update: a minute ago

Prosečna starost  
Cevovoda čiste vode: 33,13 godina  
Cevovoda sirove vode: 38,65 godina

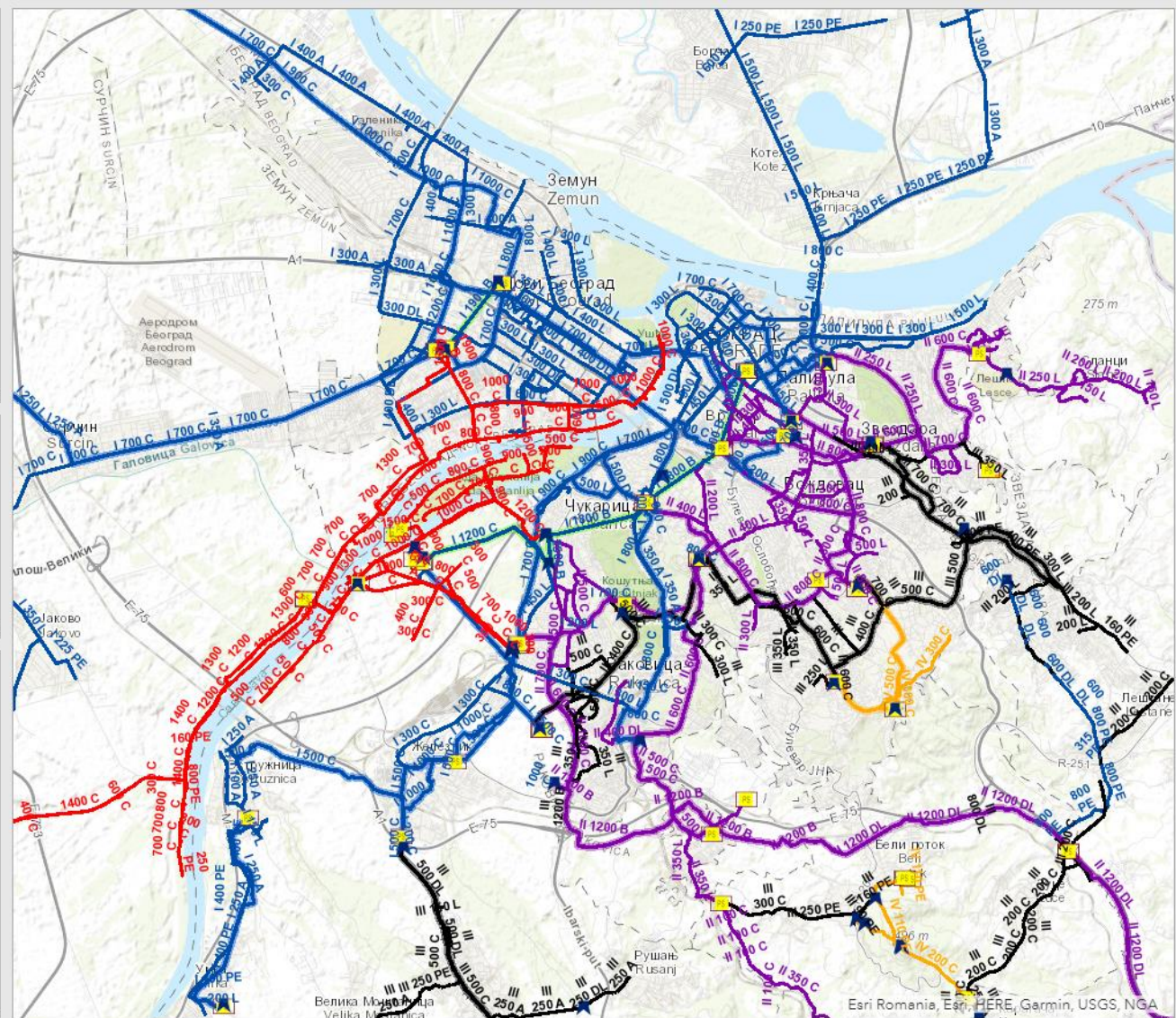
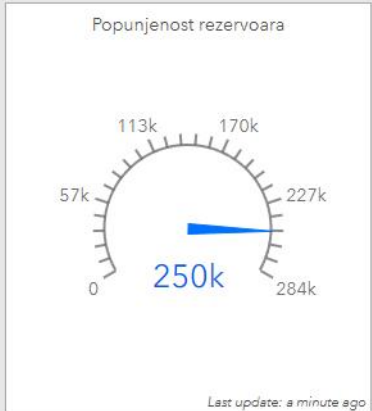
Ukupna dužina cevovoda čiste vode  
**3908.1 km**  
Last update: a minute ago

Ukupna dužina cevovoda  
P I - 899.6 km  
Last update: a minute ago

Ukupna dužina cevovoda  
P II - 1576.4 km  
Last update: a minute ago



Kapacitet rezervoara  
**283554 m3**  
Last update: a minute ago



# AM achievements & benefits-Reporting

Izbor

Datum od

11/8/2021

Pogon

VBGD1 VBGD2 VBGD3 VBGD4

Status prijave

5

Broj prijava za izabrani period i pogon

# 8,719

Last update: a few seconds ago

Broj prijava

# 3

Status 1

Last update: a few seconds ago

Broj prijava

# 973

Status 2

Last update: a few seconds ago

Broj istraga

# 3

Status 3

Last update: a few seconds ago

Broj radova

# 5,653

Status 5

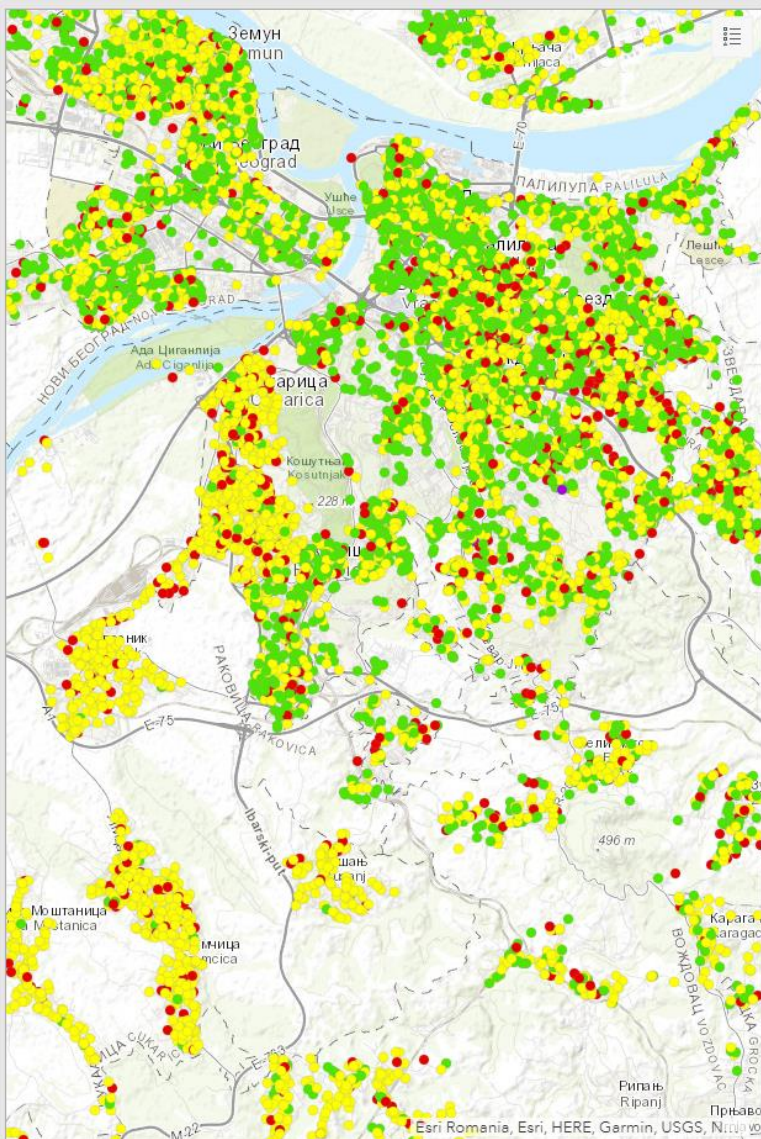
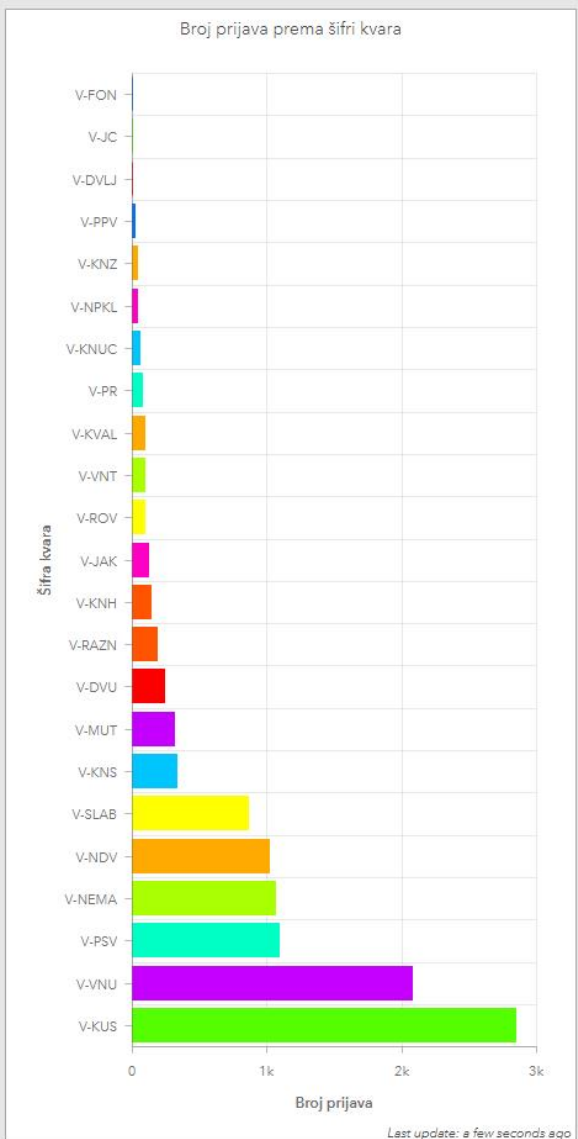
Last update: a few seconds ago

Broj otklonjenih prijava

# 4,139

Status 6

Last update: a few seconds ago

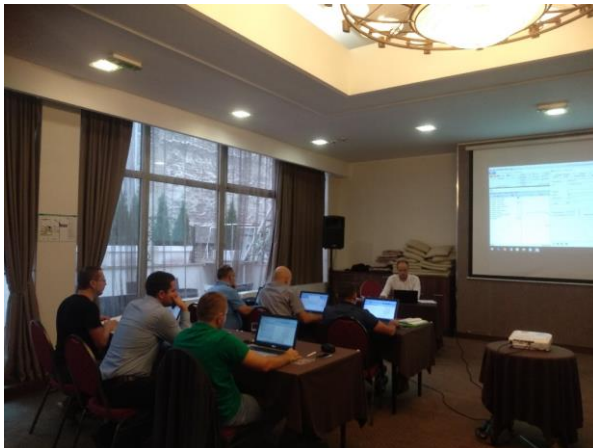


## Lessons learned:

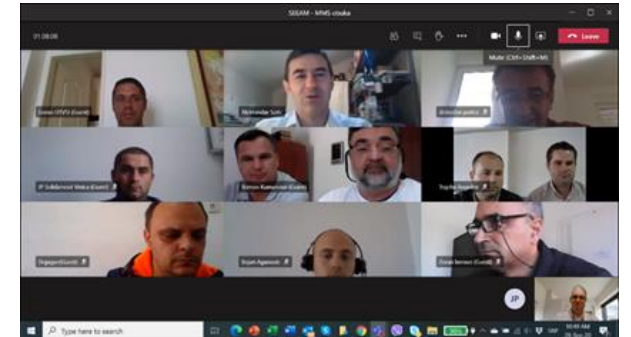
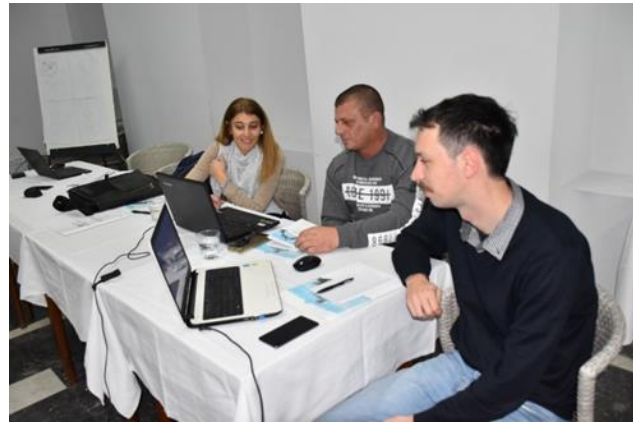
- Long-term process- **a never ending story**
- Implementation of AM **methodology=operation improvement**
- Importance of process **sustainability**
- **Commitment and persistence** pays off
- **Continuous improvement** and data update
- Change standard procedures and practice-**new era** will start
- **Modern management** is asset management
- Building of system **resilience**

# Belgrade UTVSI AM Hub

- Established **on 2014.** by WB&IAWD
- **From 2017.** UTVSI AM Hub was engaged on STA SEEAM Program
- **Knowledge dissemination** in the Region
- Support and trainings **for more than 50 PUCs** from SEE
- **Utility for Utility approach**



# Belgrade UTVSI AM Hub activities



Belgrade AM story become the **role model** for Serbia and the Region

Thank you for your attention!

Asset Management Center  
PUC Belgrade Waterworks and Sewerage

