



# Digitalisation of the water sector and water education DigiwatRO

"Dunarea de Jos" University of Galati  
and  
Norwegian University of Life Sciences

# Key facts

- Application submitted 16.02.2021
- Grant approved 16.04.2021
  
- 2 years 01.09.2021-31.08.2023
- 88 989€

# Objective

- to increase the effectiveness in the water sector by enhancing the use of digital tools in utilities facilitated by the enhanced digital competence in graduate education.
- **Sub-objectives:**
- Reducing the digital skills mismatch in the water industry
  - by establishing smart specialisation for digital water through the upgrade of curricula in UGAL with participation from the industry and NMBU
  - by supporting intelligent use of digital tools in education through incorporation of such tools , teaching and learning practices into upgraded curricula.
- Increase the process surveillance and process control in water supply and wastewater management with a high cost-benefit ratio
  - by reviewing and narrowing the gaps in the industry with concrete examples of digitalisation
  - by implementing pilot studies at utilities as graduate student projects

## DigiwatRO structure

Objective and 2 sub objectives

3+3 Outputs

4 project  
meetings

4 mobility  
events

4 Intellectual  
outputs

# Sub Objectives and outputs

## *SO1: Reducing the digital skills mismatch in the water industry*

- *Output 1.1: Develop, evaluate and incorporate a module on digitalisation of the water industry in a formal subject offered by both Universities*
- *Output 1.2: Introduce digital tools in teaching incorporated to the teaching of water digitalisation module*
- *Output 1.3: Develop digital tools to strengthen involvement and communicate water issues to the general public especially the Roma population*

## *SO2: Increase the process surveillance and process control in water supply and wastewater management with a high cost-benefit ratio*

- *Output 2.1: Demonstrate the increase of process efficiency and process security at two treatment plants in Norway and Oslo with two cases studies involving staff and students*
- *Output 2.2: Demonstrate that the digitalisation of the water industry does not only improve stability of services but also is a cost-saving measure.*
- *Output 2.3: Review the water security and access to safe water by a Roma community and evaluate how the digitalisation in the water sector may contribute the improved access*

## IO 1 : Enhancing digital surveillance, automation and cyber security in water utilities (NMBU)(11/21-12/22)

- to develop, test and validate several illustrative concepts for digital surveillance, automation and cybersecurity in the water sector. Stakeholders involved in
- the task do have a variable level of experience with such products and concepts thus the ambition is to prepare a toolbox of such products which can be used as
- teaching materials both in graduate teaching as well as in life-long learning processes.

| <b>IO1: Enhancing digital surveillance, automation, and cybersecurity in water utilities (</b><br><i>Leading organization: NMBU, Nov 2021-Dec 2022)</i> |   |               |                   |                           |
|---|---|---------------|-------------------|---------------------------|
| No.   | Tasks   | Task owner(s) | Deadline          | Tasks                     |
| 1   | Process surveillance and control systems (biological wastewater treatment plants) | UGAL          | Nov 2021-Mar 2022 | How is it done at NRA?    |
| 2   | Development of virtual sensors and cybersecurity systems                          | NMBU          | Mar -Jun 2022     | What are used at NRA/SFR? |
| 3   | Validation of virtual sensors and cybersecurity systems                           | NMBU          | Jun-Jul 2022      | What is/can be done?      |
| 4   | Process surveillance and control in membrane treatment process                    | NMBU          | Jul-Sep 2022      |                           |
| 5   | Functionality evaluation of the systems   | NMBU, UGAL    | Oct-Nov 2022      |                           |
| 6   | Feedback collection   | NMBU, UGAL    | Nov-Dec 2022      |                           |
| 7   | Coordination of the activities  | NMBU          | Nov-Dec 2022      |                           |

## IO 2: Promoting life-long learning in the water sector using hybrid education (UGAL- 06/22-02/23)

- Introduction of digital concepts to boost the life-long learning among the specialist who are active in employment.
- Digital lifelong courses can be offered and implemented an Integrated part of physical courses and will also give many specialists to complete the courses at more flexible time frames.

| <b>IO2: Promoting life-long learning in the water sector using hybrid education</b> |  |               |                     |                                 |
|---|--|---------------|---------------------|---------------------------------|
| <b>(Leading organization: UGAL, Jun 2022-Feb 2023)</b>                              |  |               |                     |                                 |
| No.   | Tasks  | Task owner(s) | Deadline            | Tasks                           |
| 1   | EU perspectives including EU directives                            | NMBU, UGAL    | Jun-Jul 2022        | Overview and comparison with RO |
| 2   | The use of big data and process control in lifelong learning       | NMBU          | Jun-Aug 2022        | Theoretical aspects             |
| 3   | Practices and evaluation models                                    | NMBU, UGAL    | Aug-Sep 2022        | What is done                    |
| 4   | Distance and life-long teaching methods                            | NMBU, UGAL    | Sep-Oct 2022        |                                 |
| 5   | Curriculum design for a continuing education course                | UGAL          | Oct-Nov 2022        |                                 |
| 6   | Teaching materials design, ICT tools identification/implementation | UGAL          | Nov-Dec 2022        |                                 |
| 7   | Teaching staff/instructors training                                | UGAL          | Dec 2022 – Jan 2022 |                                 |
| 8   | <i>Intensive course (s) with graduates from water sector</i>       | UGAL          | <i>Jan-Feb 2023</i> |                                 |
| 9   | <i>Feedback collection</i>   | UGAL, NMBU    | <i>Feb 2023</i>     |                                 |

## IO 3 : Boosting the digital skills of teachers and learners to promote digital Innovations in the water sector with hybrid learning (NMBU, 10/21-08/23)

- Dealing with slow uptake of implementation
- Improve the use of digital tools in education

| <b>IO3: Boosting the digital skills of teachers to promote digital innovations in the w hybrid learning (Leading organization: NMBU, Oct 2021-Aug 2023)</b> |   |               |                    |
|---|---|---------------|--------------------|
| No.   | Tasks   | Task owner(s) | Deadline           |
| 1   | Facilitate innovation and entrepreneurship capacities at UGAL                       | NMBU          | Sep-Oct 2022       |
| 2   | Latest concepts in hybrid learning  | NMBU          | Oct-Nov 2022       |
| 3   | Implement process surveillance & control related education                          | UGAL          | Nov-Dec 2022       |
| 4   | European aspects in engineering and chemical technologies                           | UGAL          | Dec 2022-Jan 2023  |
| 5   | Teaching materials design, digital tools identification / implementation            | NMBU, UGAL    | Jan-Feb 2023       |
| 6   | Teaching staff/instructors training, and intensive course for teachers and learners | NMBU, UGAL    | Feb-Apr 2023       |
| 7   | Feedback collection   | NMBU, UGAL    | Apr-May 2023       |
| 8   | Coordination of the activities  | NMBU, UGAL    | Oct 2021- Aug 2023 |



## **04 : Develop digital tools to strengthen involvement in water issues by the general public especially the Roma population (UGAL, 09/22-08/23)**

- General awareness and involvement on water issues among the general public is limited
- survey among general public and selected Roma communities

# Tasks for RO students

- **Legislations**

- EU and RO legislations and their status of practice today
- Challenges to implement?
- What can be done better?

- **Lifelong learning**

- How to enable/facilitate the use of big data and process control in lifelong learning?
- What options available in RO and what can be done better?

- **Online and virtual sensors:**

- Which online sensors are used at NRV (DWTP) and NRA & SFR (WWTP)
- Experience so far? Need and possibilities improve?
- What advantages in cold climates and managing disruptions?
- What can/cant be implemented in RO & why?

- **Cybersecurity**

- What are the possibilities with digital tools and what are the limitations- why?
- The status of awareness among the utility owners, policy makers, researchers and consultants?

## 2 mobility events (37 680€)

| Student mobility                                   |                     |                  |                        |   |                    |                                 |                |                           |               |               |
|--|---------------------|------------------|------------------------|---|--------------------|---------------------------------|----------------|---------------------------|---------------|---------------|
| Add row  |                     |                  |                        |   |                    |                                 |                |                           |               |               |
| Name of the institution                            | Destination country | Type of mobility | Number of participants | Total activity duration days (including travel days if requested) | Field of education | Economic sector (if applicable) | Level of study | Individual support (Euro) | Distance band | Travel (Euro) |
| "Dunarea de Jos" University of Galati              | NO                  | STMS             | 4                      | 30  | 0712               | M                               | 2              | 5 936                     | D3            | 1100          |
| "Dunarea de Jos" University of Galati              | NO                  | STMS             | 4                      | 30  | 0712               | M                               | 3              | 5 936                     | D3            | 1100          |
| Norges miljø- og biovitenskaplige universitet-NMBU | RO                  | Student_IP       | 4                      | 15  | 0712               | M                               | 2              | 3 416                     | D3            | 1100          |
| Norges miljø- og biovitenskaplige universitet-NMBU | RO                  | Student_IP       | 4                      | 15  | 0712               | M                               | 3              | 3 416                     | D3            | 1100          |

- Short term mobility of students (from UGAL to NMBU: 4MSc+4PhD students (30 days))
- Short term mobility of students (from NMBU to UGAL: 4MSc+4PhD students (15 days))

# 4 Project meetings

| Name of the institution                            | Destination country | Type of mobility | Number of participants | Total activity duration days (including travel days if requested) | Field of education (only for staff in Intensive Programmes) | Economic sector (only staff training) | Level of teaching (if applicable) | Individual support (Euro) | Distance band | Travel (Euro) |
|--|---------------------|------------------|------------------------|---|---|---------------------------------------|-----------------------------------|---------------------------|---------------|---------------|
| "Dunarea de Jos" University of Galati              | NO                  | TPM              | 4                      | 5   | 0712  | M                                     | 2                                 | 2 120                     | D3            | 1100          |
| Norges miljø- og biovitenskaplige universitet-NMBU | RO                  | TPM              | 4                      | 5   | 0712  | M                                     | 2                                 | 2 120                     | D3            | 1100          |
| Norges miljø- og biovitenskaplige universitet-NMBU | RO                  | HEI's Staff IP   | 4                      | 7   | 0712  | M                                     | 2                                 | 2 968                     | D3            | 1100          |
| "Dunarea de Jos" University of Galati              | NO                  | STTE             | 4                      | 7   | 0712  | M                                     | 2                                 | 2 968                     | D3            | 1100          |

- TPM – Transnational Project meetings (Nov 2021 to NO + xx to RO)
- HEIs Staff IP: HEIs staff participating in intensive programs 7d to RO
- STTE: Short term joint staff events 7d to NO

# Expected impacts

- to better use of digital technology for teaching and learning of water subjects,
  - improving education through better data analysis and foresight;
  - developing skills and competencies necessary to support the digitalisation of water education;
  - growing generation of water professionals leading the digital transformation of the water industry.
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- participating organisations will gain experience in international cooperation and strengthen their capacities in digital active education.
  - improve teaching styles by modern tools and resources and enhance smart specialisation for water in higher education.