

Trends and developments in the water sector education

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INADE – an ERASMUS+ Project (2021-2-DE02-KA210-ADU-000049101)



1. The Water Sector

- Facts and figures (focus: Germany and Italy)
- Challenges and trends
- Water sector education



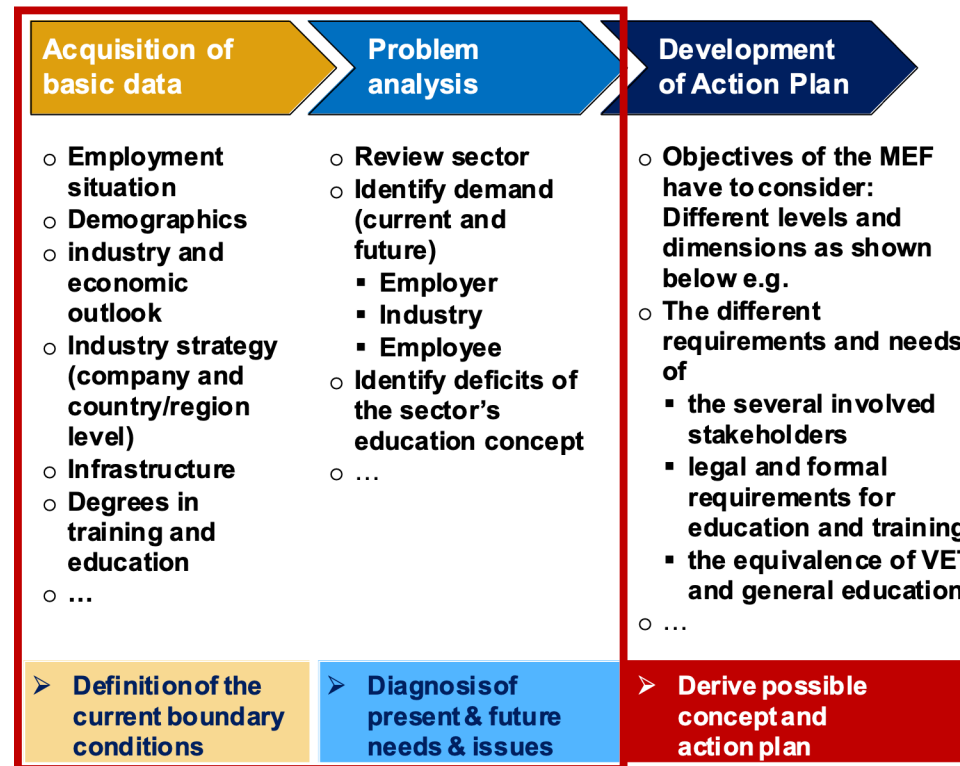
2. Workforce Sustainability

- Needs of the labour market
- Needs of employees in the water sector

3. Conclusions

Workflow in action planning for the Modern Education Framework

Analysis



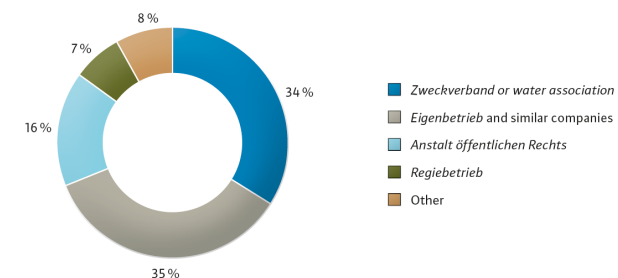
The Water Sector: Germany



Available water	188 km ³ /a
Precipitation (avg.)	800 mm/a
Water used	17.1 %
Water consumption	121 L/cap • a
Piped water supply	99 %
Connection to WWTP	97 %
No. of water companies	6 000
No. of WWTPs	9 300
No. of employees	100 000
Main water user	Energy / Industry

Types of company in wastewater disposal

Weighted by number of residents



Source: DWA Economic Data 2014



The Water Sector: Italy



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Available water	250 km ³ /year
Precipitation (avg.)	832 mm/year
Water used	30 %
Water consumption	241 L/cap • year
Piped water supply	96 %
Connection to WWTP	65 %
No. of water companies	1 200
No. of WWTPs	3 691
No. of employees (water & gas)	39 000
Main water user	Agriculture / Industry



The Italian Water Sector: SWOT Analysis

STRENGTHS	WEAKNESSES
- Starting from 1994 the industry was gradually regulated, defining optimal areas to be served (ATO), tariff method and identifying an independent Authority (AEEG) - A process of mergers and aggregations involved several utilities in the last decades - It is possible to adopt different governance models, from the direct management by municipalities to public, mixed and private utilities	- Scarce investments per capita and old infrastructures - Tariffs too low - Geographical fragmentation still remains high - Large impact of geographical features on efficiency and investments - Poor performance of public-private partnerships in terms of investments - Scarce attention of public-private partnership to water savings and to the disclosure on water quality
OPPORTUNITIES	THREATS
- EU policies will induce the Italian government to pay more attention on water issues - Firms can improve their efficiency through a process of growth, getting scales economies - Private investors would positively affect efficiency through new management practices - Great need of water education for more sustainable uses	- The global economic downturn affects negatively investments - The unstable legal framework reduces the attractiveness of the water industry - The increasing exploitation of water by citizens and firms raises the risk of shortages in some regions

Economy

INVESTMENT IN THE WATER SECTOR
National average values, denominated in euros per inhabitant per year

Denmark

160

United Kingdom

140

France

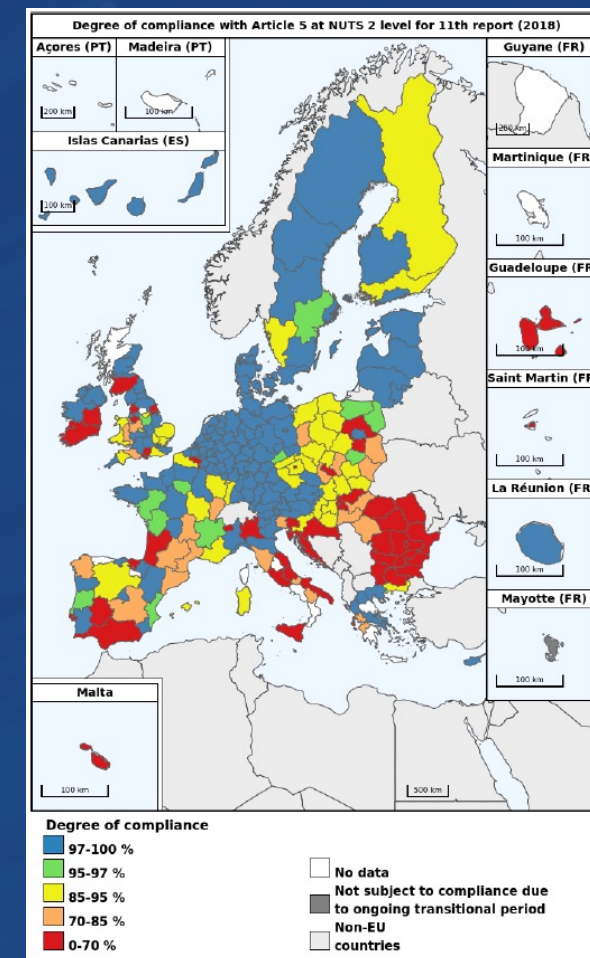
100

Germany

85

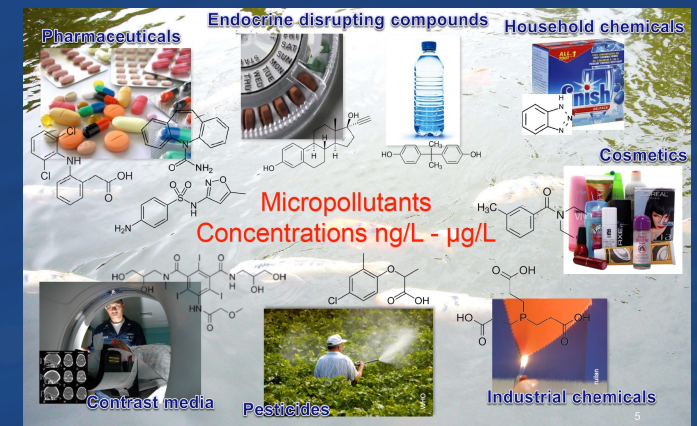
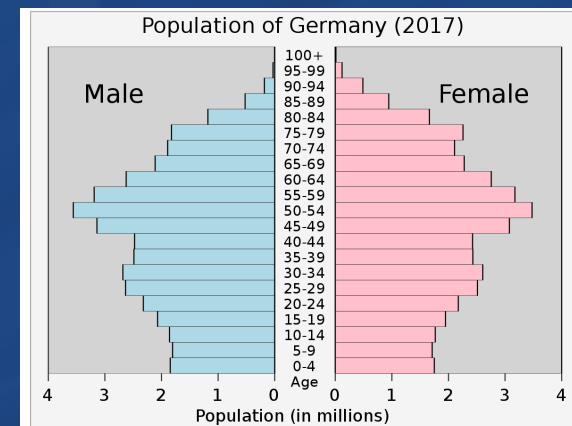
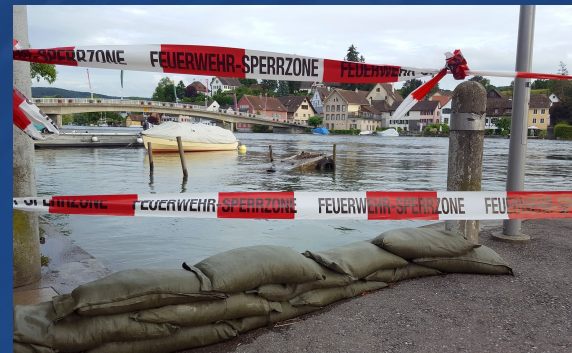
Italy

44



Trends and challenges

- Climate change
- Digitalisation
- Aging workforce
- Aging infrastructure
- Limited funds
- More stringent requirements
- Globalisation vs regionalisation



Strategic Innovation Agenda (Germany)

- **Climate change**
- **Digitalisation and new technologies**
- **Risk assessment and risk management**
- **Asset management**
- **Future proof and innovative operation**



Water sector education

- **Universities: Tertiary education**
 - Engineering, economics, management, ...
- **Vocational education and training**
 - Operation and management
- **Continuing professional development**
 - In-house, on-the-job and off-the-job
- **Non-formal education and training**



Needs of the labour market

- **Replace retiring water workforce**
- **Training for new technologies and practices**
- **High demand across all levels of competences**
- **Adequate skills in operation and servicing**
- **Demand for more skilled workforce**
- **Cope with lack of blue collar workforce**



Needs of the employees

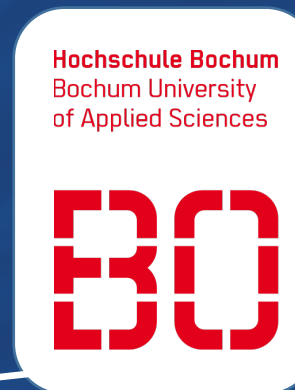
- Training of workforce from outside of the water sector
- Continuing professional development
- Non-formal education and training
- Increasing diversity and migration
- Increase attractiveness of employment



The Project Consortium



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1. Requirement for qualifying **formal adult education** and high-quality **non-formal / informal education**
2. Provide high-quality **learning opportunities for adults** with a focus on environment/wastewater and digital sector
3. Adaptation and development of **curricula at universities and training centres**
4. Collection of **best-practice examples** from EU and abroad

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MEF – Modern Education Framework for water sector education & training

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1. Action planning

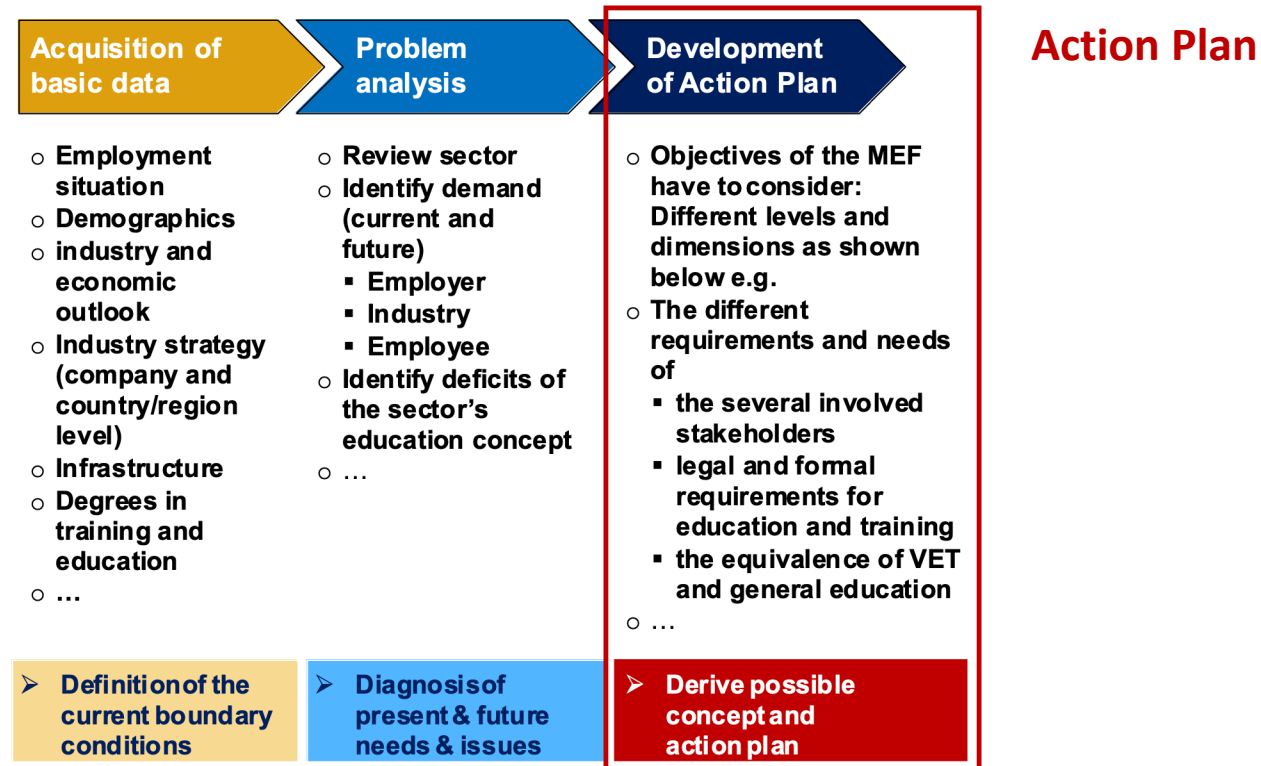
2. EQF

- Needs of the labour market
- Needs of employees in the water sector

3. Conclusions



Workflow in action planning for the Modern Education Framework

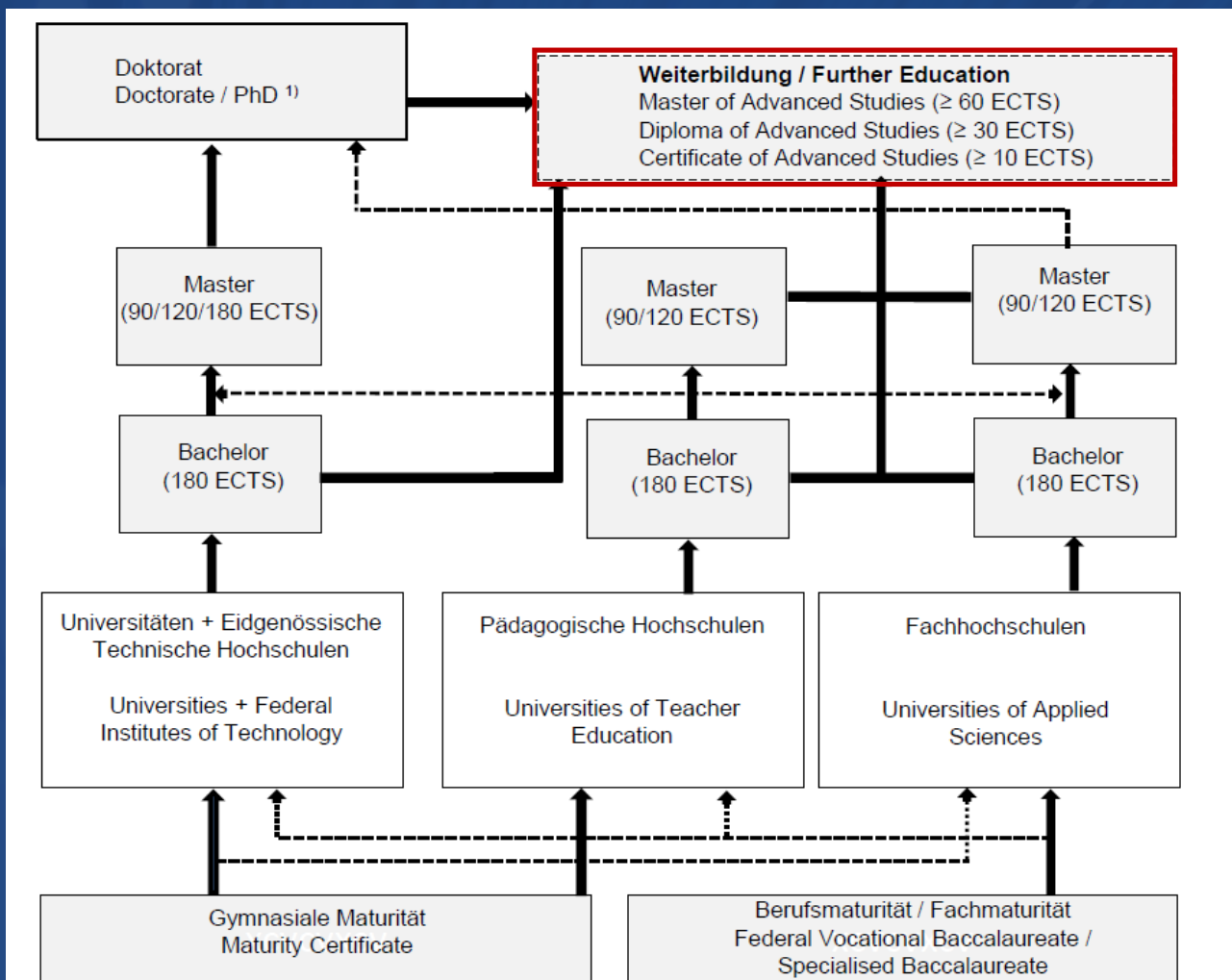


The European Qualification Framework

- **Water sector employs staff with broad range of EQF levels**
- **Management mainly from EQF Level 6/7 and 8**
- **Operation and maintenance staff with EQF Level 3/4 to 5/6**

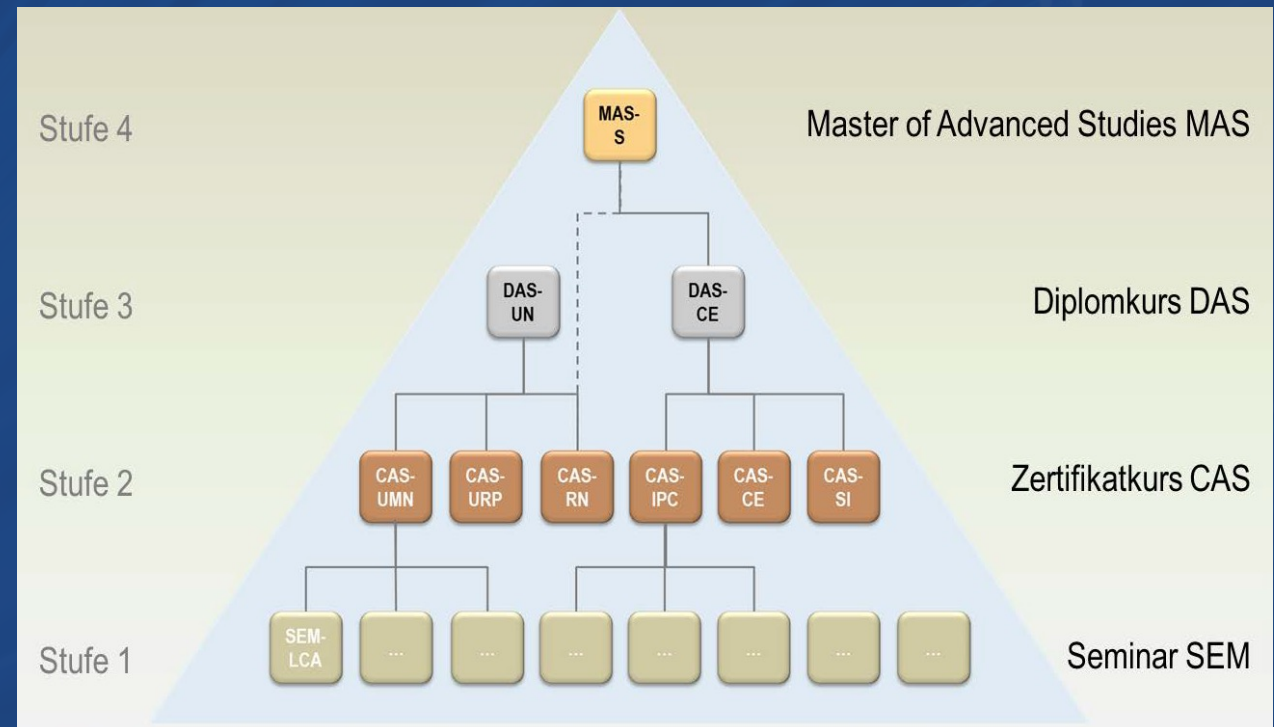
EQF LEVEL 8	ACADEMIC LEVEL	DOCTORATE
EQF LEVEL 7		MASTER
EQF LEVEL 6	POST UPPER SECONDARY LEVEL	BACHELOR
EQF LEVEL 5		HIGHER NATIONAL DIPLOMA
EQF LEVEL 4	UPPER SECONDARY LEVEL	HIGHER NATIONAL CERTIFICATE, UPPER SECONDARY DIPLOMA
EQF LEVEL 3	SECONDARY LEVEL	SECONDARY DIPLOMA OR VOCATIONAL DIPLOMA
EQF LEVEL 2	PRIMARY LEVEL	SECONDARY SCHOOL WITH NO DIPLOMA
EQF LEVEL 1		PRIMARY SCHOOL

Career pathways in Swiss higher education



Certification courses at Universities of Applied Sciences (CH)

- CAS Certificate of Advanced Studies
- DAS Diploma of Advanced Studies
- MAS Master of Advanced Studies
- **Access for non-academia to academic training/education**



MAS Environmental Tech and Mgmt (FHNW)

Master of Advanced Studies in **Umwelttechnik und -management** (FS 2017)

Master-Thesis (12 ECTS)

CAS Industrie und Umwelt (12 ECTS)

- Gewässerschutz, Luftreinhaltung und Bodenschutz in der Industrie
- Einf. in d. Toxikologie und Ökotoxikologie
- Anforderungen an eine nachhaltige (grüne) Wirtschaft

CAS Management und Umwelt (12 ECTS)

- Ökobilanzierung
- Umweltmanagementsysteme
- Corporate Social Responsibility

CAS Umweltrecht und Vollzug (12 ECTS)

- Einf. in das internationale und schweizerische Umweltrecht
- Chemikalien- und Abfallrecht
- Luftreinhalte- und Klimaschutzrecht

CAS Entwicklung und Umwelt (12 ECTS)

- Nachhaltige Entwicklung
- Landwirtschaft, Ernährung und Umwelt
- Nachhaltiger Konsum

Vocational training offers in the water sector in Germany

- Covering the EQF levels 3 and 4

1. Specialist for wastewater technology
2. Water management specialist
3. Specialist for pipe, sewer and industrial service
4. Water constructor

Non-formal education and training

- 60-70% of learning takes place outside the formal sector in everyday life and non-formal learning environments
- e.g in biosphere reserves, adult education centres, environmental education centres, social associations, sports clubs, family, circle of friends
- more motivation driven than formal education due to personal interests

Digital tools to access water professionals and support decentralized learning

- Hybrid education and training approaches to avoid long journeys
- Money saving education offers
- Decentralized solutions like VR
 - Augmented Reality Operation
 - Digital water management
 - Predictive Maintenance
 - Sensoring and monitoring



Organisation by sector institutions

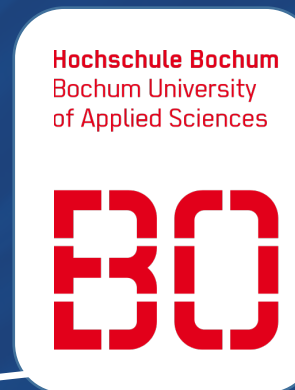
- **Climate change adaptation**
- **Digitalisation in the water sector**
- **New technologies**
- **Risk assessment**
- **Risk management**
- ...



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1. **Best practice examples for modern sector education and training available in Europe**
2. **Importance of sector organisations such as National Water Associations for exchange and training**
3. **Combination of vocational trainings and non-formal education suggested**
4. **Academic pathways for industry experts**

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