digital-water.city

Assessing the potential of digitalization by real-time monitoring of bacterial concentration in urban water systems

Caradot N., Seis W., Schwarzmüller H., Rouault P. – KWB, Berlin

Angelescu D.E., Huynh V., Hausot A. – FLUIDION, Paris

Goffin A., Jehanno P., Tabuchi J.P. – SIAAP, Paris

Fatone F. – UNIVPM, Ancona, Italy

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Leading urban water management to its digital future

H2020 innovation action | 5 M€ funding

Project start: June 2019 | Duration: 3.5 years

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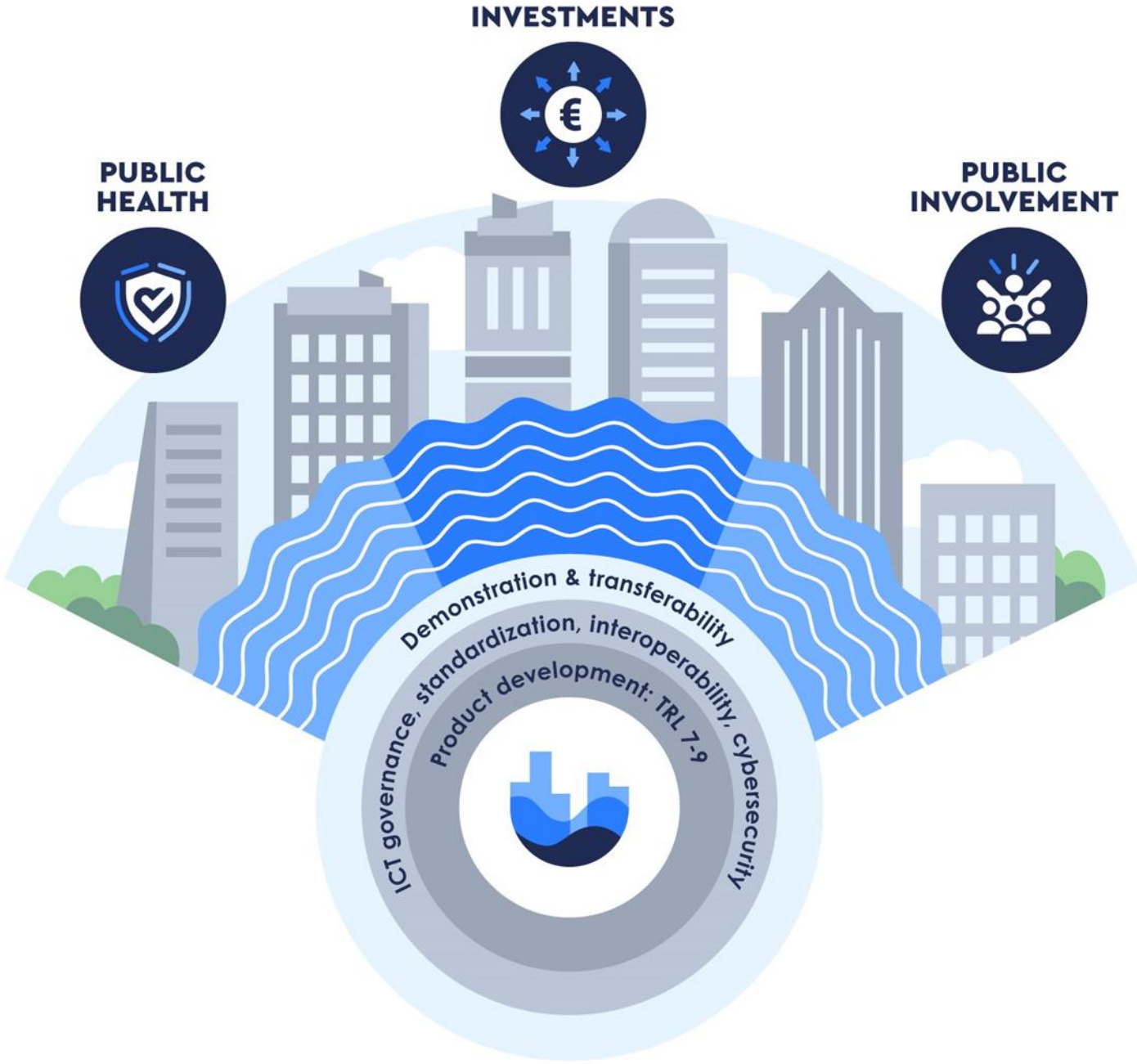
Project objective

- → Create linkages between the physical and digital worlds
- → Develop and demonstrate **15 advanced digital solutions** to address water-related challenges
- → Lighthouse to raise awareness of other cities and accelerate market uptake



Scope within the water cycle

Groundwater and drinking water abstraction

Stormwater and sewer networks

WWTP and reuse

Surface water

24 partners

KOMPETENZZENTRUM Wasser Berlin

Digital Water .City

Utilities

Berliner Wasserbetriebe

Sofiyska Voda

SIAAP
Service public de l'assainissement francilien

GRUPPO CAP

BIOFOS

R&D

UNIVERSITÀ POLITECNICA DELLE MARCHE

UNIVERSITÀ DEGLI STUDI DI MILANO

SINTEF

SORBONNE UNIVERSITÉ

eco logic

irstea

DHI

ISTITVTO SVPERIORE DI SANITÀ

Companies and SME

ICRA
Institut Català de Recerca de l'Aigua

PARTNERS4URBANWATER
Langeveld | Liefting | Schilperoort | De Haan | Post

IPEK

ICATALIST

fluidion
fluidic intelligence

GIMENO grupo

kondo

Vragments

Strane Innovation

Arctik
Communication for sustainability

Innovation

#Copenhagen

Flooding and environmental impacts

> Machine learning flow forecast
> Real time control sewer/WWTP

#Paris

2024 Olympic games

> E-coli sensors
> Early warning system for bathing water quality

#Berlin

Infrastructure perf. and public involvement

> ML for wells management
> Online tracking of illicit connections
> Augmented Reality for groundwater

#Milan

Safe water-reuse

> Drone for water stress monitoring
> Matchmaking platform
> Nexus energy and carbon monitoring

#Sofia

ROI and operational costs

> Low-costs CSO monitoring
> HD camera for sewer cleaning

Innovation

→ Check all our digital solutions on our website > Digital-water.city

Focus EGU 2020 > one solution

→ Development and test of a new sensor for real-time bacterial measurements, manufactured by the company Fluidion

#Paris

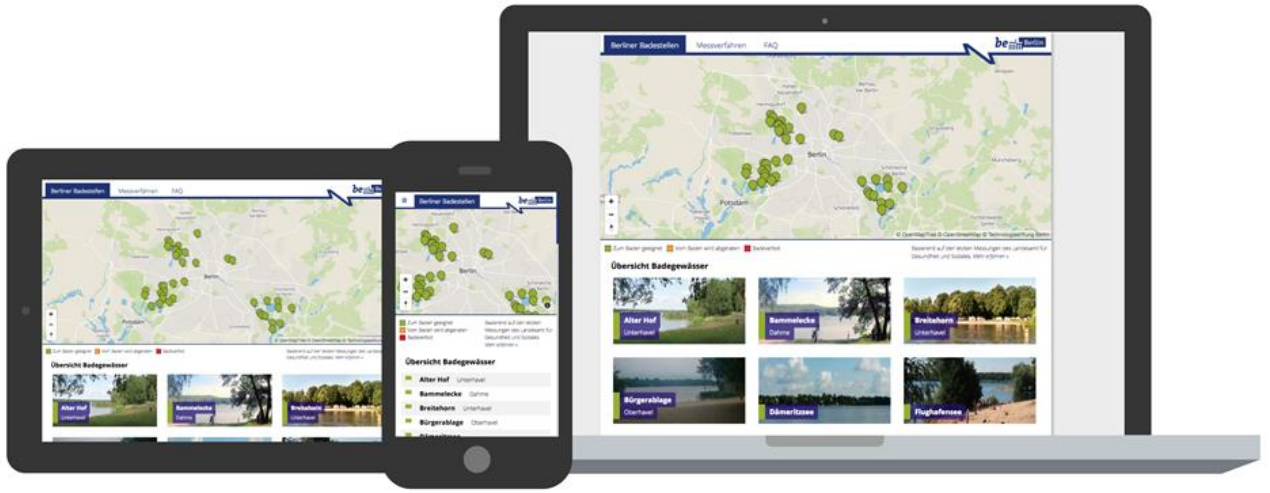
Improve bathing water management in the river Seine for the Olympic games of 2024

© Pixabay

#Paris

© fluidion.com

Real-time measurement of bacterial contamination



Mockup: Technologiestiftung Berlin

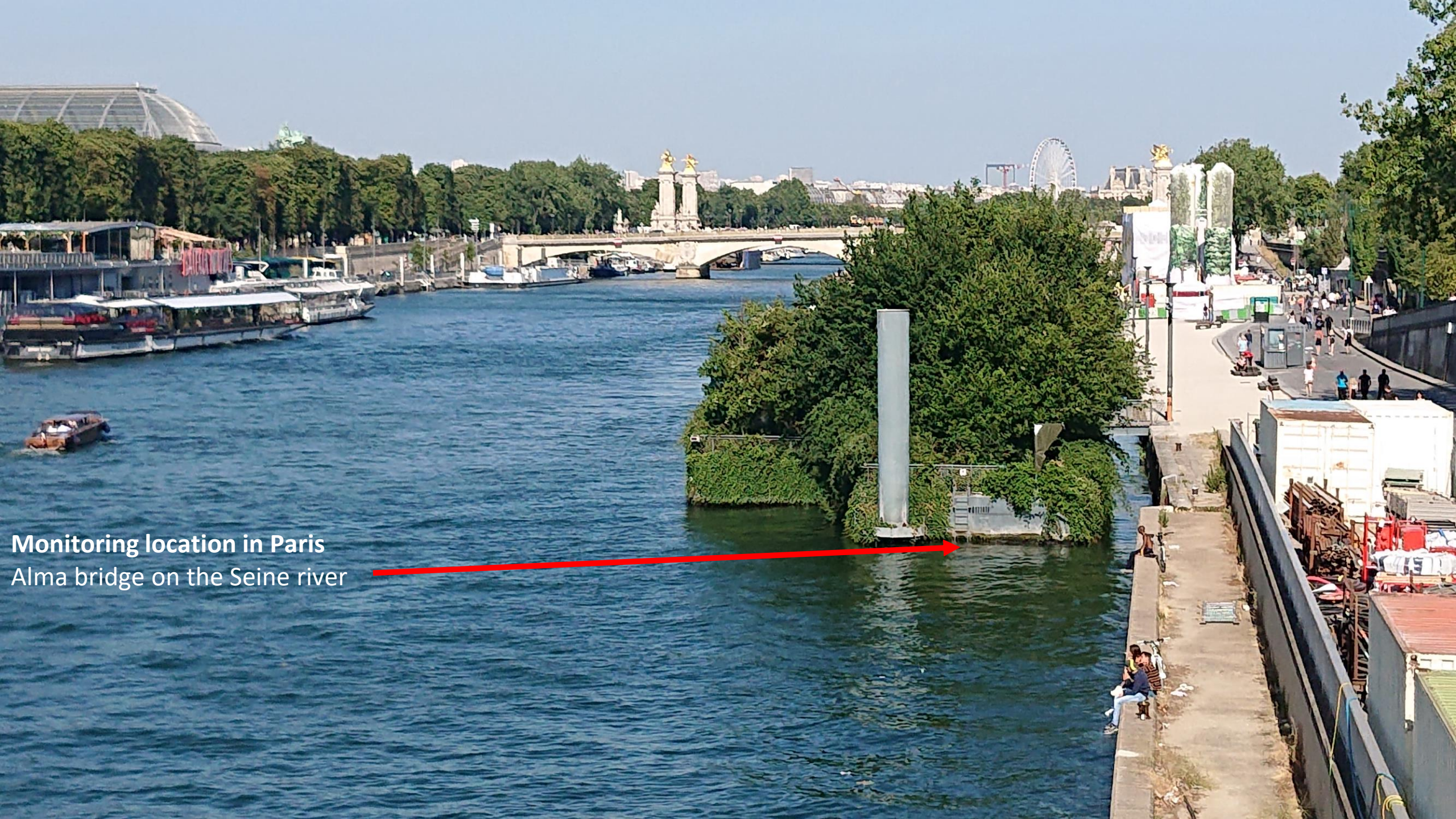
Early warning system to forecast bathing water quality and communicate with the public

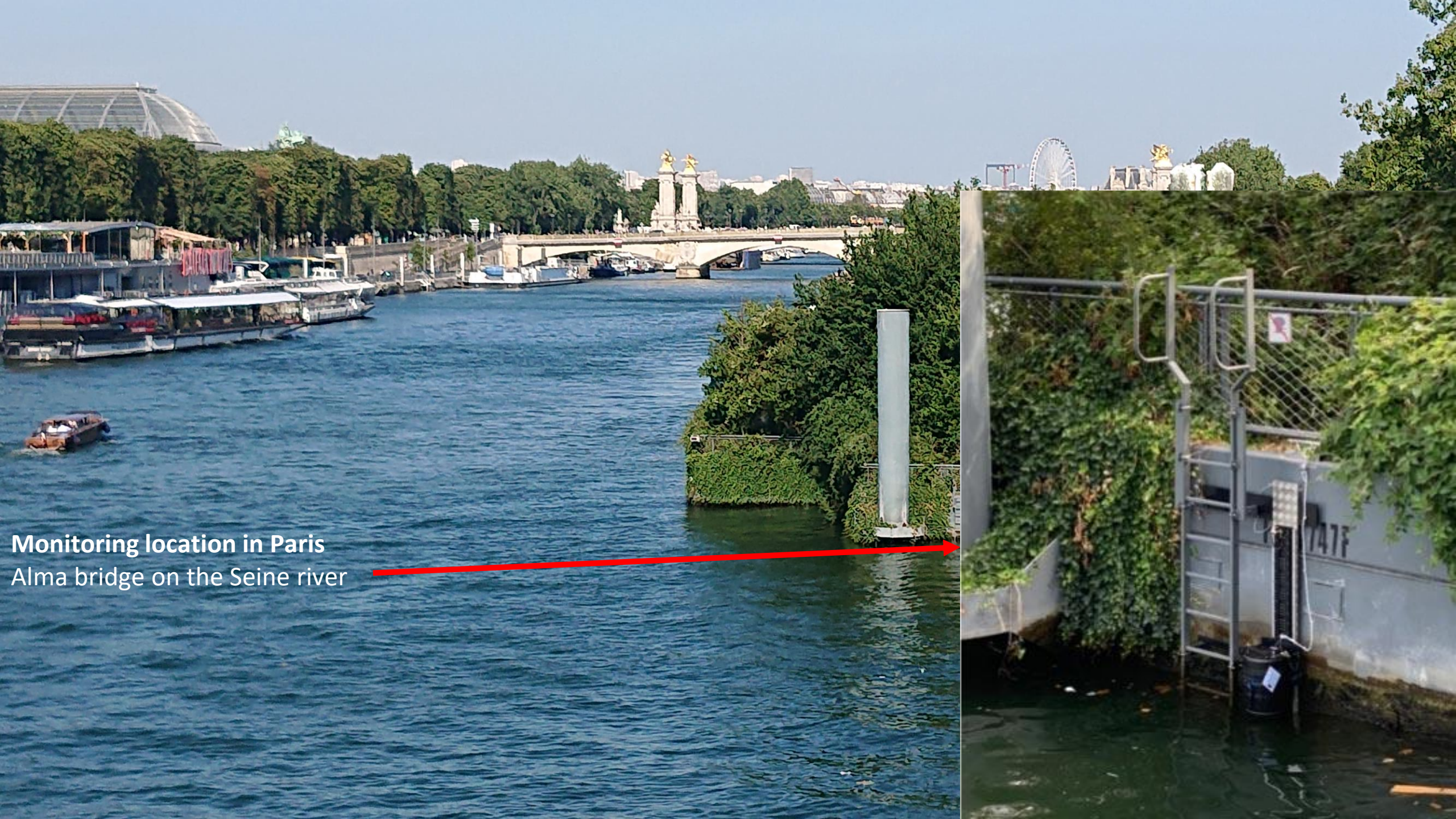
ALERT System advantages

- → Analyzer for sample collection in-situ, reagent mixing and incubation, optical detection (absorbance and fluorescence), bacterial quantification (E. coli, Total Coliforms or Enterococci) and wireless data transmission

- → It measures over a wide ranges of concentrations in a single measurement
- → It provides measurement data fast, in a form that can be integrated with modelling software and reporting practices
- → It is affordable compared to competing technologies
- → It has a very simplified maintenance with single-use cartridges (ALERT V2)


Seine location
River
River
Marne location
Ste Baudile
Stormwater outlet
Fresnes-Choisy
Paris
Boulogne-Billancourt
Issy-les-Moulineaux
Malakoff
Montrouge
Meudon
Clamart
Le Plessis-Robinson
Sceaux
Châtenay-Malabry
Domaine départemental de Sceaux
Chevilly-Larue
Arcueil
Gentilly
Le Kremlin-Bicêtre
Ivry-sur-Seine
Vitry-sur-Seine
Villejuif
Charenton-le-Pont
Maisons-Alfort
Créteil
Saint-Maur-des-Fossés
Champigny-sur-Marne
Bonneuil-sur-Marne
Sucy-en-Brie
Ormesson-sur-Marne
Chennevières-sur-Marne
Villiers-sur-Marne
Bry-sur-Marne
Le Perreux-sur-Marne
Fontenay-sous-Bois
Vincennes
Saint-Mandé
Montreuil
Rosny-sous-Bois
Les Lilas
Gagny
Chelles
Noiseau
La Queue-en-Brie
Le Plessis-Trévise
Pontault-Combault
Bois de Boulogne
Bois de Vincennes
Tour Eiffel
Musée du Louvre
Le Centre Pompidou
Le Jardin du Luxembourg
Les Catacombes de Paris
Université Paris Est Marne-la-Vallée
Marne-la-Vallée
Champs-sur-Marne
1ER
4E
7E
9E
10E
11E
12E
13E
15E
19E
34 km ~ 60h00 à 76h00
Seine location
Ste Baudile
Courtesy of SIAAP
16.7 km ~ 27h00
Seine location
Fresnes-Choisy


Monitoring location in Paris
Alma bridge on the Seine river


Monitoring location in Paris
Alma bridge on the Seine river

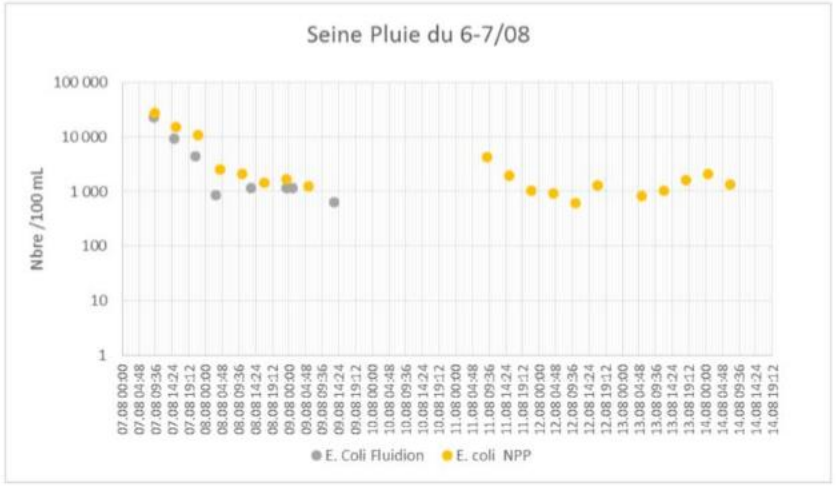
Example of installation in Berlin river

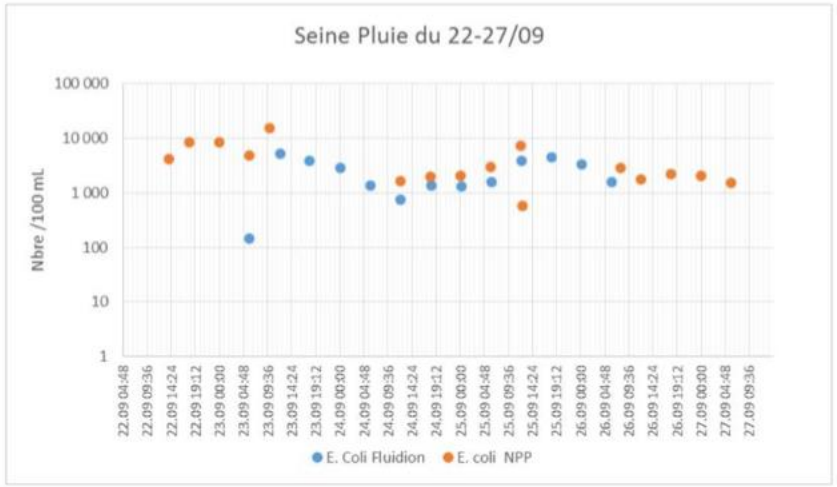
- The sensor is secured and floats in the river

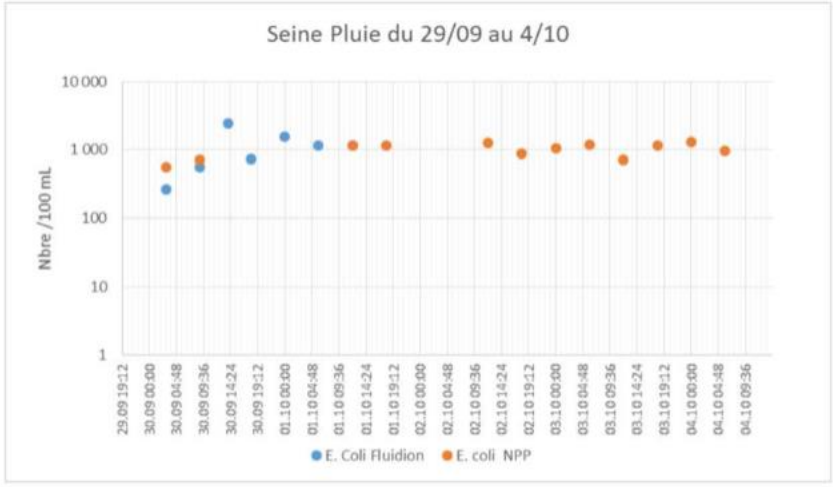
Other type of use > Sensor embedded on a drone vehicle

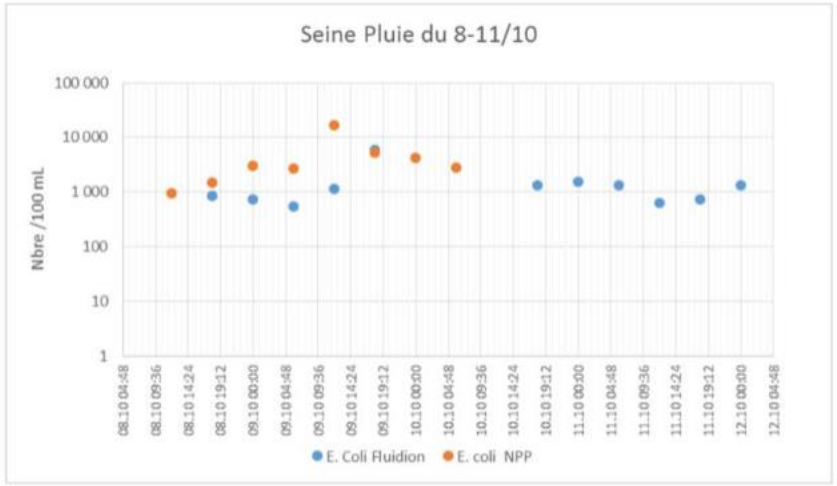
- The drone includes live video feed by 4G and multi-parameter probe

Wet weather Seine measurements









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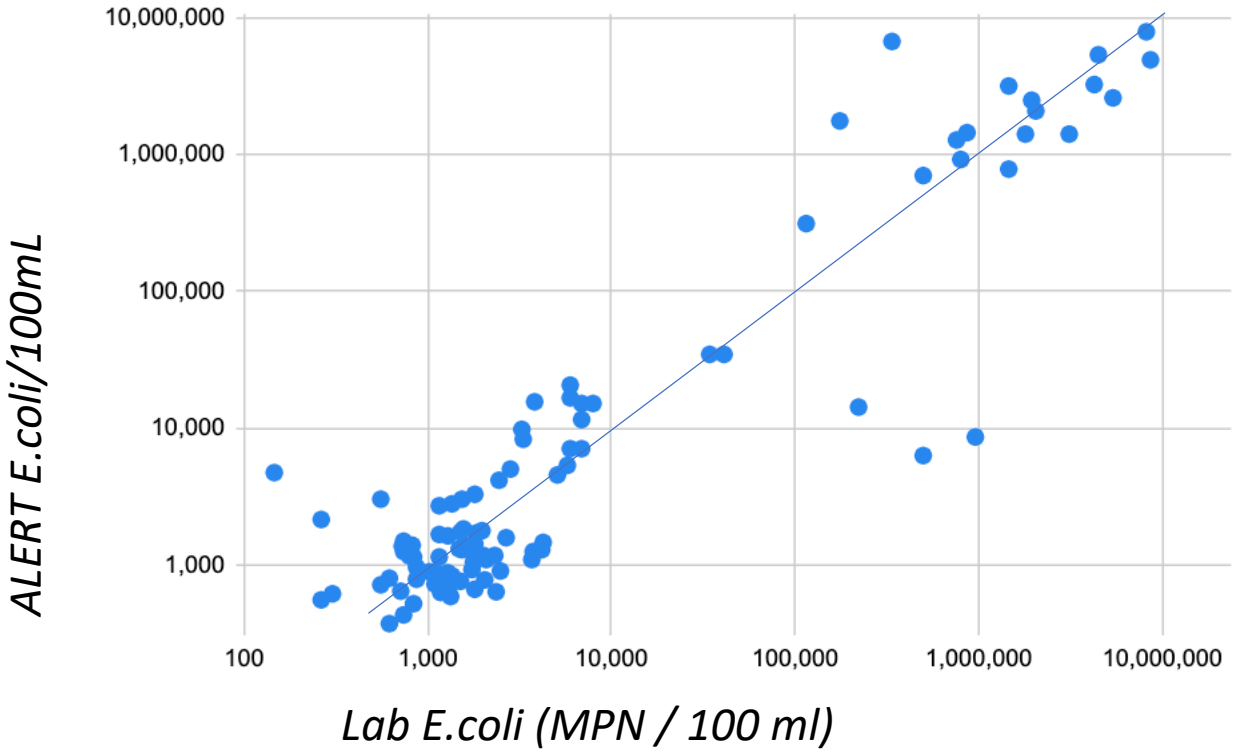
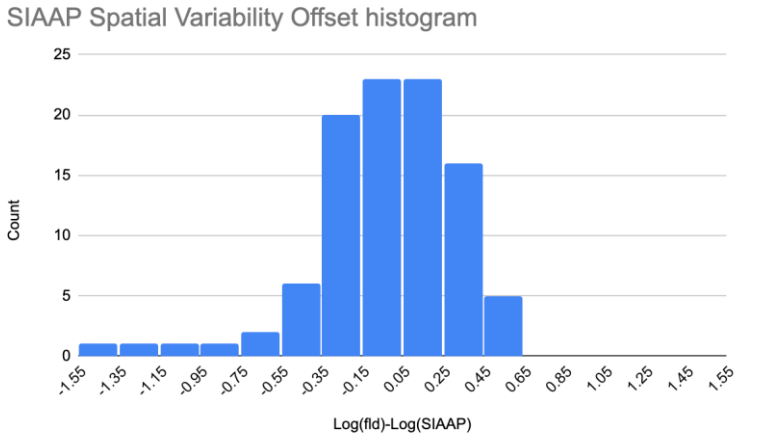
Freshwater comparative analysis





ISO 17994	x_bar	2.58%	Enough data?
NO	s	108.05%	NO
L	s_bar	10.70%	INCONCLUSIVE
10%	W_95	21.40%	SIAAP
	xL	-18.81%	
	xU	23.98%	
	COUNT	102	

EPA	Index of agreement (>0.7)
	0.96
	R squared (>0.6)
	0.86

Preliminary conclusions:

ISO 17994 norm – not enough samples, inconclusive

EPA – OK as alternative method

→ The device shows good correlation but needs to be validated with more data in 2020

Next steps

→ **Validate the accuracy** with additional samples campaign in Berlin, Paris (for river) and Milan (for WWTP)

→ Measurements of ALERT in lab > **avoid uncertainties link to sampling point and transport**

→ Measurements of ALERT and lab after full homogenization + repeatability tests with and without filtration > **assess the influence of suspended solids**

Conclusion ALERT system

→ New opportunities for

- the continuous monitoring of bathing water quality and
- the assessment of contamination risk by the reuse of treated wastewater for irrigation.

→ In particular, it is a **key innovation** to contribute to the objective of Paris city and other local municipalities to provide permanent and safe opportunities for bathing in the Seine river for the 2024 Olympic and Paralympic Games, and beyond.

DWC in few words

→Leverage the **potential of data and digital** technologies

→**Boost the water management** in 5 EU cities

→**Promote the value** of the digital solutions for the tech providers

→Achieve a **new step in the integration** of digital solutions in EU, in particular regarding cybersecurity, interoperability and governance

Acknowledgement

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Contact us > nicolas.caradot@kompetenz-wasser.de