

GLOBAL WATER RESEARCH COALITION (GWRC)

Request for Proposals (RFP No. SENG1C11)

Issued and managed by the

WATER ENVIRONMENT RESEARCH FOUNDATION (WERF)

Proposals must be received by WERF no later than

4:00 pm United States Eastern Time, Wednesday, May 23rd, 2012

Guidance on Sensors in the Global Water Industry

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On behalf of the [Global Water Research Coalition \(GWRC\)](#), the [Water Environment Research Foundation \(WERF\)](#) welcomes proposals from a well-qualified global team of experts, and/or those with experience working on projects requiring global collaboration (if selected, this team will be the “umbrella contractor”), to conduct all the necessary tasks required to provide guidance on sensor technologies, primarily on their current use, deployment, and efficacy in the water industry. The proposal that **best** addresses most, if not all, of the overall project goals, objectives, and tasks listed below, with the team that has the demonstrated background, experience, and qualifications to complete similar tasks within budget and schedule, will be selected to perform this high profile, fast tracked project.

Project Goal

The primary goal is to identify and document information on the types, costs (capital and operating), and more specifically, the real-world experiences of the water industry with the use of commercially available online sensors in collection and distribution systems. These include sensors used in water catchment areas, reservoirs, in treatment systems and processes (for both drinking water and wastewater), in drinking water distribution as well as wastewater collection (sewer) systems, and for receiving waters and the environment. This project is intended to seek out, synthesize, and share the real-world experience at water utilities through case studies. It will help the water sector user community as well as technology providers better understand the practical needs and gaps, and the size of the market, and to work better together to apply sensors so they can manage water systems more effectively and efficiently.

Key Tasks / Objectives:

- **Through case studies, identify experience of the water sector in procuring, deploying, and utilizing sensors in real-world applications for different segments of their business operations (i.e., in the catchment, water treatment, wastewater treatment, collection and distribution systems, etc.).**
- **Identify and document the drivers, barriers, and issues encountered (including how these have been overcome) by the water sector when utilizing online sensors.**

Additional Tasks / Objectives:

- Identify gaps where online sensors could be used globally to effect a step change in M&E (monitoring and evaluation), O&M (operation and maintenance), and management of systems in the different segments of the water sector.
- Identify appropriate analytical methods as well as locations where sensors would best be configured, deployed, and used in catchment areas, in water distribution systems, sewage collection systems, and in water / wastewater treatment processes.
- Provide a database of organizations and specific contacts within these organizations where sensors have been successfully installed and used in different segments of the water sector.
- Provide installation, O & M requirements; cost data for identified best in class sustainable water and wastewater quality monitoring systems based on commercially available online sensors.

Project Background and Rationale:

The global water sector is faced with a number of challenges to deliver safe drinking water, provide adequate urban drainage and sanitation, and to manage and treat wastewater. The challenges include the impact of climate change, a growing demand due to urbanization and problems related to aging and sometimes disintegration of the existing water infrastructure.

Sensors are integral to the global water industry, business interests of the sponsors of this research project, and the public interests of citizens served. They provide the opportunity to: (a) increase reliability, optimize, and improve performance of treatment processes, (b) reduce costs by saving energy and chemicals, in some cases allowing facilities to generate, or recapture energy and recover resources, (c) alleviate regulatory pressures from more stringent treated wastewater effluent discharge requirements, drinking water quality limits, and additional requirements to monitor and report various constituents, (d) identify potential contamination in wastewater systems that may impact worker health, treatment processes, assets or the ability to produce recycled water, and (e) better address risk-based approaches to water quality management.

It is believed that a significant amount of information on sensors is currently not in the public domain. However, this information is available within various water and wastewater utilities/municipalities as well as among process engineers, operators, and service / instrument providers, and in the “gray” literature. It is essential to the successful implementation of online monitoring by the water industry that the knowledge and experience of utility owners, operators, and water industry professionals is captured and made accessible to the wider industry. It is generally understood that one of the largest barriers to the use and acceptance of online sensors by water and wastewater industry is the lack of knowledge on the availability, reliability, serviceability and placement of these sensors. There is also a lack of understanding of what the different segments of the water industry need, the size of this global market, as well as knowledge of which sensors are robust, accurate, and simple to install and operate. This lack of understanding (and a lack of trust that sensors can make a step change) of the benefits that online sensors can bring to monitoring, evaluation and management of processes compared to current practices, has hindered progress for almost a decade. A consolidated view on trends and uptake of sensors is currently lacking. We do not know what is out there, who are using sensors, the actual range of costs of these systems, or the successes and lessons learnt. For example, some of the biggest problems will be overcoming the issues of maintenance, calibration, and installation of sensors in the “real world” environment of wastewater. Identifying, capturing, and documenting this information is the necessary and critical first step to identify the overall needs of the industry as well as the overall gaps.

This project will help to understand and document the drivers, barriers and needs of the water sector to apply sensors and to identify commercially available online sensors; the correct application of sensors to help manage water systems more effectively thereby maximizing compliance; and the current sensor based methods used to help maintain or increase the efficiency of water and wastewater utilities. It serves as a catalyst for greater collaboration and to leverage resources from both technology providers and the user community including the sponsors of this research.

Project Scope

Proposers are encouraged to develop and submit their intended scope of work, details of their budget (see below), as well as schedules and milestones to successfully deliver on the stated project goals, objectives, and tasks described on the first page and articulated in general below. The project is anticipated to be for one year (up to 15 months), commencing on or by July 2012. If selected, this team would enter into a contract with WERF to conduct and complete the project. The team will be referred to as the “umbrella contractor” for this project.

Task 1: Project Kick-off Call, Develop Communications Structure and Common Instruments

The umbrella contractor is expected to establish a communications structure between their project team members, WERF, GWRC steering committee, and the PSC (see next section – which includes contact information and matrix of responsibilities) and participate in a project kick-off conference call. As part of

the first task (no later than 3 to 4 months from the project start date), the umbrella contractor is expected to develop a common survey template / matrix / case study template / other instruments (hereinafter “common instruments”) that would be either sent to utilities, industries, manufacturers / suppliers / service providers of sensors, and design engineers among the countries represented by sponsors of this research, or used as the basis to undertake in-depth interviews and case studies. They will also design and deliver an online database structure to catalog and query the requisite information.

Task 2: Develop list of sensors used; Performance parameters, etc. to aid case study selection

The umbrella contractor will seek information from respondents and others on existing sensors (including analyzers, instruments, etc.), including, but not limited to: (1) types and functions of these sensors, (2) the rationale behind their positions and locations in catchment areas, drinking water systems, sewer collection systems and treatment processes, (3) technical performance (sensitivity, calibration needs, drift and stability, maintenance needs, etc.), (4) specific sampling, data collection, data analysis, monitoring, and testing regimes for these systems; and (5) their costs (capital, as well as operation and maintenance). They will also collate information on the experiences (both successes and failures) with these sensors, determine which sensors are reliable and high-performing, etc.

Task 3: Case Studies

This information (along with input from the steering committee – *see anticipated project structure described in next section*) will help identify the relevant case studies. It is expected that comprehensive case studies will be undertaken in most, if not all, of the countries represented by the sponsors of this research. The umbrella contractor is expected to develop a case study framework to ensure consistency in the collected information and then to document these case studies through interviews with individuals from the identified organizations. This will provide more detailed information on the drivers, the actual costs (maintenance and installation), identify specific issues and document how these were overcome, etc., as well as provide contact information (optional).

Task 4: Reporting and Dissemination of Results

The project would include a meeting / workshop with the Steering Committee (and others) in one of the GWRC member countries to discuss results (including synthesis of data from various countries, case studies, database, etc.) and provide input for the final report deliverables. The latter (final deliverables) should include material that can be used by GWRC partners (to be organized separately by the partners) to disseminate results to their members and provide the basis for outreach exercises to the water and sensor developer industries as well as adopters/users of sensor technologies. The draft final report can serve as a starting point for the workshop.

The overall project outcomes and deliverables will help:

- Transfer and disseminate knowledge gained from the survey data, and real-world case studies.
- Identify barriers to the use of online sensors in water and wastewater systems.
- Benefit water sector professionals who seek guidance on the state of the art about sensor technologies, including what should work for their situation, what is currently available, and what is still in a development stage.
- Identify and confirm the needs and gaps in the industry and communicate these gaps to the commercial sensor industry and water sector professionals.
- Identify next steps and how outcomes of the project can best be applied.
- Document further research needs and gaps, that if met would support a step change in M&E (monitoring and evaluation), O&M (operation and maintenance), and management of systems in the different segments of the water sector.

As part of the project, the umbrella contractor will develop one or more guidance documents that will include what to look for in a sensor, what sensors are used for what applications, installation and maintenance requirements, performance and reliability of these sensors, etc., and provide detailed case studies from around the world.

While it is acknowledged that data capture, storage, retrieval and analysis are important components of an online monitoring system, investigation of the technical aspects (specific hardware and software used) of this subject is not included in the scope of this project. This project is wholly focused on how online sensor hardware is currently used by the water industry. Having said this, the importance of data capture and management to the successful implementation of online monitoring should be discussed in the final report to provide context and to highlight it as an area of future study. In addition, the potential or ability of some systems to provide trend analysis data, to adjust and self-monitor their performance, etc., should be reported to the extent possible. Similarly, identification and documentation of emerging, future sensor technologies, and the research and outreach needed to promote wide spread adoption of real time monitoring networks is also not included in the project scope but should be discussed in the final report to highlight these as areas of future study.

Project Structure and Oversight Committee

A Steering Committee of funding partner organizations (i.e., sponsors) plus volunteer technical experts (the Project Sub-Committee) has been established to develop this RFP, assist in the review and selection of proposers, provide overall guidance and technical peer review for this project. Dr. Amit Pramanik, the WERF lead staff-person, will chair the committee and manage the overall project.

The Steering Committee members will provide input to the umbrella contractor on various deliverables during the course of the project. They can also assist by sending out the common instruments to their members in various countries / continents, help identify the correct person(s) these should go to, assist the PI with follow-up of their members as needed, and help develop and participate in the workshop. The precise method of coordination will be influenced by ideas received from the project team selected to act as the umbrella contractor; however, an outline is indicated on the following page.

GWRC partners planning to fund this project (sponsors) include:

- Singapore Public Utilities Board (Singapore)
- Suez Environnement – CIRSEE (France)
- STOWA (The Netherlands)
- United Kingdom Water Industry Research (UK)
- Water Environment Research Foundation (USA)
- Water Services Association of Australia (Australia)
- Water Research Foundation (USA)

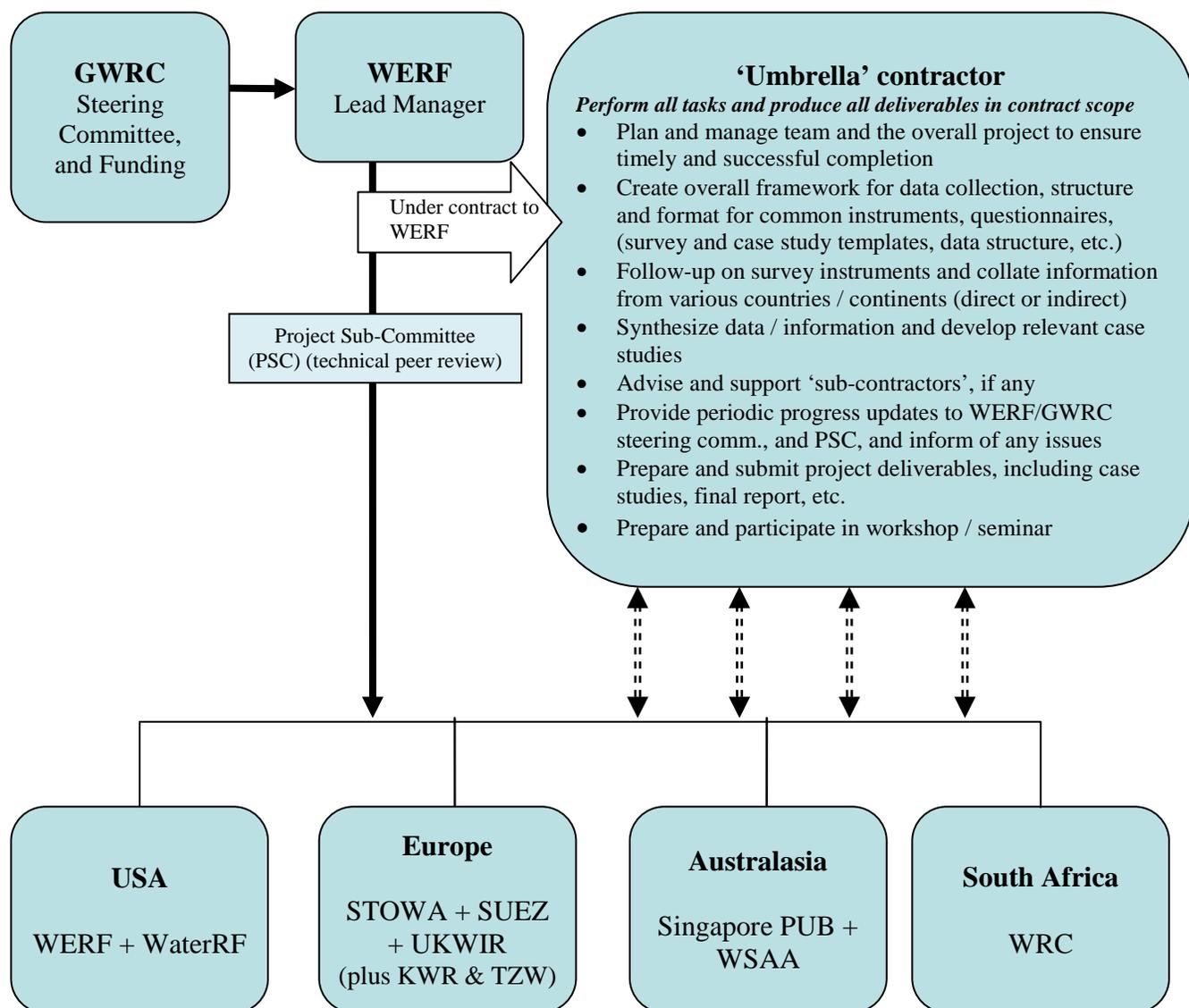
The following GWRC partner plans to fund the services of a local sub-contractor to gather relevant data for their country using the common instruments developed by the umbrella contractor:

- Water Research Commission (South Africa)

The eight GWRC partners noted above and three more listed below would provide in-kind contributions for efforts within their countries. This includes help to disseminate the common instruments to their members, providing input needed for the project within the framework set by the selected umbrella contractor, collecting information and identifying candidate case studies for their respective countries:

- DVGW-Technologiezentrum Wasser – TZW (Germany)
- KWR Watercycle Research Institute (The Netherlands)
- U.S. Environmental Protection Agency (USA)

In summary, GWRC members will help guide this project and help produce part of the outcomes (e.g., sub-reports for the different regions). They will help distribute the common instruments (surveys, etc.), provide contact details for those that the surveys have been distributed to, help identify potential case studies, provide contact details for these individuals in the utilities for the umbrella contractor to follow-up (collect and collate the information, etc.). It is also anticipated that these members will participate in a workshop near the end of the project.



Proposers are expected to identify a lead principal investigator (PI) who will serve as the main point of contact for this project. The PI will be responsible to manage and coordinate the overall project effort, oversee the development of the common instruments and case study templates under advice from the steering committee, oversee the interview process and the documentation of case study information, coordinate the dissemination and collection of information from each of the project sponsors, follow-up with respondents and others, manage the synthesis and report writing, convene and facilitate a workshop (in coordination with the sponsors of the research), and other duties necessary to successfully complete this project and provide the deliverables both in a timely manner and within the overall project budget.

Proposers are also encouraged to establish an international team with local representation in the countries / regions of the GWRC members noted above.

Project Budget and Duration

The anticipated budget for this project is USD 175,000 with the project anticipated to start on or before July 2012. The project is expected to be completed within 15 months from the date that WERF and the selected project team / umbrella contractor execute the research contract.

Proposers are strongly encouraged to seek additional partners, collaborators, case studies, etc. to further leverage the level of effort and funding, as well as to successfully complete the research. In-kind contributions, for example, through wastewater utilities, consultants, technology providers, personnel, laboratories, etc., are encouraged.

The budgeted amount above (including cost share contributions) is expected to cover the entire scope of work of the umbrella contractor. Overhead costs may not be used as in-kind contributions. The requirements for cost sharing are subject to 40 CRF §30.23.

Anticipated Deliverables and Milestones

The proposal should include a detailed scope of work, budget, as well as a list of deliverables and milestones to track, communicate, and measure progress for this project.

Communication of deliverables includes, but is not limited to, written progress reports, conference calls / seminars / meetings, and a workshop. Draft and final reports that can be published and distributed by the sponsors of this project among the required deliverables. The Final Report (and/or other deliverables) submitted at the conclusion of the project should satisfactorily address technical review comments by the steering committee and project management team

Following is a list of deliverables provided for similar projects:

- Consistent “common instruments”, e.g., key information needed to be gathered through surveys or questionnaires, templates for case studies, etc.
- Design and delivery of an online database to house and access results of the survey
- Progress reports
- Draft final report, including case studies
- Final Report (at conclusion of project)
- Workshop or seminar presentations and / or proceedings that can be used for technology transfer to end users including the sponsors of the research.

Additional information and guidance on [communications deliverables are available online](#).

Progress reports and deliverables should be provided to WERF based on the schedule that is proposed in the scope of work. WERF will distribute these to the steering committee members for peer review and input. The selected contractor is expected to be available for teleconferences and / or online discussions with the steering committee during the course of the project, and for a project workshop / seminar.

Additional RFP documents:

- [Proposal Instructions and guidelines for RFP](#)
- [Supplemental information on sensor research provided by GWRC research sponsors](#)
- [“Sensor Integration and Guidance” State of the Knowledge report by WERF, Dec 2010](#)
- [WERF sample research contract](#)