


Engaging stakeholders for improved IAM implementation

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Abstract

There are major challenges for water infrastructure asset management in the public sector of Sweden. Necessary intensity of reinvestments is too low and simultaneously stakeholders find it difficult to source qualified personnel. By implementing comprehensive methods such as Infrastructure Asset Management (IAM) processes, efficiency can be improved and to some extent can compensate for lack of human and economic resources. The Mistra InfraMaint research programme is building and disseminating knowledge of sustainable, effective and efficient maintenance of infrastructure. Involving stakeholders is found to be effective to transfer the research into practice. The cooperation between researchers and stakeholders has already started the application phase, giving the opportunity to meet, get to know each other and discuss the importance and priorities. For further in depth involvement of stakeholders, six of the PhD students are industrial PhD students, situated within the municipal companies' organisations. Also, the competence building parts of the programme will be done in co-creation with the stakeholders. In the coming years, Mistra InfraMaint will contribute with innovative and applicable knowledge, and increase utilization of new technologies, approaches and methods. Dissemination of the results will lead to increased competence and contribute to better IAM within relevant organisations.

Key words: asset management, digitalisation, infrastructure, maintenance, municipalities

INTRODUCTION

There are major challenges for the management of infrastructure in the public sector of Sweden. Necessary intensity of maintenance in the water and wastewater networks is too low, backlogs in some areas are increasing and there is urgent need for improvements (SWWA 2017a). At the same time stakeholders; for example, municipalities, find it difficult to source qualified personnel interested in working with maintenance (IQS 2016).

When the resources are limited, increased efficiency is needed. By implementing comprehensive methods such as Infrastructure Asset Management (IAM) processes, this can be achieved. Standards for IAM such as EN and ISO (2014) are available; however, the use and application of these is limited, especially in smaller municipalities (e.g. Gay & Sinha 2014; CNC *et al.* 2015; SWWA 2017b; PSD *et al.* 2018). Ways of working from standards need to be organisationally integrated and more easy to apply to be commonly used and effective. Many tools and methods for decision support are already available but smaller municipalities often lack the knowledge to handle them (Malm *et al.* 2009; Alegre 2010).

Efficient IAM includes not only planning processes. New technology, transdisciplinary approaches and increased competence are also key essential parts. Research results should be implemented but without readiness of stakeholders to apply the results, the research efforts are lost. Understanding the opportunities, whilst also having awareness of how to handle potential risks inherent in

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organisational change, is essential. Training and education are key factors for success, not least in engaging people within the stakeholder organisations. Taking pride in work and openness for new ideas also provides the basis for future skills supply and attractiveness of infrastructure maintenance. Digitalisation is a transformational force in society that also creates the need for digital transformation of higher education and the delivery of high-quality digital skills for lifelong learning ([Digitization Commission 2016](#)).

The Mistra InfraMaint research programme is building and disseminating knowledge of how to develop more sustainable, effective and efficient maintenance of infrastructure. This is being achieved utilising new technology and new methods for planning, procurement and organisations. The programme period is 2019–2022 and involves many partners; five universities, three institutes and several stakeholders. The research programme has a total budget of 8 million Euro and includes 20 projects; PhD projects as well as senior research projects. The programme works are interdisciplinary in three thematic areas: sustainable decision support, based on relevant data, sustainable business models and organisations and sustainable competence building. ([Mistra InfraMaint 2019](#)).

Involving stakeholders is a good way to get research and results developed in Mistra InfraMaint into practice. Moreover, stakeholders do not care about research disciplines; they care about outcome. In this paper, we are describing the process applied for this interdisciplinary research programme and how we involve stakeholders.

METHOD

Process for transdisciplinary research based on needs

To increase cooperation between researchers and stakeholders we organized an open workshop for stakeholders, researchers and authorities at the start of the application phase, giving the opportunity to meet, get to know each other and discuss the importance and priorities. In the workshop, stakeholders presented their main challenges and the four focus areas in the research call were discussed in groups. The focus areas were: assessment of the infrastructure status, forecasts and decision support, financing and business models, and organization and processes. After the workshop the application team (two people, the authors of this paper), met up with and had discussions with several key potential partners. From this, we built a consortium that included all the required expertise.

In order to further boost communication and cooperation, we applied an open arena for project proposals during the application phase. This resulted in well over 100 suggested projects. All the proposals could be read by all involved parties, as they were published on a web-page accessible with login. This was found to be a practical method which, together with several web meetings where the proposals were discussed, resulted in an efficient open arena. In the work with prioritizing projects that followed, we involved and invited researchers and stakeholders to cooperate, in order to identify the key components of each project. We suggested clustering of some project ideas and researchers from different groups were also prompted to interact and come up with a common interdisciplinary project. This has resulted in a consortium that already during the application phase had a good knowledge of each other's special skills and how we complement each other. When projects from different disciplines have been clustered and merged, new ideas and paths have also been found.

Stakeholder involvement

To really involve stakeholders, we suggested some of the research be done at stakeholders' organisations, see [Figure 1](#). The acceptance and engagement for this was won when discussing the

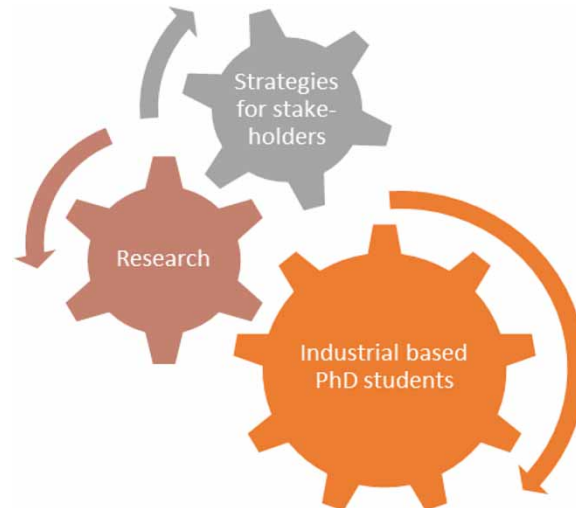


Figure 1 | Interaction illustrated as cog wheels.

win-win situation, where the utilities themselves could reach cutting edge in the IAM field and get case studies that could achieve direct implementation. So, we are especially pleased that six of the PhD students will be industrial PhD students situated within the municipal companies' organisations and expect that the value of this will be shown early, already after the literature reviews, when the knowledge achieved can be utilized for more or less immediate pay-back.

Within the programme, one project will, for example, carry out an empirical study focusing on organisational barriers in municipal water and sewer (WS) using case studies, international and national studies and by drawing upon the empirical material gathered by the industrial PhD students in the programme. The model will be tested in at least one of the participating organisations in line with action-based research (Toulmin & Gustavsen 1996).

Competence projects for further involvement

Competence building is an important part of the research programme, aiming to support implementation of effective methods of working and exchange of experiences and expertise. The plan for activities over the programme period has been developed in the form of a roadmap for competence building. The initial steps in building this roadmap were done through deep interviews of stakeholders, where the current situation was discussed, and future competence needs were identified. The interviews were followed by invitations to workshops where the results of the interviews and gap analysis were presented, and priorities and methods for competence building were discussed and decided in a second workshop. The result is a plan developed for competence building of stakeholders, with direct involvement by stakeholders, together with programme management and with valuable input from the scientific advisory board of the Mistra InfraMaint programme. According to the plan, the research programme will provide collaborative projects in a similar format as developed by LNEC (Alegre *et al.* 2015) but also continuous knowledge transfer utilizing web-based methods and micro-learning.

Involving PhD students and senior researchers in the knowledge transfer will be an important and expected effective way to deepen the students' understanding of challenges in the planning for IAM, at the same time as providing participants with the latest knowledge.

To further strengthen the interaction between the PhD students, we plan for annual meetings between all the students and their supervisors, communication channels for continuous exchange of information and joint courses during the programme.

RESULTS AND DISCUSSION

Transdisciplinary research based on needs

Interdisciplinary and integrative approaches can be expected to widen views, although making inter- and trans- disciplinary research and collaboration has often proved challenging (Petts *et al.* 2008). Challenging, but also fruitful is how we have found the work, prompting and nudging project leaders to cooperate, widening their scopes and understanding each other's methods and views. There have been a lot of discussions just to understand the different vocabularies and methods used, when different methods were used by research groups, but for the same purpose.

For example, the workshop showed that the focus of the research call was well in line with the stakeholder challenges, requesting better decision support. However, some researchers were keener on further research in the assessment of status. Therefore, we steered the application more towards decision support than status assessment.

Project 1.10, Asset Management from data to socioeconomic decision support is a further example, where the initially different ideas and areas of expertise were merged into one project, through prompting but by positive cooperation by all the participants. The project will contribute with practical methods and data to take socioeconomic, social and environmental value into the decision support. The two research groups cooperating in the project had specific project ideas for roads and water respectively, using different methods for Cost Benefit Analysis (CBA) and Life Cycle Costs (LCC) analysis. By compromising about methods and combining this into one project they were able to exchange experiences and make common contributions, not only for the specific project, but also for other projects within the programme. The collaboration is done in a project group with one senior and one junior researcher from the two research groups doing the project together. A conclusion is however also that very clear and precise project descriptions are required when applying true inter- and trans disciplinary research.

The discussions and clustering work resulted in a programme consisting of 20 projects, as illustrated in Figure 2, targeting the three important thematic areas of decision support, business models and organisations and finally competence building. Half a year into the four-year research programme period, it is early days to expect results from the research projects, but experiences so far indicate that also the senior projects need more time than expected for coordination and communication, in order to really work in an interdisciplinary and communicative way.

Stakeholder involvement and PhD students

The advertising and applications for the PhD students have provided a natural start for deepening stakeholder involvement. It has, however, proved to be more difficult than expected to get suitable candidates for our industrial and institute PhD students' positions. One reason could be differences in expectations about what one believes is to be achieved, between the university and the employer, which affects how the selection of applicants is made. From the universities, top notch research and education are the focus. The universities will obtain good research, but also build good researchers who can take the field further and strengthen research in the area. Concrete results are a bonus, but the important thing is to build knowledge, local Swedish knowledge that in the long term will raise the whole of Sweden's asset management. Long term means that the first professors perhaps will be installed in 10–20 years' time. The municipalities, on the other hand, want to have 'academic doers' making a difference straight away. The researches done must be useful and the PhD student must be part of the core business. These different views are the case, even though we believe that we are working with some of the most motivated and resource-rich municipalities in the area. The degree of maturity for working this way (with PhD students) is probably substantially lower in the

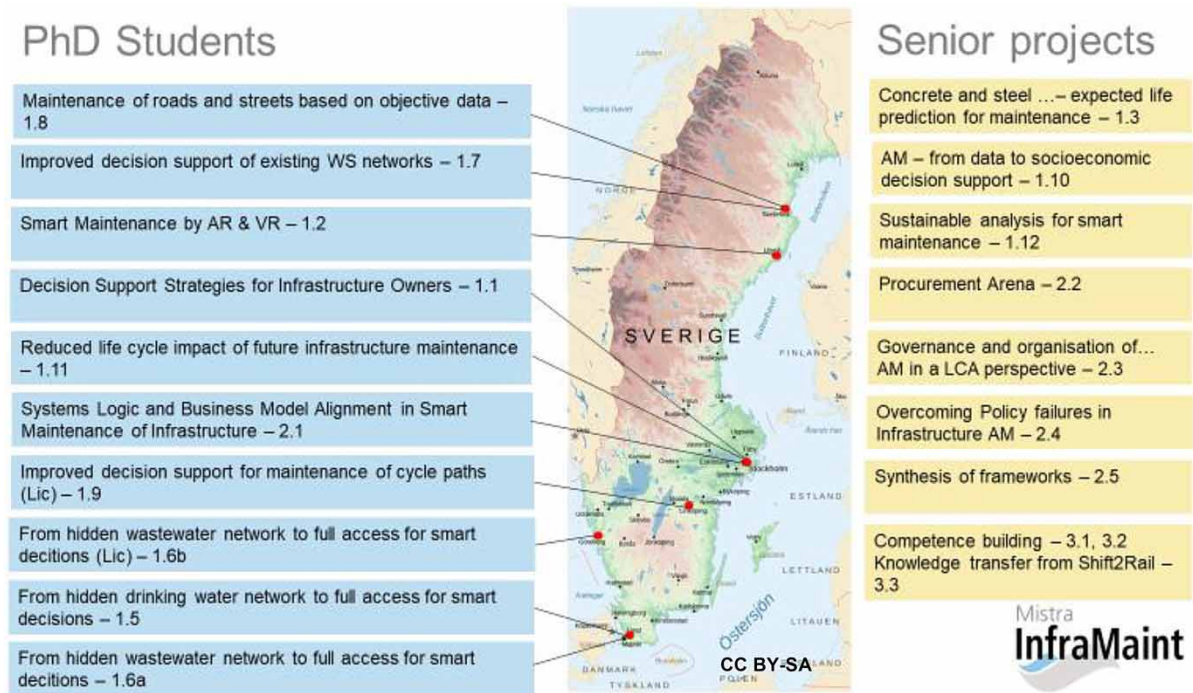


Figure 2 | Mistra InfraMaint, a research programme with PhD students located at stakeholders around the country (Sweden), combined with senior research projects.

average Swedish municipality. Another reason for the difficulties in finding motivated candidates is that we are building a research area that does not exist in Sweden, and that requires strength and endurance. There is no Swedish academic ground and there are no Swedish academic role models within IAM for these fields. The research programme Mistra InfraMaint is a good start. We will build capabilities, when the PhD students are encouraged to gain a deep knowledge in the IAM area. A third reason is that infrastructure is not the ‘hottest’ topic in the academic world and that recruitment ads in other fields are more popular.

The results of the research projects will contribute to innovative and applicable knowledge on how to organise the maintenance organisations so they can take advantage of the new technologies, approaches and methods. The results can be expected to lead to improved effectiveness, both directly in the involved organisation through the action-based research, and indirectly by the results of the analysis of organisational barriers and how to overcome them. Dissemination of the results will lead to increased competence and contribute to better long-term asset management within relevant organisations.

Involvement through competence building

The gap analysis identified a list of subjects of interest for learning, such as the potential use of digitalisation at all levels of the organisation, procurement expertise, risk analysis and effective long-term planning.

The development of the competence building roadmap has already created valuable involvement from stakeholders. We will work for this to be continued through the planned collaborative co-creation projects, where participants from approximately 10 to 15 organisations will meet for training and workshops at the beginning, middle and end of the project, working with tasks at home in between the meetings. Continuous support will be provided, as well as web-based learning. This will also involve the PhD students.

CONCLUSIONS

In the coming years, Mistra InfraMaint will contribute with innovative and applicable knowledge about how to organise the maintenance and the maintenance organisations, so they can take advantage of the new technologies, approaches and methods. Dissemination of the results will lead to increased competence and contribute to better long-term asset management within relevant organisations. Already identified conclusions are: (1) transdisciplinary approaches need a lot of time on communication but also a little bit of prompting and nudging; (2) stakeholder involvement takes time, and understanding each other's incentives is essential; and (3) research-based knowledge can be built in the stakeholder organisations and research can be made more applicable by co-creation competence work.

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