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# HELIP® and "Anyway Strategy" - Two Human-Centred Methods for Successful Digitalization in the Water Industry

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**Summary**

Many municipalities and cities are facing numerous, sometimes very complex water management challenges. In addition to heavy rainfall events, because of climate change, this also applies to the necessary improvement of water quality about trace substances and micro plastics. This also means an increase in the complexity of tasks, a diversity of levels of action and knowledge. The necessary freedom to acquire new knowledge in an appropriate manner in terms of content and time is becoming increasingly limited because of these framework conditions. An additional burden is the fact that it is becoming more and more difficult to obtain adequate specialized staff. Therefore, the necessary planning processes are becoming longer. The implementation of environmental protection measures has to follow later. Furthermore, new, and more efficient methods for better environmental protection are used less frequently or only insufficiently because there is too little knowledge about them.

Experts promise more support and facilitation by solutions that have been developed during digitalization and offered on the market for technical and organizational level [1]. Here, however, there is often a lack of time on the user's side to act in an appropriate manner with resource-supporting IT systems that make it possible to automate or simplify standard procedures or make processes more efficient and effective. If external consultants are part of the selection of appropriate IT systems, successful implementation and use often fails due to the lack of fit between the IT system and the existing organizational structure or culture, as well as in relation to the human end user. Two ways to address these obstacles are the "Anyway Strategy" and " HELIP®" methods. They are the result of a meta-study on success factors and barriers in the selection and application of digitalization solutions [1] and a from a development project for digital innovations [2] in the water industry.

**Keywords:** Water industry; Technology; Climate change; Digitalization; HELIP®; WaterExe4.0; Organization; KOMMUNAL 4.0; Market; Society

## Meta-Study WaterExe4.0: Technology Diversity vs. Lack of Focusing on Staff Requirements

In the meta-study WaterExe4.0 [1], conducted by Hof University of Applied Sciences, around 700 projects, products, complete solutions, services and studies were identified that contain a high proportion of innovative digital methods and solution approaches. The results were assigned to various aspects and categories, which are summarized in Table 1. Only 11% of these approximately 700 digitization solutions could be identified as a large-scale and permanent realization in a water management application, although for almost every current issue of water management task there is already a suitable digital solution or research results that are not far from application maturity. This left the study authors with the impression of a large gap between available solutions and actual implementation. To find out whether this statically surveyed discrepancy was due to the selection of methods (e.g., categorization was too rough), or whether there is a reluctance to procure on the user side, users and industry experts were interviewed in addition. Previous studies have already indicated that industrial development is far ahead of municipal needs [3-6]. Therefore, the analysis of published research papers, available information on industrial products as well as publications on municipal practical examples were supplemented by a quantitative survey and qualitative expert interviews to determine the reasons for the apparent discrepancy between supply and demand. Around 120 industry representatives took part in the online survey. In addition to the question about previous experiences with digitization projects, the interest was in non-technical influencing variables as a success factor or implementation obstacle, which the respondents were asked to identify or derive from their project experiences. The online survey was primarily designed as a quantitative survey, but also

gave participants the opportunity to share their own thoughts in addition. This made it possible to address aspects of digitalization that have not been addressed at all or only marginally in previous research.

**Table 1:** Application distribution of digital solution variants.

| | Waste Water | Tap Water | Stormwater | Water Bodies | Re-Used Water | Sludge |
|---|---|---|---|---|---|---|
| Share of identified digitization solutions in total | 28% | 30% | 13% | 11% | 16% | 2% |
| thereof: | | | | | | |
| Inter-municipal | 34% | 40% | 50% | 61% | 30% | 13% |
| System-wide | 25% | 17% | 21% | 14% | 18% | 17% |
| Entire system | 13% | 12% | 11% | 8% | 17% | 38% |
| Subsystem | 13% | 12% | 7% | 5% | 14% | 29% |
| Object level | 11% | 10% | 6% | 6% | 13% | 0% |
| Product level | 4% | 9% | 6% | 5% | 9% | 4% |

Source: WaterExe4.0

The main obstacle named by participants in the online survey was a lack of staff, closely followed by an unexpectedly high overall effort in a digitization project, although this was not specified further. By some distance, the lack of internal competences and insufficient funding were named. Other factors mentioned the fear of change, insufficient involvement of employees, and technical aspects such as unresolved IT security and a lack of standardized interfaces. In addition, the lack of time to sufficiently deal with the existing digital possibilities due to their existing complexity or the priority of everyday tasks keeps many away from starting a digital project. There is no problem of lack of time if the practical benefits of digital offerings and the relationship between benefits and price became visible much earlier. It would also help if providers showed more commitment to respecting the needs of the municipal side and providing more individualized advice. With regard to the factors that were positively evaluated in the project (Table 2), it is ultimately the own staff competences and a reasonably successful internal communication that, with the support of the external experts, ultimately led the project to success. The respondents were also allowed to name their individual success factors. These range from need-based digitization, clear project goals, practical relevance, internal understanding of digitization and trust in the subject matter to clear benefits such as simplification of processes and structures, acceleration of workflows and improvement of transparency.

**Table 2:** Success factors in digitization projects, results of the online survey.

| Which of the following factors have positively supported your project? (n = 94) | Mean | Variance | Deviation |
|---|---|---|---|
| Sufficient time | 2,84 | 1,83 | 1,35 |
| Sufficient financial resources | 3,51 | 1,66 | 1,29 |
| Cross-departmental communication | 3,63 | 2,06 | 1,44 |
| Competence of the project manager | 3,97 | 1,37 | 1,17 |
| Competence of the staff | 4,00 | 1,19 | 1,09 |
| Expertise from specialists | 3,68 | 1,59 | 1,26 |
| Orientation towards available best practices | 3,02 | 1,89 | 1,38 |
| Exchange with third parties who already have experience | 3,25 | 2,35 | 1,53 |
| More training opportunities | 2,31 | 2,18 | 1,48 |
| 3,36 | | | |

Source: WaterExe4.0

The 30 interviewed experts from the water sector commented wide range of topics regarding possible success factors in digitization projects. 31 different factors were addressed, ranging from sufficient time and the preparation of a risk analysis to an overarching strategy and attention to sustainability. Sufficient employee acceptance, a recognizable added value of the digitization solution and the responsible key persons were named as the most important success factors. From the


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experts' point of view, obstacles result in a false expectation of quick solutions, in poor usability as well as in insufficient infrastructure requirements up to communication inability and leadership failure. The lack of resources (money, staff, time), the employees' reluctance to embrace new ideas and the lack of IT infrastructure are the strongest obstacles. As much as the human factor is seen as a central role by the experts and participants of the online survey, the success or failure of a digitization project is influenced by a large number of other criteria, some of which are very different. For example, the exact definition of the use of a digitization solution is also of decisive importance. Furthermore, the existing pressure to be able to present data as quickly as possible and the creation of work facilitation. According to the experts, the most important ways to advance digitization projects are the introduction of pilot projects or the orientation towards best practices, i.e. the early creation of a real practical reference instead of looking at theoretical ideas for too long. This is followed by paying attention to generational change with the associated cultural adaptation and establishing digitization as a process and not as a one-off, time-limited and thus finishing project. Of equal importance the use of so-called 'anyway' projects as a testing and learning space was mentioned.

## HELIP® - Highly Efficient Learning for solution development In Processes/projects

Many digitization solutions have a high level of performance and functional complexity. Even if municipal users in the water industry need many of these functions in the medium and long term, the high range of functions overwhelms most potential users in a digitization project, especially at the beginning. The bigger the distance between the purpose/content of an offered solution and a normal everyday work, the less are personal accesses to innovations. This situation significantly influences decisions for or against a digital solution. The results of research projects such as WaterExe4.0 or KOMMUNAL 4.0 [1,2] have confirmed this.

HELIP® aims to achieve more time and cost-efficient solution development based on faster and more targeted learning including effectively use of new knowledge, which is a crucial aspect especially in the context of digital transformation. Through a combination of strongly practice- and individual-based learning content in conjunction with function-related counselling/analysis using organizational-psychological analysis, learning and communication methods, the connection of new content and existing knowledge and organizational structures increase so that integration into everyday work happens in a sustainable manner in a short time. Previous approaches separate counselling/planning, realization and training, which considerably worsens the transfer assurance. In HELIP®, the focus is more on the functional goal and its benefits than on selected technologies alone. In addition, the respective roles of those affected are considered and an analysis of possible consequences on the various levels of action (person, group, organization, market, society) is carried out. All this together promotes thinking in variants to find the best solution.

Based on the results of the studies on WaterExe4.0 and KOMMUNAL 4.0, the basic elements of this methodology were already described in [7] using the example of the digitalization of municipal water management. With the help of HELIP®, for example, the best or most effective emission avoidance potentials can be found for sewage discharge into water bodies. The procedure must be time and content efficient (because municipal experts are usually lacking) and results must be delivered promptly. Implicit knowledge of the operating staff can be made accessible with this approach and effectively integrated into the development process, because the existing application knowledge is made available in a targeted manner. So far, this happens too rarely in classical processes. The starting point in HELIP® are current results of learning and transfer research that new content can be learned and applied more quickly and effectively if the personal context of the training participants is considered (competences, way of working, current tasks, communication style, etc.) and incorporated into the learning didactics. In contrast, this research show also that training still mainly takes place in isolation from the practical day-to-day work and a possible transfer of learning is only envisaged when the new systems or technologies for application are already in place. Then, the necessary practical knowledge of users can no longer flow into good planning or ongoing realization.

It is also known from studies on cost and resource planning in projects that the influence on project costs decreases very quickly, especially at the beginning, while the necessary knowledge for a good decision-making basis in the project builds up very slowly. These process effects are boosted by the fact that further training measures for the future users of new technologies only take place at the end of a project. Although the information on new technologies, defined by responsible persons for planning, already takes place before a project or in the initial phase, there is no focused attempt in this phase to analyze how the technologies are to be integrated into the existing work processes or how technology and employee knowledge/experience will fit together. When it comes to new technologies, as it is the core of digitalization, in most of cases almost all decisions are based on theoretical knowledge or imprecise prototype experience.

The projects WaterExe4.0 and KOMMUNAL 4.0 have shown that in municipal water organizations the willingness for engagement in digitalization increases the closer possible solutions touch daily practice and thus become more comprehensible. In order to find out where the ideal point of intersection between the digitization idea and practical application lies, several hundred discussions were held with lots of responsible persons in municipal organizations within the WaterExe4.0 and KOMMUNAL4.0 projects.

Based on these experiences a sufficient willingness to participate in initial trial projects could be achieved among the responsible persons for the municipal projects.


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Up to now, application ideas envisaged in potential digitization projects have been described very often from the perspective of an abstract digitization vision. Municipal users can only comprehend these ideas in their full scope at a very advanced stage of the process or cannot transfer them to their own application needs. Therefore, the needs/goals/expectations/fears etc. of the end users must first be clarified in depth. This is the precondition for a suitable discussion of digitization ideas while the missing background knowledge has to be trained parallel. These processes take place iteratively (Figure 1) in the form of detailed question/answer sequences until there is a common understanding of the end user's initial situation (needs and expectations), the digitization application in question and the resulting benefits.

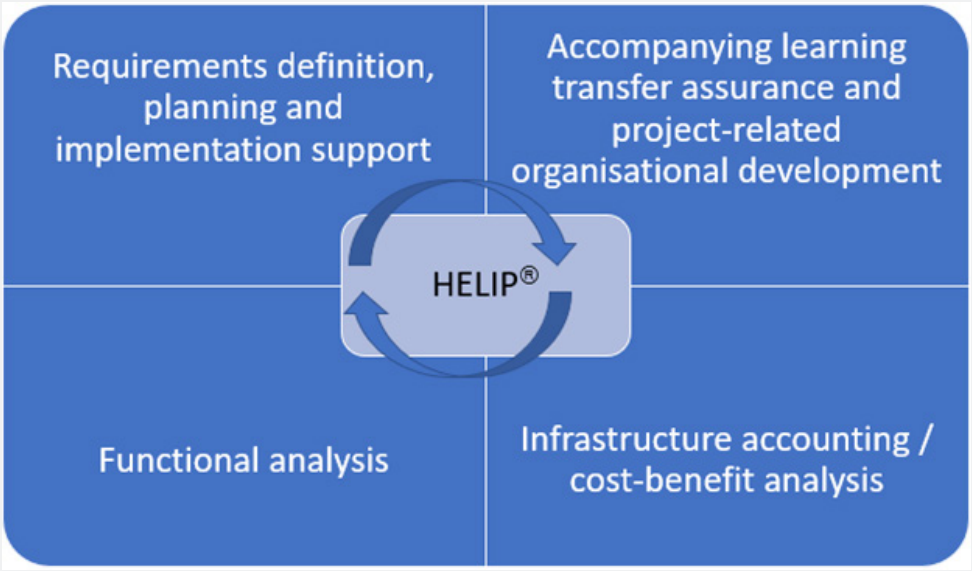


**Figure 1:** HELIP®- Principle of operation.

This approach differs greatly from the usual needs analyzes and pre-planning processes in a linear way in the municipal water management or in technical planning processes. These processes fashion based on a rough task list formulated by the municipality. Often the formulated tasks do not reflect the multi-layered needs of the municipality and its human beings, but this becomes apparent in an unconsidered way in the further realization steps. This is because the municipal representatives are often not aware of their heterogeneous knowledge and experience background, which must first be made transparent in the HELIP® process. In conventional planning phases, there is no comparable 360° reflection like HELIP® as a full analyzes of the requirements to be considered, as normal processes are usually limited to purely technical issues.

The HELIP® concept relies on a corresponding 360° reflection of the task and influencing conditions right from the start of planning and assigns the necessary knowledge transfer of new contents to the individual organizational contexts and the task of the respective municipality. In addition, the matching practical task packages are coordinated with the further decisions and planning steps of the overall process. The previously common separation of planning/implementation and further training no longer takes place. Classical planning, which includes extensive investments, organizes the work steps in a linear logic; feedback of later findings to earlier planning phases is hardly possible. If elements of the HELIP® concept must be integrated into the project processing at an early stage, a comprehensive 360° reflection of the entire task first takes place, including all involved people, looking for the affected organizational processes and to find the necessary form of technical consulting.

The HELIP® process is divided into 7 essential levels.

**i.** 360° task and organizational reflection (target/actual analyzis ), considering all internal and external persons, processes and other requirements involved

**ii.** Task definition

**iii.** Selection and definition of the sub-project

**iv.** Creation of a suitable project incl. adaquate learning culture

**v.** Determination of the project process structure

**vi.** Implementation of the sub-project

**vii.** Consolidation of results and derivation of knowledge gain for the overall project at the next (technical) level

As shown in Figure 2, these phases do not run in a linear fashion, but iteratively with attention to feedback loops and their


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influence to each other in the overall process. This means that fine adjustments can always be made to the individual processes. Depending on the requirements and target impact, individual phases can also be processed in parallel or nested within each other.

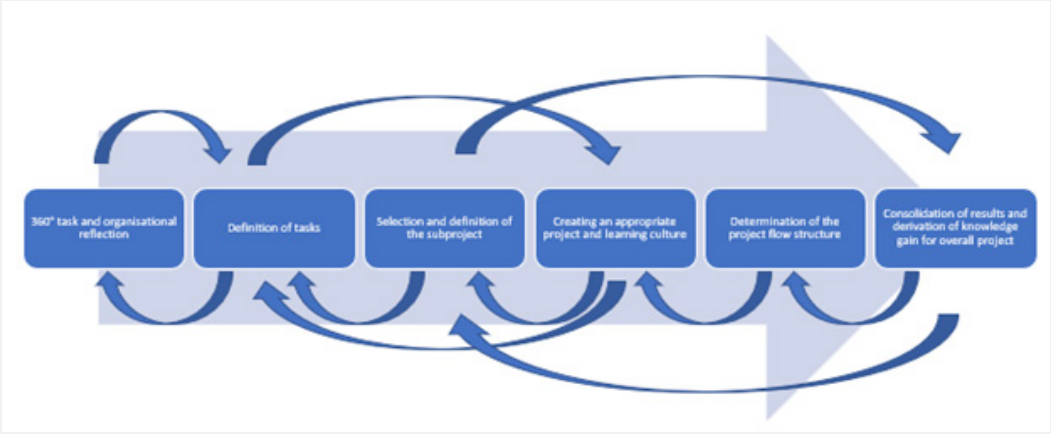


**Figure 2:** 7 Levels of the HELIP® process.

## "Anyway Strategy" as an ideal starting point for HELIP®

As a result of a holistic reflection, a subtask (= anyway project) has to be selected that represents the overall project, on which learnings and experience can be made that are able to transfer to the overall process and its other subtasks. It is important to find a subtask that can be planned and realized in a short time to gain quick wins. In relation to the timetable of the overall project, a first (partial) project realization takes place in a very early processing phase. This makes it possible to gain initial practical and application experience and thus a increasing increase in knowledge, which enables better decisions for the further project phases. It is particularly important that the selected sub-project is representative of the overall measure in terms of learning content and basic requirements. In addition, a selected sub-project should be chosen that is to be realized in any case and later integrated into the overall measure. Tasks or projects that are to be carried out anyway as a measure are suitable for this.

The focus to an "Anyway Strategy" identifies measures and planning projects that currently determine everyday life in the respective municipal enterprise and for which, ideally, approvals have already been obtained and financing has been clarified. This prevents tiring discussions about permits and money that too often lead to the death of a project. The next step is to examine which digitization ideas can be used to solve these "anyway" tasks more efficiently and sustainably. In doing so, it also had to be considered that a possible innovation project must not lead to any additional burden on the employees. Due to the variety of solutions now available in the field of digitalization, a suitable innovation idea should be found for almost every "anyway" task that comes into question. By involving the employees concerned in the identification process and in the search for a suitable digitalization solution in appropriate time, the willingness to participate increases abruptly and the acceptance of a new solution becomes very high. Interestingly, during such pilot (anyway) projects, a special momentum develops among the municipal employees. More and more, the employees contribute their own approaches to digitalization or provide significant improvements to the existing ideas. The more a climate of cooperation at eye level, develops through HELIP®, the more fruitful the result will be at the end of the process. In retrospect, it can be said for the projects selected so far according to the "Anyway Strategy" that the process provided the initial spark for a sustainable renewal process for the technical modernization of existing wastewater infrastructure. Thus, the impact went far beyond the actual project.

The following example illustrates the process of the "Anyway Strategy" by use of the HELIP® process. At the beginning of a process, it is necessary to check which technical "business-as-usual" measures were pending and in which processing stage the project is. Then it must be clarified whether the planned new technology could be implemented as a so-called smart machine or smart system instead of a conventional technology. The example of the selection of a computer system on a relief sill of a canal system is to illustrate how the system was used and can be applied everywhere. In canals, rake systems are used increasingly on so-called relief thresholds. If the sewer runs full and excess mixed water escapes from the sewer at these thresholds, retention systems (so-called rakes) installed can reduce the discharge of dirt into water bodies.

Conventional rake systems automatically clean the screen bars covered with dirt at set intervals. The focus here is on ensuring hydraulic capacity, regardless of whether the current operating status requires this or not. A reduction in pollutants is not taken into account. Smart rakes, which are e.g., equipped with


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the KOMMUNAL 4.0-based IntelliScreen system [7] use networked information from local machine operating data, from webcams, as well as precipitation data from data portals to achieve greater operational safety and water protection. While usual raking systems are cleaned by constant combing and/or clearing devices, rakes equipped with Intelli Systems have the advantage of adapting the combing and/or clearing devices to the current operating situation thanks to extensive data evaluation. While the removal of dirt particles from the screen bars is the focus of conventional systems, the exact opposite is desired with Intelli Systems: the dirt particles should remain on the screen bars as long as possible. It has been found that the dirt acts like a fine filter, stopping small particles that get into the water bodies with normal rakes. The intelligent system makes sure that the dirt is only removed when the amount of rainwater is too high, in order to avoid an overflow in the sewer. In addition, the intelligent system prevents the debris from staying on the rake bars for too long to avoid blockages. In contrast to conventional systems, the clearing devices are only activated when necessary. Thus, as described in [2], the filter effect of the screenings could be used directly for the first time based on the expanded information situation in the sense of improved water protection. Screening systems in sewers are being used more and more often and are therefore typical "anyway" projects. The way from a common to an intelligent (innovative) system is not very far, as the basic mechanisms and components are identical. Minor (but not simple) adjustments to the machinery and digitalization thus lead to a leap in innovation. For the municipal operator, this approach results in the following advantages:

**i.** The basic concept of an "anyway project", i.e. the system of raking or material retention in the canal, is known, already discussed and approved. This means that there is no disruptive new project.

**ii.** The share of new technologies (digitalization) is comparatively low when "anyway projects" are identified (experience shows < 20 %), the employees are familiar with the essential techniques, the new things to be learned are always linked to existing knowledge, so learning is easier and is accepted immediately.

**iii.** The additional costs for the "anyway project" extended by digitalization are usually < 20 % of the total costs.

**iv.** At the same time, the chance of innovation funding is greatly increased; the previously planned conventional technology usually has no chance of receiving funding at all.

**v.** The increase in digitization solutions makes municipalities more attractive to younger, digitally savvy young professionals.

The earlier an " anyway project " project is found, the more effectively HELIP® can be integrated and applied in a new type of project, e.g., for the digitalization of water management tasks. The focus is on people and their conscious and unconscious needs and can be specifically addressed and considered in the project planning. This not only increases the probability of success of the project but also user satisfaction and considerably reduces or even avoids follow-up costs.

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