

# Chapter 2

## Practical experiments

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In parallel to the inner sensing, studying, and contemplation on the fabric of water aspirations as described in Chapter 1, ordinary ‘life on the outside’ continues. In conversation with the reflections of heart and water, the work increasingly becomes a continuous integration of the holistic view into each part – adjusting, listening, designing, testing, understanding of dynamics, mediation, etc.

I work as part of the senior staff in the water utility of Kalundborg in Denmark. This hence becomes the arena for the expression of the inner thought processes and ideas. As well as the other way around, what happens in the utility provides food for thought in the contemplation of water aspirations. It is difficult to convey a one-to-one description of how this dialogue takes place, as in ‘I sensed/thought this and then did this or that and then that happened which made me sense/think so and so’. But it is distinctly clear that such a dialogue takes place. And I trust that dialogue to be of vital importance. This is not a work of ‘stiff dogmatism’, but on the contrary, an attempt to fluidly ‘act connectively and collaboratively’, as Veronica Strang puts it.

The contemplative experiments of writing this book changed the outcome of both analysis and decisions, but perhaps more importantly changed the perceived options – new possibilities appeared possible. Similarly, experiments with different ways of organising work and people, different types of social processes, different ways of listening etc. changed outcomes.

The dialogue between the inner and the outer circumstances often occurs in leaps. The leaps seem to occur for two reasons or in two different kinds of processes.

One process is when an insight initiates an inspiration for change. In that case, it takes time to translate the idea into real actionable tasks. Second, it takes time because a new way of doing things in a utility most often needs to be anchored with a number of people. Sometimes it takes time to convince people to take the kind of risk a new idea constitutes. And in that discussion, many people will come up with reasonable objections that need to be addressed. There is no point in forcing it through – it will increase the risk of failing dramatically. So it takes time and often lots of feedback loops and adjustments. When it finally works out it seems as if it happened in a leap.

A different experience is when a new pattern emerges out of what happens in daily work in or around the organisation of the utility. What happens may either dissonate or resonate with the contemplations. It is as if due to these contemplations new things become visible and cause surprise. The myriad of things that take place in a utility organisation become a springboard for understanding the new mindset in a new way, generating new insights and ideas. Again, seeing a pattern once or twice is usually not convincing, there has to be a cognitive recognition – which often takes the form of a ‘eureka moment’.

I have chosen to write about my work at Kalundborg Utility to illustrate how we have found practical ways to move in the direction of increasingly taking on a water stewardship role. I will try to explain how I have interpreted it, how we have experimented and what types of changes this has brought about.

I began in the utility at the same time that a new CEO had been appointed. This marked a significant change in management of the utility and a change in strategy towards a clear strategic marker of ‘sustainability’. The change process in Kalundborg Utility is therefore also a case story that gives an example of a trajectory of a journey towards sustainability in a water utility. This is NOT an attempt to give directions or even inputs to how this journey should be made. Instead, it is an attempt to root the ideas and the whole endeavour of water stewardship in practicality and common real-world projects and issues. If it is to be taken as an encouragement, it is an encouragement to experiment, to look at these experiments and then design better and more daring experiments.

What I have tried to make clear in the below cases is what we managed to ‘upgrade’ from project to project. So it is not about doing the ultimately right thing – though every time we tried. Actually, what is a richer focus is to look for what was upgraded. Later as this focus became clear, the question changed to: ‘what do we want to upgrade?’. This is particularly clear in the last case below.

## **COLLABORATIVE DEVELOPMENT OF A NEW UTILITY STRATEGY**

Before we started working with our five-year strategy towards sustainability, the top management worked out a set of values from which leadership in the utility would spring in the future. The chosen values were: passion, relationships, ambition and

motivation and they set the tone for the strategy to come. These values were an attempt to change from a culture of disengagement, static background dissatisfaction, stress and a lack of direction and imaginative courage. With the new values, a new state of mind in operating the utility was called upon.

The values spurred a great deal of controversy both in our utility and even in some of our 'fellow utilities' because the values marked a stark departure from the traditional utility values which can be characterised as operational robustness, conservatism and risk-avoidance. The new values stated a different way to be a utility. Some greeted the change as a breath of fresh air, others became anxious about the meaning of this for themselves and the work they mastered, and still, others felt angry – either because they thought the earlier values were now deemed wrong or because the new values were too far from their own values and competences.

The process and choice of the new values were carried out solely by the top management group of the utility. In retrospect, I think that this was needed to change the agenda so markedly, to communicate the radical change clearly. But it was at the same time evident that this was the kind of top-down approach that we actually had to change away from. If we were really to achieve a future where these values would be authentic, this could not be the way to move forward in the future. Therefore the following strategy process was designed to be distinctly participatory. The strategy process lasted a year and was carried out in the following steps:

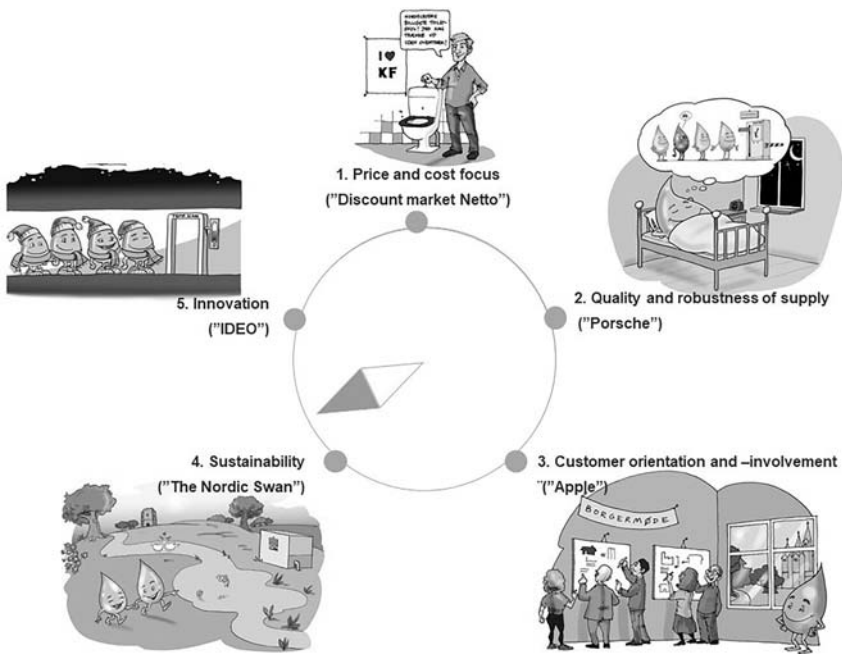
- (1) Brainstorming;
- (2) Grouping of themes based on emerging patterns;
- (3) Internal and external analysis;
- (4) Deciding on strategic markers;
- (5) Translation of strategy into actions.

The brain-storming phase took input from each line of utility (drinking water, wastewater and district heating). Together we tried to answer what needed to be done or with a different twist: what would be good if it was done. For the area of, for example, wastewater treatment, there were close to 100 ideas for activities and concepts to be implemented. The ideas were of different quality and some almost contradicted each other. The ideas were applicable on different abstraction levels, many being neither strategic nor directly actionable. So it was really a messy body of ideas. In the group, we tried different kind of groupings which revealed some redundancy in the ideas. But even redundant ideas were formulated differently by different people and hence giving a different flavour to the idea and just merging the ideas into one headline seemed to reduce or dispirit the idea.

Eventually, an organisation of the ideas with a strong explanatory power was 'invented'. The ideas were grouped according to the mindset the idea represented. First, we saw that the ideas were an expression of three different focuses: (1) cost

reduction, (2) quality improvement and (3) customer service and participation. Later this was extended with two additional mindsets: (4) environmental concern (later renamed sustainability) and (5) innovation see Figure 5.

The five categories became an important inspirational and organising principle. The method inverted the problem to: 'If our strategic direction was mainly 1, 2, 3, 4 or 5, what would the main actions in our strategy look like?' This caused five different futures to be imagined and described. To support our imagination and memory, we linked a company name with each scenario, a company name which seemed to be governed by either of these foci. The cost focus (1) was represented by a Danish low cost supermarket retailer (Netto), the quality focus (2) was represented by a luxury car brand (Porsche), the customer focus (3) was represented by a customer-centric mobile phone designer (Apple), the environmental focus (4) was represented by a Nordic environmental product label (Nordic Swan) and finally the innovation focus (5) was represented by an American innovation consulting company (IDEO). It was not that we wanted to copy these companies, but it was a very nice 'short-hand' way of speaking of the directions in a way that everybody understood each of the five general directions.



**Figure 5** The five strategic directions identified in the strategy process. (Source: Kalundborg Utility)

After describing the five different futures (including vital technical aspects) an analysis was undertaken with five key questions: What do our private customers prefer? What do our industrial customers prefer? Would our key stakeholders support this? Is it economically feasible? Is there anything legally preventing the strategy?

The analysis of the first questions was carried out by focus group interviews. In the focus group interviews, different types of private customers were presented to the five strategic options. The analysis revealed a few surprising points. Across all three customer focus group meetings, a similar pattern played out. When first presented with the cost-focused strategy option, the group loudly applauded, this was what they wanted: lowest possible cost! Following, when presented with the high-quality focus, they changed their mind. After the presentation, this was what they would rather have! Some exhibited the same pattern when presented to the customer involvement direction, though here there was a difference between customers. And finally, there was very high support for the sustainability focus (in this context the innovation-focus strategy appeared more as a tool than a strategy relevant to customers).

The overall conclusion was that especially customers in the main city centres wanted quality at a reasonable cost and would be happy to pay extra for initiatives with a visible positive effect on the environment, preferably in the form of beautiful waterways to be seen in the city. For the industry, the cost is always important, but within reason, and it was evident that sustainability and robustness of supply were higher on their agendas and sparked more energy.

Finally, when the analysis of the five key questions had been carried out, all management personnel were gathered for a 2-day workshop to present and be presented to the results of the analysis on each of the three main utility branches: water, wastewater and district heating. It was clear at the workshop that deciding which strategy to pursue was an abstract and challenging exercise for many; some had strong opinions while others seemed more confused and undecided. This provided a new problem. We wanted a high level of organisational involvement, but how could we broker these different opinions in a responsible, fair and transparent way?

At some point, the top management group took a leadership decision. The group had a separate meeting to have a debate based on the input they had received, and then they would take a vote as there were also conflicting viewpoints within the top management group. Based on the vote it was decided that sustainability was the primary strategic marker and innovation the secondary one. The ambition was to use innovation as a tool to make sustainability come about without excessive additional cost.

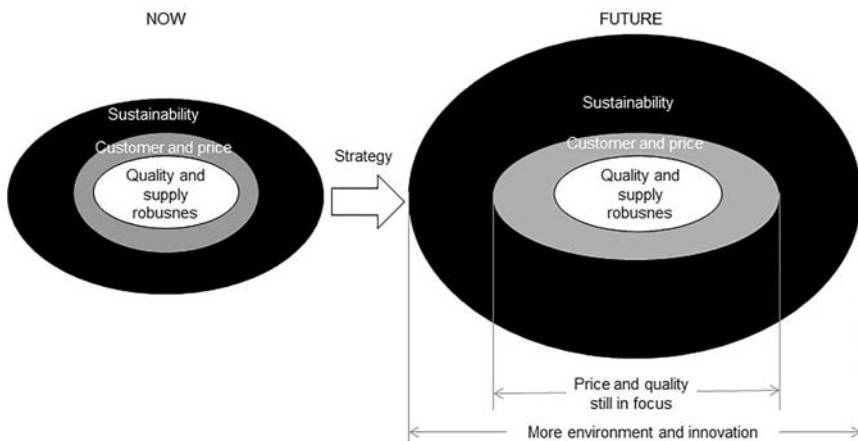
When the organisation was presented to this decision, some were very outspoken against it. There was a confusion of whether that meant that we as a utility didn't care about cost, quality or customers anymore. As a top management group, the standard procedure of operation would be to quiet down the critique in a more or less

hard-handed way – to show ‘leadership strength’. But this would be the exact opposite of the way we wanted to move the organisation.

Instead, we found a way to improve the strategic storytelling to include the ‘opposing viewpoints’ as well. In this discussion we realised that throwing overboard the traditional utility values was neither what we wanted nor necessary. Instead, we realized the different directions were rather different layers of the story of the utility see [Figure 6](#).

At the beginning of the utility’s lifetime it had been about establishing a system with operational robustness. Later, when the system had been running for decades, ‘cost and pricing concerns’ came into focus. It was probably less than a decade ago that customer service had become an additional theme in life in utilities. Hence the strategic story became a recognition of these foundational values at the same time as it added a new layer of sustainability and innovation. And it was apparent that there had to be elements of development for all five directions. From a strategic point of view sustainability and innovation were the new themes that had to be incorporated in the utility culture. It was clear that on occasion this layer would be in conflict with the more inner layers and at other times they would enhance or upgrade them.

In a sense, one could also argue that the sustainability dimension had been there all the time in the form of compliance to environmental law. However, in the forthcoming strategy period, we were going to ‘strengthen that muscle’, to understand our effect on the environment better and to find solutions that take environmental issues better into account, than what we had done in the past.



**Figure 6** The new strategy is not a radical departure from old virtues of robustness, quality, economy and customer focus. Instead, sustainability is a new layer we are adding to the work. (Source: Kalundborg Utility)

So in that sense, all strategic directions or themes were integrated but with different approaches and with different emphasis. What the strategy succeeded in doing was changing the discussion and, naturally, including more elements of sustainability and innovation in our work moving forward.

As every strategy book in the world states, one thing is defining a strategy, implementing it is a whole other and different matter. We did a lot of interesting work in terms of strategy implementation; some worked – some didn't. But what is important to note is that the strategic story became the foundation of a lot of the following work and is a basis of the case stories that follows in this chapter.

## **What was upgraded?**

### *Training in providing processes for complex tasks*

Retelling the story makes the process look nice and more well-planned than it was. At the time, it did not feel so. However, it worked well that a general process was planned and visible to all. It meant there was a direction and steps to complete. We had help from a strategy consulting company to support the process. A surprisingly difficult thing was to make sure that everybody knew what the word 'strategy' meant. This was difficult to many, who did not see that there had ever been a strategy to the work they were doing.

### *The interview-translate method*

It was also difficult for many employees to carry out some of the work packages. The work seemed too abstract to several of the key personnel in the utility. To overcome this, we changed the work method, so that instead of formulating strategic analysis themselves, they were interviewed and their input was transformed into statements useful for the strategy development. Every time we read the statements back to the specialists for confirmation that we understood it correctly. This method became a standard method in many subsequent discussions and projects. The issue that a lot of knowledgeable persons do not have a strategic mindset had to be solved to get all relevant knowledge up for decision. The translation of tacit or silent knowledge into defining parameters for decisions became an important method in many decisions to come.

### *Sustainability on the agenda*

The strategy process put sustainability on the agenda in the utility. The word sustainability has been around since the Brundtland report and is often used in the media. However, it is clear that there is still a long way from having heard the word to really understanding it and even from there to translate it into actions. In the utility this was the first step in a long and winding journey towards higher degrees of sustainability.

**Your reflections:** Do you recognise these layers in the story of how we work with water? To what extent can it be both-and and where does it have to be either-or? What advantages and disadvantages do the both-and and either-or thinking and acting have?

## EFFECTIVE SUSTAINABILITY THROUGH A PROJECT MODEL

Implementation of a project model was of paramount importance to the strategy. The project model facilitated both a structured movement towards sustainability and an improved framework for innovation. At the same time, the project model strengthened a process of increased project management professionalization, an increased focus and an increased clarity on issues like cost, operational robustness and customer involvement. The project model meant a strengthening of the overall project culture. The starting point was that projects were carried out intuitively supported by a few contract templates and checklists. There was a difficult gap in the organisation's ability to align the projects with any strategy. The problem was apparent on two levels: the strategic portfolio prioritisation level and the project execution level. Many projects only exchanged one piece of infrastructure with a new piece following the same design. There was a lack of a critical and constructive discussion of how to upgrade or change the system. And there was hardly any discussion about how to judge whether there was a reasonable relationship between the cost and benefit of each project.

Implementation of the project model was carried out in order to align the project processes and ensure a methodological approach to key questions.

The project model was designed based on the principles of stages and gates. That means that every project timeline is divided into the number of phases divided by gates. For each gate, there would be a gate meeting, where the approval of a project owner or steering group was required to proceed from one phase to the next. Each project hence has a project manager and a project owner/steering group. In the gate meeting the project manager reports the results of one phase to the project owner. The project manager has to present the stage of the full project for 'the gate to be opened' and the project to move on to the next phase. In Kalundborg Utility we used the project model shown in [Figure 7](#).

The purposes of each phase are:

### **0 Proposal**

This 'phase' is meant to collect all suggestions and inputs from the whole organisation regarding what projects need to be carried out in the utility. At portfolio meetings the proposal list is prioritised, some projects may be



0. Proposal	1. Framing	2. Concept	3. Design	4. Implementation	5. Evaluation
Description Purpose Initial business case Project estimate	Ambitions Goals Success parameters Scope First budget Key risks	Concepts Innovative elements Comparison Business cases Evaluation Sustainability Recommendation	Detailed design Tendering Permits Evaluation of successparameters Budget Risk assessment	Tender process Negotiation Choice of supplier Building Budget follow up Tests Operationalisation	Project evaluation

**Figure 7** The project model (in brief). (Source: Kalundborg Utility)

rejected, the rest are prioritised. In the beginning our focus was on whether a project was to be carried out or not. However in time we found out that the question of *when* rather than *if* it was to be carried was more relevant. The question of *when* was determined using the mindset of asset management, risk analysis and business cases to make an evaluation of whether the lifetime of the asset can be continued or if it constitutes a critical risk to the robustness of supply. This often requires an assessment of the probability of a threat, consequence of a risk as well as determining the relevant backup plan. Carrying out this kind of systematic risk assessment provides an analytical and objective way of prioritising projects.

**1. Framing**

Framing of the project is crucial for the success of the project and for ensuring mutual understanding between project manager and project owner/steering group about the aims, limits and means available. Projects can be framed in many different ways; hence if this is not done openly and consciously, everybody will make up their mind sub-consciously – and in different ways. This may cause a lot of confusion and frustration during the process, and it often leads the framing to become a matter of continuous debate or conflict. Important results of the framing are scoping of the project, defining deliverables from the project, defining success criteria and level of ambition and it includes preliminary time plans and budgets.

**2. Concept**

The concept phase is crucial for innovation. In an organisation where innovation has played a very small role, we started off with small changes. In the beginning each project was required to suggest at least two different concepts for solving the project challenge. It was surprising to realise that for many project managers it was difficult to find two different solutions and for some even to see why that would be relevant. Moving one step back and truly understanding the project challenge, understand its purpose, rather than just seeing a solution, is a surprisingly tricky mental movement for many people. This caused a pedagogical dilemma to be solved by the project owner. They had to insist on more than one concept – sometimes

against a fair amount of resistance or confronted with poor alternatives. At the same time it was a competence development process where the project owner had to find a balance between being supporting and facilitating and being insisting and appropriately critical of poor concept development.

### **3. Design**

The design phase is generally where engineers and technicians feel most at home. In this phase, we often found that support for risk assessment was important. Again, the challenge had to do with culture. It is not an intuitive act to separate probability from consequence and to address these two different aspects separately. Additionally, a lot of water professionals have a very conservative view of risk, such as 'if there is a risk, it must be removed'. So this is also something to train. Another way to challenge the design is to see if additional functionality can be included in the design. Designers are often focused on meeting minimum requirements only. But fulfilling additional 'wishes' is where we can draw new pride and happiness in the solutions – and done at the right time it does not need to be expensive. It is a challenge of trying to be able to integrate more functionality into the solutions. And thereby meeting more needs.

### **4. Implementation**

The building phase is the busiest phase. This is where proper preparation meets reality – or not so seldom, where lack of preparation meets reality. Small mistakes or small issues that have been overlooked can have huge effects at this stage. When a project is 'bleeding' it is often the innovation that is cut from the budget first. Therefore it is important with diligent project management to respect all the mundane tasks of project management and inclusion of experts from all relevant technical fields – in the preparatory phases as well as in the implementation phase. The better and deeper the project manager knows the project design, timeline, risks etc. the more able one is to react 'on one's feet', when mistakes occur. Still, one should be very careful to respond too fast. Reflection is the antidote to mistakes making snowball effects.

Another important aspect to plan carefully for is the transfer of the project to operations – this is a topic that could warrant half a book on its own. If the operation department has not been tightly knit into the project team, this is where a whole new set of problems begin. Additionally, to really succeed in establishing a future respectful and sustainable operation of the new system, where proper care is paid, it is important to have everyone involved – including operations. They need to play an active role during the project. There is often a tendency for conflicts between construction engineering and operation. It requires that both groups bend towards each other to work things out. This again requires a safe space for this work as well as genuine respect and mutuality.

### 5. *Evaluation*

So often skipped, with loss of reflection and experience as a consequence, the evaluation phase is important. The times when we have put real engaged energy into evaluation are the times when we have learned the most. And there is really no way around this. Of course you learn as you progress through the project, however in ‘the heat of the moment’ you do not see as clear as you believe you do. Reasons for frustrating mistakes, behaviours or events often do not appear or dawn upon you until during reflection and seeing the situation from more viewpoints later on. Interestingly, most evaluations end with similar conclusions: ‘we need more dialogue’, ‘we need to address the hard problems head-on and with all involved around the table as soon as possible’, ‘we need to build more social capital early, problems will wear on that capital and if there is not enough, we will all suffer from anger towards each other’, ‘we need to communicate eye to eye when conflicts arise – not by email, though it seems more comfortable in the moment’ etc.

## **What was upgraded?**

### *Improvement of project management skills*

Project management is a separate field of competence, and most technical staff are not sufficiently prepared for this kind of work. In spite of the fact that most water professional engineers will carry out lots and lots of projects over their lifetime. They only get better if project management is elevated to its own field of expertise. It is as if the educational system imagined that all technicians and engineers were going to work under a skilled project manager. This is not the case, most will have to lead projects themselves. And the social skills and agility required to ‘survive’, or better yet to excel, in project management need to be trained systematically on the job. It becomes better with experience only if there is a focus on it. If there isn’t a theoretical framework and an operating process framework, improvements in project management skills will be slow or lacking. This will have serious consequences for the ability to implement sustainability, because taking in regards to sustainability is a matter of integration of increasing numbers of aspects, which means implementing solutions that are often more complex – or perhaps, even more precisely, requires a higher complexity of mindset to find the simple solutions that satisfy many needs and requirements. Therefore, being able to carry out a project with a complex solution is not straight forward. It requires project management skills.

### *Project ownership is not trivial*

Having the phases working and the project management skills in place are the first stepping stones for an effective, competent and professional project department.

However, to excel in the role of the project owner is important. In many organisations project ownership is done with inadequate focus and competence. There seems to be the idea that this is an easy part of the management job. That perception gets in the way for improving performance in project organisations. The ability of the project owner to challenge the project, while ensuring the sense of a safe space, is quite difficult if one hopes to improve the project. The theory of ‘Secure Base Leadership’ is useful as a theoretical framework for the work as a project owner.

### *Application of Secure Base Leadership*

The fundamental idea of Secure Base Leadership (*see, for example, Kohlrieser (2012)*) is that the leader needs to develop a relationship with the individual project managers in a way that creates a secure bond between them. This is the responsibility of the leader. To have a secure bond means that the leader needs to act in an accountable way; that the project manager can rely on the person and that the leader take a special interest in developing the bond between the two. From psychology, it is well known that secure bonding is of primary importance for a life led with ease, happiness and a sense of meaning and inner balance (see attachment theory for more details). Originally this was found to be true between mother and infant, but recent research has found that a similar principle is relevant in the workplace. When a leader succeeds in creating a secure base, the project manager will feel safe, accepted as they are and through this will be inspired to live up to expectations as they evolve. This requires empathy, common goals and daring to trust one another. Relationships in this context are continuously built-up, maintained, degraded and rebuilt. This work has to come from a ‘caring and daring’ perspective and we need to identify and realize when we act from fear to find ways to avoid this. This also means that the project owner or steering group should encourage the project manager to take risks. In many utilities risk-aversion is so ingrained in the mindset that it takes a conscious and uphill struggle to loosen its grip and bring new life. This is not to encourage a risky behaviour per se, but rather to understand when minor risk stands in the way of more progressive solutions. This of course requires the leader to be mindful rather than blaming when risk occasionally materialises.

### *Portfolio management is the key to making an effective impact*

Many utilities become nothing but asset management units, which maintain and refurbish the system as it is. This in itself is challenging to carry out in a cost-effective way. However, this is where the importance of strategy comes in, to make sure that there is a direction in the work – a higher aspiration, that at least to some extent transcends the pure cost-benefit calculation.

**Your reflections:** How do you ensure sustainability in your projects? When in the process will reflections on water stewardship have the most impact? What kind of new questions need to be asked?

## RESPECT FOR WATER, TISSO II

In 2019, Kalundborg Utility won the WEX Global Circular Economy Water Project of the Year. The prize was given for developing a full-scale water treatment plant (Tisso II) to deliver water of drinking water quality based on water from a lake without the use of chlorine.

It took slightly more than five years to finalise Project Tisso II. The project is a good case to investigate what worked and what did not work in terms of translating the strategic direction of sustainability and innovation into a large scale project. The project clearly shows that sustainability and innovation do not consist of singular events, but an ongoing process requiring collaboration, focus and a good portion of grit.

Project Tisso is an example of a project that started on the wrong foot. Due to lack of experience with defining a new water plant, we had given too much defining power to external consultants, consultants with which we increasingly came to disagree. It developed into a series of conflicts over approach, values and choice of technologies. Our relationship became increasingly sour as the project progressed. And as the conflict escalated, we slowly but steadily moved upwards on the stairs of conflict. I had times of great inner struggle; because as a project manager I deeply wanted the project to be one of generous and effective collaboration. But we felt there was a lack of reciprocation as well as a lack of listening and attention. Internally, we had many contemplations of what the reasons for this might be and how to solve the problems. The ‘collaborative approach’ ought to be working, we thought, but we could not make it work. And this wrong start kept haunting the project again and again as we moved forward and all the way to the end of the project.

My interpretation today is that the consultant’s and the utility’s project team were too far away from each other mindset-wise, and because we were not sufficiently precise in what we wanted and perhaps not clear enough in our communication. Hence large and small conflicts became the order of the day in the project execution.

At some point, an additional consultant company was included in the team via a public–private innovation partnership to take care of the process and machinery part of the water treating facility, while the original partner’s responsibility became limited to the building and architecture.

A facilitation team of two people were included in the project to attempt to ‘re-establish peace’ in the project. The facilitation team included an internal

project member who was being taught facilitation and an experienced facilitator. To get on to a new start the newly enlarged team met, and a new collaboration model was established. The team now consisted of the internal team, the two external consulting groups and the facilitators.

It was a feeling of great relief to have a joint whole day session on co-developing the new 'Manifest of Good Collaboration' and having this sense of re-alignment in aspirations and direction. The new collaboration model kept the group together and the project moving forward. However, despite the efforts, the project cooperation relationship remained difficult throughout the design part of the project with a number of tough low points.

Had there been only one reason for this, this could probably have been rectified but the reasons were multiple, complex and opaque as several of them had to do with difficulties in the partner's own organisation. It did not have to do with lack of competence – though at times it came across like that. It did not have to do with the people being 'bad or unlikeable', though at times we felt that way in frustration.

What it did have to do with was: (1) a lack of ability, resources or will to deeply engage with the challenge and the aspirations; (2) too much distraction from other projects leading to a lack of attention to both the detail and the whole totality of the project. Both types of attention are necessary, and it is very demanding to hold both; (3) A lack of attention to the psycho-social field in the project. That is having a sense of when to step forward, when to step back, when to challenge, when to work to increase trust, when to explain, when to be prepared with a plan of actions etc. Again, this comes back to the lack of a 'sensing attention'.

The problematic issues were addressed and collective solutions were found again and again, but at some point it had become such a sore point and patience was running short. Therefore, the partner's role was reduced to an absolute minimum. The relationship to the partner changed from a focus on collaboration to one of culpa and repairments. A negotiation battle continued at director level for years and did not reach the end until after the plant had delivered water for months.

In the learning phase a workshop was arranged where representatives from the partner attended. Still the underlying reasons for the partner's predicament never became clear. But clearly it had been a negative experience for both the project and the consulting company – neither benefitted; both suffered in all the ways one can suffer in a large project including economically, reputationally and stress-response wise.

Why speak about this failure in the project when the project as a whole – in spite of these obstacles – today stands out as a world-class innovative and sustainable water treatment plant? For several reasons. First of all, to convey the important message that working in a new sustainable way is not 'a walk in the park' – it is fundamentally difficult, and having a sustainability focus or a focus on 'good collaborative processes' and frameworks is not always enough. One reason for this is that the new mindset of collaboration and sustainability may run smack into the existing mindset and compatibility is not always found. I would not say

that we learned enough to avoid similar situations in the future. However, there are a lot of pitfalls we will not fall into again. The keywords are still dialogue, trust-building, rapid conflict resolution, secure base leadership, attention, understanding both the whole and the details and taking responsibility for defining the project frame including purpose, success criteria, ambition levels and correctly identifying needs, requirements and wishes etc. However, it is also paramount to make sure that the partners you engage with have a mindset that is strongly entrenched in collaboration. This can be tricky in the current competitive environment and it requires contracts that can handle this.

So let's change attention into something that worked out well. The advantage of not being too experienced in building water treatment plants was that the utility could muster the courage to set high aspirations in regard to innovation and sustainability per the utility strategy. An advisory board process was set up to help meet these expectations. This process resulted in a solid innovation catalogue and clarity in stating the innovative story and purpose of the project. The advisory board process worked as a kind of spinal cord in the design phase of the project. It unified everybody, it gave a clear and concrete goal to work towards, and it inspired everybody to become inventive and willing to take innovative risks.

The participants in the advisory board process included all internal stakeholders, a representative from the water customer, the project consultants described above with some of their c-level managers and a group of three Scandinavian professors. A skilled facilitator helped design the workshop and facilitate the process.

## Workshop 1

At the beginning of the advisory board, we defined the purpose of the process as this: 'The purpose of establishing an advisory board for the Tisso II project is to ensure a high level of innovation and cooperation; innovation that will ensure lower cost (capital and operational), safer operation and smaller environmental footprint of the plant. At the same time, the plant will work in the future as an integrated part of the campus that Kalundborg Utility is building up, a campus platform where students, scientists, practitioners and industry can test new ideas, equipment and processes in a full-scale environment in a way that ensures safe operation.'

The process was started in an open-ended way without a well-defined end-result in mind. The open-ended approach gave the process a feeling of 'coming together', where everybody had an opportunity to contribute with what felt important. And that was precisely the idea. Not to limit the outcome by the limitations of the project manager's ideas, but to let all internal and external stakeholders and experts voice their thoughts and ideas.

So while we grappled in the first workshop with trying to get everybody to understand the many aspects of the challenge and at the same time guide the innovative impulse, the participants in return inspired us with something we

could not have come up with on our own. We went through five themes for the day: the project organisation, the plant design, control and automation, membrane technology and the future campus. And at each theme we were asked difficult and sometimes uncomfortable questions by the panel of professors and customers.

At some point while trying to explain the possibility of protecting the water body from pesticides as opposed to treating water to remove the pesticides afterwards, our Norwegian representative made a joke about the Danish water mentality and said: ‘you Danes have an almost religious relationship to your water’. While this caused everybody to laugh it also caused some debate and reflection because there is some truth to it, but the reflection was also that what we really wanted to perpetuate in this project was the concept of ‘Respect for water’. Hence ‘Respect for water’ became the overarching headline for the whole project. A headline that we kept returning to as in for example: ‘Does this give respect to water?’

Another surprise was the Danish professor who, exhausted after a long day, said: ‘I am surprised that up until now nobody has said the word ‘sustainability’. It is like it is in the air, but we are not treating the topic of sustainability deliberately’. And yes, this was really surprising. It was ‘in the air’ and yet it was true that all the other issues around the plant had a strong tendency to take priority. These two inputs became cornerstones in the work moving forward.

## Workshop 2

In the second workshop ‘respect’ was at the centre stage in all presentations. The workshop was structured around four key stakeholder presentations:

- Respect for the experiences from the existing waterworks – by a plant operator
- Respect for the users of the water – by the main water consumer
- Respect for technology – by the technology provider
- Respect for the lake and its streams and rivers – by an external consultant carrying out a measuring campaign in the lake

Each presentation brought something of interest to the project. The group was divided into three groups. In each group, one person was assigned the role of being a ‘pink duck’. The responsibility of a pink duck is to bring in an ‘appropriate disturbance’ into the group by whatever means he/she can come up with. Especially, if the group tend to agree too quickly, the pink duck should play the role of the ‘devil’s advocate’. The project ended up with seven key themes for innovation in the project see [Figure 8](#).

The themes were:

- (1) Symbiosis and sustainability everywhere
- (2) Perfect traceability of water
- (3) Disinfection without chlorine
- (4) Predictive risk management and control



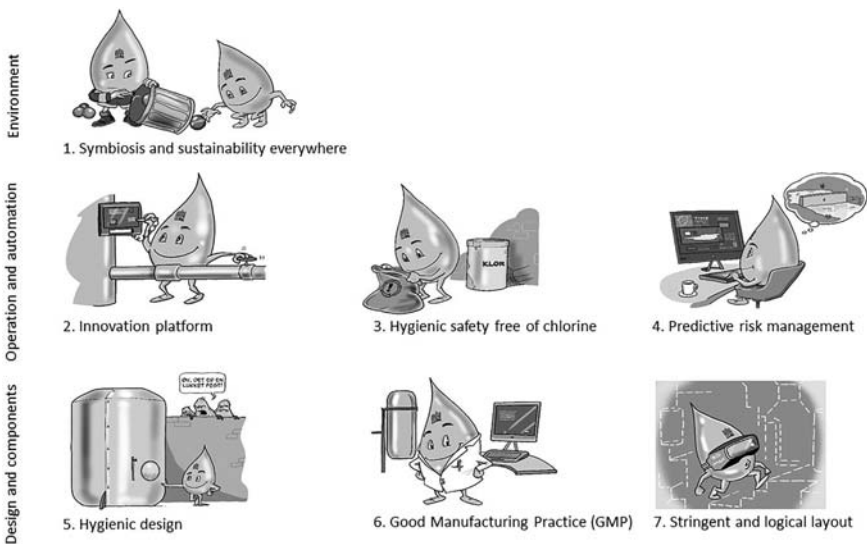
- (5) Super integration of hygiene in the design
- (6) Good manufacturing practice
- (7) Stringent and logical design.

The presentation called ‘Respect for the experiences from the existing waterworks’ made by the operator had some important implications both on the day of the workshop, and also in the continuation of the project. The operator was not accustomed to doing presentations – especially presentations to professors – and was hence understandably a bit nervous, but nevertheless he was ready to meet the challenge. We decided that I, as the project manager, would help him with the structure of the presentation, but that he would be the one to provide the content. Having this dialogue about what he wanted to say and my different suggestions on how this or that could be presented was for me a valuable insight into his world. It was an ‘exercise’ that forced me to try to grasp that knowledge more deeply.

We came up with a nice presentation, where he presented three things he liked about the current plant and five things he disliked and would like to see resolved in the new plant. In headlines this was:

**Likes**

- (1) Being included in the project from the beginning to really get to know the processes.
- (2) That the processes are visible with the naked eye.
- (3) An additional screen to extend the view of the SCADA system.



**Figure 8** Innovation themes in the Tisso II project. (Source: Kalundborg Utility)

**Dislikes**

- (1) There is too little space in the building. Things happen on different levels on top of each other.
- (2) The operation is made difficult with the lack of panels and lack of ways to change the process by, for example, changing settings, controlling valves or pumps etc.
- (3) Chemical storage is too small and we need to order in too small quantities all the time, which is expensive.
- (4) Choice of material – some of the building material cannot withstand the chemicals.
- (5) Supply during break-down is always critical.

Everybody was very interested in understanding the reason and the consequences of these likes and dislikes and everybody was happy to hear a voice that is often not so loud at this stage of the project. For the operational department this presentation also marked a change to greater engagement and activity in the project. It also helped bridge some of the operator–designer conflict gaps, by having something specific to talk about and work with.

**Workshop 3**

The third workshop was carried out like a game, that had both collaborative and competitive elements. The participants were divided into two groups with a mixture of the different roles in the project. The game had seven sets – one for each innovation theme identified in workshop 2. Each set was played the same way. An expert presented ideas on the topic for 10 minutes, then the workgroup shared their ideas on the topic for 10 minutes. Then each group had a dialogue to find good ideas related to the topic based on their diverse backgrounds. Then each group was given 10 minutes to present their ideas. The group was given one point per idea. Of course, this could have potentially led to idea-myopia, so it was stressed that the ideas should be shaped in a way that they could give the project what we called ‘an interesting success’. Additionally, it was stressed that the project already had enough work on their table, so ideas should rather have a feel of ‘work smarter not harder’, than the opposite.

The work resulted in almost 100 ideas. These were scored by everybody individually based on the criteria: resource intensity (low resource consumption was a good thing), price (preferably low price) and height of innovation (innovation height was good). Based on these parameters the final innovation catalogue was prepared with innovation activities within each of the seven innovation headlines. A modest prize of a couple of bottles of red wine was given to the winning team; together with the honour – which probably was more important.

Innovation		Innovation	
1. Symbiosis and sustainability everywhere	1. Degassing replaces chemical (NaOH)		5. Limited access to the waterway
	1. Energy recovery (turbine)		5. Easy to inspect
	1. Operational optimization towards sustainability KPI's		6. Perfect traceability
2. Innovation platform	2. Reference test line		6. User requirement specifications for components
	2. Smart Machines		6. Green card for chemicals
	2. Three-phased startup		6. Open for customer audits
3. Hygienic safety free of chlorine	3. Early ozonation		7. Functional decomposition
	3. Biostability studies		7. Virtual reality and 3D models
4. Predictive risk management	4. Automatic failure handling		7. No red zones
	4. Real-time monitoring and control		7. Plant for showcasing
	5. Four independent hygienic barriers		

**Figure 9** Final list of innovation for the Tisso II project. (Source: Kalundborg Utility)

### Final result

In the end an innovation catalogue was prepared, see [Figure 9](#). The catalogue included 21 innovations that were agreed to be included in the project. This is a good result considering that most of the innovative ideas were grounded in the needs of key stakeholders and understood and deemed relevant by all participants.

Unfortunately, at a later stage, the project had to make severe budget cuts due to the higher than expected bids for the building part. This meant that six innovations were taken out of the project. Three of them could be included again later (marked with an exclamation mark), others (marked with an ‘x’) required more substantial changes.

Still, it is a plant with 15 innovations. The most important being the ability in full-scale to supply water of drinking water quality from surface water without the use of chlorine, an innovation directly linked to the headline ‘respect for water’.

**Your reflections:** What does it mean to take an innovative risk? How can collaboration attenuate innovative risk? How do you get inspired from the outside? Is there a culture of personal leadership and taking personal responsibility in the culture you work in? How does that influence your willingness and ability to take responsibility and show leadership? What barriers do you see for showing personal leadership?

## **SMALL-SCALE IWRM IN LAKE TISSO**

Lake Tisso near Kalundborg serves many purposes and poses threats for many stakeholders: Water is abstracted for water use for several industrial usages using different water quality. The lake, with its upstream and downstream rivers, makes up an important diverse eco-system. Cattle are grazing at the shores of the lake and the rivers. Commercial and recreational fishermen are fishing. Many people are using the area for recreational purposes, including sailing. The area is an active resort for tourists. Bird watchers are looking out for rare migrating birds, special designated islands in the lake need to be above water in the important hatching period and flooded clean in the winter. And lots of people live around the lake and its streams either permanently or in summer residences.

A principal point in the lake on which all of these activities depend is an automatic weir that controls the water level in the lake. The weir is currently controlled by the local municipality based on a 20-year-old regulation scheme. Even in this modern age, such an aquatic system with lakes and up- and downstream streams constitutes a kind of unrecognised centre for many people. This can be observed by the long-time criticism that has been taking place by more or less all of the stakeholders. In the latest municipal election, the lake control had become an important theme in the election debate.

As the water abstraction permit was to be renewed, the utility and the municipality decided to join forces to see if it was possible at the same time to improve the whole water system by looking into the weir system and its control. This decision was the beginning of an engaging Integrated Water Resource Management (IWRM) project. By including representatives for all stakeholders, this technical project has become an interesting Integrated Water Resource Management project. Representatives from all stakeholders were summoned in a process with the purpose of developing a new control strategy for the automatic weir that if possible would meet everybody's needs or make a fair and transparent compromise. At the same time the strategy had to take into account the expected future changes in precipitation patterns due to climate change with wetter winters and drier summers.

To aid the process two dynamic models are set-up for the area. A small local model simulates the lake and a larger holistic model includes the key rivers and the influence of the nearby ocean water level. The project takes place in close cooperation between the local water utility Kalundborg Utility and the local authority Kalundborg Municipality. The project has a high level of political attention as the lake is perceived as a major local asset and an important water resource for the Kalundborg Symbiosis, a thriving industrial ecosystem famous for its longstanding exchange of resources between different industrial entities.

The project addresses several SDGs with a special focus on SDG 6 (Sustainable management of water). According to the UN, putting Integrated Water Resource Management (IWRM) into practice will be the most comprehensive step towards

achieving SDG 6. This small scale experience has taught us that IWRM is a very rewarding process in the sense that it provides a shared holistic and detailed understanding. This provided the opportunity to make a really innovative and effective solution taking all needs into account. At the same time it is a complex task that requires pro-active planning, deep technical-scientific understanding and a strong capability to mediate conflicting needs.

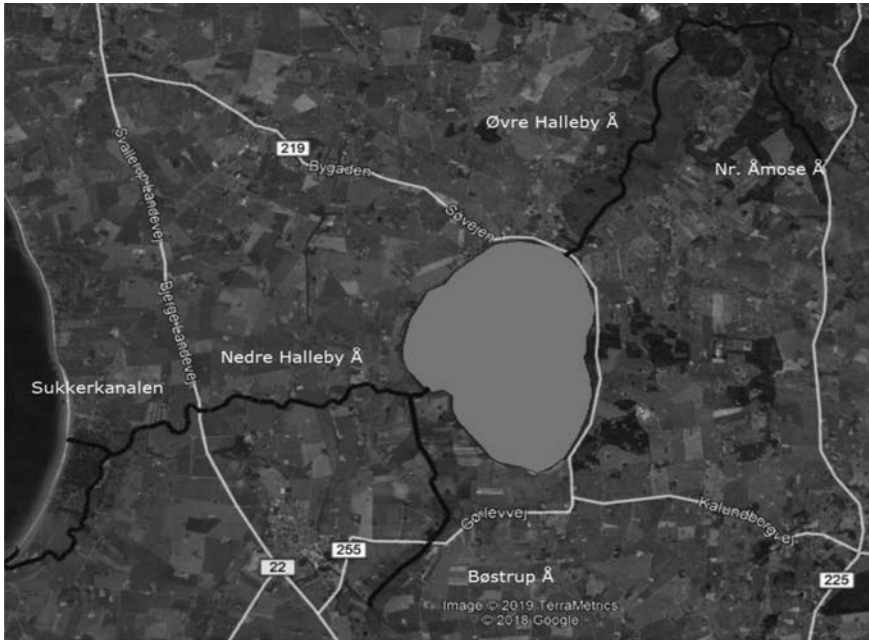
The project also addresses SDG 15 (Terrestrial ecosystems) by taking special care in adjusting the system to ensure the corresponding required conditions to enable a thriving ecosystem in the lake system. A key focus is on the indicator fish species trout. According to local investigations carried out by the local fishermen, the number of trout in the system has been falling drastically during the last decade. Additionally, there is a focus on vegetation, where a local botanic organisation has mapped the number of different species of plants for the area to more than 600 different species. One success criterion for the project is to establish a continued collaboration with local nature organisations to enable continued improvement after the project of establishing a new weir system.

In the centre of the IWRM project we established the 'Lake Tisso Forum' consisting of representatives from the NGOs, the industry, representatives of agriculture, landowners, summer residents, the river guilds, leisure organizations, the symbiosis centre, the utility and the municipality.

The forum process was planned with four workshops over half a year but eventually ended up including five workshops before a final agreement was reached. As in the case of the Tisso II advisory board process, there was again this from-workshop-to-workshop planning method. The results from the workshops were in a kind of dialogue with the modelling work, where every workshop was in some way a response to the result of the former workshop and each new modelling result was a response to questions posed at the previous workshop.

The establishment of a hydraulic model for the whole hydrological system, see [Figure 10](#), was a central learning tool for both the project team and the forum. Besides the lake itself, it included the upstream river (Upper Halleby River) and the downstream river leading to the sea (Lower Halleby river) as well as a major side stream joining the Lower Halleby River (Boestrup River). The surface of Tisso lake is 12.3 km<sup>2</sup> and up to 14 m deep. It consists of freshwater and is located in a Natura 2000 area within the area of Kalundborg Municipality. Input to the simulation model include historical rainfall, water heights, water flow in Lower Halleby River, cross-section measurements of the river profile, water levels in the Great Belt, the sea where the river has its outlet through a delta called 'the Bottle' as well as through an artificial canal called 'the Sugar Canal' originally serving as an outlet for an inland sugar factory, that does not operate anymore.

The model served three different purposes: (1) as a basis to understand the system dynamics; (2) a system to compare different situations; (3) a system to develop and



**Figure 10** The hydrological system of Tisso. (Source: Google maps)

compare newly developed control schemes like a benchmark system; and (4) a system for understanding extreme events due to climate change. But first and foremost it worked as a ‘myth buster’. We, as humans with our human brains, do have an extremely poor ability to understand dynamic water systems in our minds. Hence, if we are not supported by models our conclusions are often plain wrong. This was very clear at the beginning of the project. We were all trying to comprehend and imagine how the dynamics work. A model is essential to gather people around a shared science-based understanding (almost like a microcosm mirror of the discussion of atmospheric CO<sub>2</sub> and climate change).

On a superficial level, this may appear to be ‘an easy project’, where one just has a dialogue with the stakeholders, provides simulation results, and develops a new method together whereupon everybody leaves the work happily. Not so easy, though. An obstacle at times seemed to be the mere fact that many thought this was easy. But environmental decisions are often only ‘easy’ when looking on the surface.

The challenges included bringing the very different stakeholders with their generally low level of understanding for water systems and hydraulic modelling as well as differing worldviews and interests along the whole process. Because of the initial widespread dissatisfaction among stakeholders, the process started in a

state of negative trust capital. Hence, a first and continuous priority was building trust capital. Additionally, the hydraulic model understanding and mutual understanding of the many different stakeholder needs had to be increased dramatically both within the project group and among everybody in the forum. Remember, it is a painful process admitting ‘not knowing’.

In parallel to running the forum process, the project group had to understand the hydraulic system themselves. They had to understand the system to the extent that they could continuously present preliminary results to the forum. The group needed to understand the controllability of the weir, the annual and seasonal variations in rainfall and evaporation; they had to understand how the operation affected the ecosystem and a number of other issues about the full system.

Hence the process was demanding from a technical-scientific point of view, from a facilitation and diplomacy point of view as well as from a pedagogical point of view.

## Workshop 1

Start-up of the forum. Throughout the forum a local politician acted as the moderator of the meetings. This was beneficial for a number of reasons. One crucial point was that the political system thereby gained an in-depth understanding of the results from the process so that they could later treat the recommendations politically in a competent manner. Another important point was that it provided the project team with a frame to step into, rather than also having to ‘hold the space’ of the process in the meetings. Additionally, the politician chose to comment on the project result stating his view, which supported the forum in its alignment process. This latter effect was really contingent upon the politicians’ good abilities to make this come about. A different ‘personality profile’ may have had the unfortunate effect of doing the opposite ...

The first workshop included an introduction to and a discussion of the purpose of the process. This allowed everybody, project group, politician and every stakeholder, to articulate their own hopes and understand the hopes of everybody else. All stakeholders had 2–5 minutes to present their ‘case’, their reason to be in the process and what kind of problem they hoped to have solved. The session was intense and interesting, and it underlined the diversity of interests, worldviews and personalities in the group of the 20 stakeholders.

Each stakeholders key-points were condensed into one or two sentences that were mirrored back in the referendum from the day. This was a mutually benefitting way to do it. The project group could make sure that they had understood the core of the messages. And, the stakeholders were assured that they had been heard and understood and that their interests were now being adequately considered. This was an initial action that started the process of establishing a secure base for all involved while increasing trust capital. Thereby, the feeling in the forum transformed from scepticism and suspicion that this was

a 'pretend democracy process' to an increased sense of trust and engagement in finding mutual solutions.

This trust-building progressed differently in each individual. At some point in the process, the most sceptical participant challenged the group to come and see reality together with him. He did not feel that he was being understood deeply enough. So we did. It all contributed to the forum moving along despite conflicting interests and different worldviews.

## Workshop 2

Everybody involved in the process had differing understandings of the system dynamics and the implications of the natural part of the system, i.e. the effects of weather and physical dimensions of the system. Those who understood it in one way could not convince those who understood it in a different way. Did the problem relate to the lake? Or the upstream or downstream rivers? And where and when exactly was the conflict? And what in that conflict could be affected by the weir? And what were the consequences of changing weather conditions from year to year?

A brainstorming workshop where the stakeholders were mixed in groups of different and opposing interest was initiated. The purpose was for each group to identify and clarify the potential and real conflicts in each of the three parts of the system: Lake Tisso, and the Upper and the Lower Halleby River. This had to be considered during three different conditions: (1) high water level conditions (flooding); (2) standard conditions; and (3) drought or low water level conditions. Based on the groups' collective insight they were to come up with collectively developed solutions and ideas for solving or alleviating the conflicts.

The effect was that a lot of ideas and interests were unearthed from the silent tacit knowledge in each stakeholder. Additionally, the groups had a lot of fun with each other and the process included both laughter and eureka moments. This helped further loosening the tension and building up trust. Hence, the groups' presentation rounds were carried out with good humour and feel-good emotions in the groups as well as a play-pretend competition between groups about whose ideas were the best. Therefore, everybody left the workshop happy, hopeful and full of inspiration and new ideas.

However, the sheer number of ideas posed an unforeseen dilemma in the workgroup. The group had nowhere near sufficient resources to analyse all of the ideas. Some of the ideas were so far removed from the focus of controlling the weir that they were entirely out of scope for the project. This was, of course, a positive dilemma, but nevertheless a dilemma. In such a case ensuring that the process does not become a 'fake democratic process' was not so easy suddenly.

Finally, what we did was to prepare an idea catalogue and parked this in a 'track 2' of the process. The local politicians would then later have to prioritise these ideas after the weir control project was finalised. We made sure the ideas were described



well enough to be recognisable for all involved. Some ideas were the combination of input from more groups, so the outcome did not end as one group or another 'winning'. Rather, in the end, there were 10 integration-ideas to work on later. This approach was easily accepted by the forum.

### Workshop 3

At this point in the process the modellers had finalised the setting up of the model for the hydrological system. The model, therefore, was presented for the forum. The stakeholders hardly had any experience with hydrological models – or models at all. So the presentation was to provide this understanding to the extent that the model could be useful for everybody. This invariably included understanding model assumptions, model calibration and model uncertainty. The main aim was to communicate how and to which extent one could trust the model. To explain that even if the model had some deviations from measurements, it would be possible to compare different strategies to understand overall patterns and success parameters. This was difficult material for everybody and spurred minor controversies between some stakeholders and the modellers. However, the presenter had a high level of authenticity, in-depth knowledge and pedagogical skills and some members of the forum understood the work and could hence help some of the other members to get the main points. Hence, generally, in the end, most members went home from the workshop with at least some modelling understanding.

Additionally, the forum was shown the Tisso II plant to get a more tangible understanding of the scale of what we were working with. The plant is quite impressive to see with all the pipework, the reactors, sensors, controls etc. So this also had an effect of improving trust in the capabilities of the utility and an understanding of the 'professionalism' and the 'industrialism' that was also part of the story about the lake. With its modern design, the plant radiated a different more impressive image than the more old-fashioned worn-down wood and concrete weir system at the outlet of the lake could.

### Workshop 4

This fourth workshop was held in buildings near the weir system. Hence a 500 m walk was arranged for all members to come down to the lake and see the machinery and enjoy the view over the impressive lake. The workshop was held in a nice museum focused on the area around Tisso, including material from the Viking age. This made a comfortable setting for the workshop. In general, each workshop was held in different places in the municipality to show the members different things and provide various kinds of ambience in the workshops.

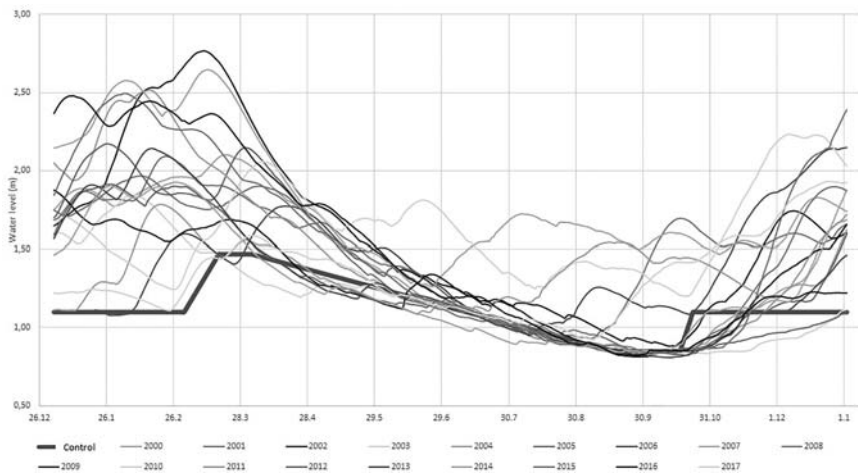
In this workshop, the initial control experiments were presented and discussed. Improvements were suggested, and dissatisfaction was vented. In spite of the efforts in the last workshop to provide trust in the model, some of the stakeholders distrusted the model. This was partly because the model produced

insights that went contrary to the stakeholder's internal understanding. Different viewpoints were vented, and disagreements resurfaced. The moderator did an excellent job to keep the situation under control in a good sense. The difficult issues were about understanding the result, about changing internal stories and about the discrepancy between model and reality. To be able to continue in an ordered way, the workgroup suggested carrying out individual dialogues with smaller groups of stakeholders in order to discuss the model in detail and to deepen the understanding of the stakeholder needs. This was acceptable to all participants, and a series of dialogues followed the workshop.

Different illustrative figures were developed to convey the results effectively. A rich and practical illustration showed each year superimposed on each other, see Figure 11.

The picture made it clear for everybody how varied the years are due to varying weather conditions, and how far and how often the states of flow and water level deviate from the current steering curve. The stakeholders representing fishing brought an external expert from a university. We learned a great deal from this expert about how we could improve the system to ensure better conditions for ecological health in the system. The agricultural representatives gave us a lesson in agriculture and how diverse the needs are between the different farmers – this led us to understand how difficult the job as stakeholder representative was. We learned something new from each meeting and the questions and doubts of each stakeholder were treated seriously and the insights were integrated into the solution to as much extent as possible.

Following these one-on-one dialogues and the input we gained, the workgroup put everything together into a new integrated control scheme. This again was a



**Figure 11** Simulations of all years superimposed on one year. (Source: Kalundborg Utility)

complex process of different dimensions. It was challenging to find something that would work by performing well and at the same time, clearly signalled how each stakeholder had been included and their needs integrated – while at the same time not changing things too much. However, at some point, the core principles were clear, and the group reached the point where the new control scheme made reasonable sense from all perspectives at once.

## Workshop 5

Basically what the workgroup, the forum, the politicians and the steering group had learned during the process was the following four key learning points:

- (1) The weir has little controllability regarding high water levels (flooding) – the low slope towards the sea is the main factor controlling the situation when a lot of water has to go through the river system.
- (2) The water flow in the downstream river is the most critical element determining the thriving of the eco-system, especially trout. Sufficient flows at the right time are essential for the trout's ability to navigate the river and for adequate amounts of oxygen in the water. If the rivers cannot meet these conditions in most years, trout cannot thrive in the system and will eventually disappear.
- (3) The current control regime (a steering curve) signals expectations that cannot be met. Hoping the system will follow this pre-determined water level curve has and will, if kept, continue to disappoint and frustrate everybody. Additionally, the flow in Lower Halleby River is essential and currently not controlled at all – with detrimental effects on the ecosystem. Hence, we must change our perception and expectation of the control scheme.
- (4) The primary function of the weir is to ensure a proper withholding of water from spring to late summer to provide both a sufficient water level to supply Lower Halleby River to ensure the health of the ecosystem and to supply water to the industries. Both needs can be met simultaneously in non-extreme years.

These four learning points were not apparent from the beginning and each had in its own way and degree been subject to controversy. Now, these were settled and all agreed on these conclusions.

The new control scheme was developed based on these key insights to ensure a transparent and just compromise between all stakeholders. The new scheme enabled a significant improvement of the conditions for the ecosystem, while only reducing supply robustness and agricultural interests slightly. The results can be seen in [Figure 12](#). As can be seen, the effects were benchmarked against simulations of the current 'steering curve'-based situation and a 'natural system' without a weir installed.

Scenario			Supply	Landowners		Ecosystem		
Climate	Control	Abstraction	Supply not met	Max. Height surpassed	Average water level april-september [meter]	Qmin < 0.5 m <sup>3</sup> /s All year	Qmin < 0.7 m <sup>3</sup> /s Sep-Jan	Qmin < 1.5 m <sup>3</sup> /s Sep-Jan
Existing	Current	3,5	0%	43%	1,28	11%	17%	35%
Existing	W/o weirs	3,5	12%	41%	1,22	1%	18%	48%
Existing	New	3,5	0%	46%	1,40	0%	0%	17%
Existing	New	5,0	1%	45%	1,39	0%	1%	17%
Existing	New	7,0	2%	43%	1,37	0%	2%	18%
Climate 2050	New	3,5	0%	45%	1,41	0%	0%	18%
Climate 2050	New	5,0	2%	44%	1,40	0%	1%	18%
Climate 2050	New	7,0	3%	44%	1,38	0%	3%	19%

**Figure 12** Performance in various control scenarios. The performance indicators in rows ‘Supply’, ‘Landowners’ and ‘Ecosystem’ in percentages describe the time where criteria are not met. The average water level is interesting for the landowners as it determines which part of the land can be accessed by machinery during sowing and harvesting. (Source: Kalundborg Utility)

The results show that the robustness of supply is unchanged, while the conditions for the ecosystem is improved tremendously – actually improved beyond the ‘natural system’ without a weir. The situation for the landowners is slightly worsened. An alternative control scheme was tested to improve this latter effect. That reduced this disadvantage considerably, though it was not possible to eliminate it completely.

The control scheme and its effects were presented to the forum. Two alternative control schemes were present and one was recommended and accepted by all in the forum. There was an almost audible relief in the forum about the solution, many saluted the result, and there was no critique except a few suggestions for detailed adjustments to the presentation.

Additionally, the effects of forecasted climate change were analysed. This had some implications for the industrial users, as the resilience tests of the system in regard to droughts showed potential problems with supply during late summer. This topic would have to be dealt with in a different project (see next case).

## What was upgraded?

This was regarded as a rewarding process as well as a satisfying outcome by all participants, which was a positive surprise when considering the starting point. In the worst case the result could have been a deepening of conflicts. A key insight was that the idea of secure base leadership works and it was fortunate that the project group was able to ‘generate’ enough trust to overcome the conflicts. At the same time, it is also apparent that it is a resource-demanding task to work this way with a large group of stakeholders. However, if – as in this case – the process eventually succeeds in creating peace and agreement, the municipality and utility will save many resources later due to the discontinuation of the more

than 10-year-old conflicts. In the end, it may have been the least resource consuming way of doing it.

The demands on the skill set required to make such a process work is quite high. Especially, the three competencies of modelling and control, mediation/facilitation/forum leadership and political-diplomatic skills were all crucial for the success of the process. Had any of these lacked in the project or failed for some reason, the process would have been significantly less successful.

There is also an insight that a few setbacks in terms of increasing conflict level in the process can actually be a good thing. It focuses attention and helps everybody gain a deeper understanding of differing points of view; points of view that could otherwise have been unintentionally neglected or felt neglected by individual stakeholders. The conflicts and the way they were handled drew people together rather than apart.

This was a resource-intensive process for the workgroup – and hence costly for the municipality and utility. It is an eye-opener to understand what level of effort is required to carry out IWRM successfully. It really stresses the size of the challenge we have in front of us to transit to water stewards able to handle IWRM. The transformation to a sustainable agenda is a huge task. This cannot be done with a casual attitude; it requires attention, competence and respectful dialogue. But I believe if it can work out in this small-scale, it can also be done on a larger scale. But we really need to practice.

The use of models for this kind of problems is crucial. It is a pre-requisite for having a real and lasting effect. Even with a model, it is difficult to comprehend all the connections and patterns. Without it, the discussion is prone to myths and misinterpretations. Perhaps it would have been possible to reach an agreement without models, but that would entail a great risk, that the agreement was not built on the right system dynamics. The agreement would as Oren Lyons call it is not according to ‘natural law’ – which would become apparent five or 10 years down the road with recurring conflicts and without the hoped-for improvements for the ecological system. Hence, models are a vital tool for water stewards in many projects.

**Your reflections:** How well can you handle situations where you as the expert need to collaborate on an equal level with non-experts? Can you remain honest and humble? Can you navigate inspiring trust and confidence while at the same time be full of doubt and deliberations? Can you remain calm and friendly when your results are attacked? Can you articulate the needs of all your stakeholders – do you understand why they find these needs important? Can you find solutions that satisfy all needs? When you need to disappoint some stakeholders are you able to do that respectfully? What is your experience in building trust capital? Are you conscious of your methods?

## **A MAJOR RENEWAL OF THE WATER PRODUCTION INFRASTRUCTURE**

The infrastructure of water production utilities is often constant for decades before an opportunity for change arises. In Kalundborg Utility one of these opportunities has come up as the 70-year-old existing water treatment plant requires a major overhaul or, alternatively and more probable, be substituted with a new plant.

Besides its high age, the local industries predict an extension of production and hence predict an increase in water consumption in the near future. This further strengthens the incentive to renew the water production infrastructure. The renewal also provides an opportunity to establish a back-up solution for Tisso II for drought situations. Additionally, it provides a cost-effective way of fulfilling a municipal request of always having 1 Mio m<sup>3</sup>/year in reserve in case new industries were to be established in the municipality.

The challenge is made further complex due to the Industrial Symbiosis in Kalundborg. Kalundborg Symbiosis is the world's oldest and most comprehensive industrial symbiosis. It commenced in 1961 and has developed progressively step by step since then. The Industrial Symbiosis now consists of nine private and public companies exchanging water, energy and materials through 22 different streams. Delegations from all over the world visit the industrial symbiosis in Kalundborg every week of the year. The central principle is that waste from one company becomes a resource at the next company.

The cooperation between the companies in the symbiosis provides mutual benefits, economical as well as environmental. The Symbiosis creates growth in the local area and supports the companies' environmental and climate change mitigation efforts. The annual gains of the Industrial Symbiosis for the partners include 24 Mio Euro indirect economic savings, 14 Mio Euro in socio-economic savings, reduction of CO<sub>2</sub> emissions by 635,000 tons per year, saving of 3.6 Mio m<sup>3</sup> water, saving of 100 GWh energy and the reduction of consumption of 87,000 tons of material. This of course morally and practically obliges the new water structure to show foresight in regards to identifying and realizing additional symbiosis and sustainability opportunities.

The default base scenario for handling this new situation is as most utilities would do: build a new water treatment plant and establish equipment to abstract the additional water resources – in this case, by establishing two additional groundwater fields.

While we are keeping momentum with the base case scenario by identifying new locations for the plant and groundwater extraction, we are at the same time searching for innovative alternative concepts. In the age of sustainability, SDGs, circular economy, new water treatment technologies, industry 4.0 and in the city of the world's oldest and largest industrial symbiosis, it is imperative to succeed in changing the water supply system markedly.

Hence, an innovative parallel track of the project is established. This track is a collaborative process to explore alternatives. The design of the innovative co-creative process builds upon the experience from the above-mentioned projects. As input to this process we used the idea of ‘upgrading’; by asking: ‘how can we further upgrade the innovation process to ensure that the group of people come up with a solution that is closer to a sustainable ideal, while at the same respecting what came before and provide solutions that are acceptable to all direct stakeholders?’

In the former case stories I have described how the projects ‘upgraded’ our competence, methods and mindsets as we went along. What we want to do in this project is to plan a series of project upgrades each born out of ‘a frustration’ with something that did not work or just did not work out right in earlier projects/experiments. The upgrades do not necessarily build on ‘complete failures’, but may also address a potential that did not bear sufficient fruit, a way of thinking that was not explored enough or something that was not fully comprehended or included. Working with frustrations and upgrades is a way forward, where we attempt to bridge the gap between what we are and what we want to become serious – and then try to do something practical about it.

At the stage of writing this, we are still in the start phase of the project. So what follows is a description of a number of ‘upgrades’ we plan to work into the project.

## **Upgrade 1: Consciously attempt to express an ambition level for the result**

### *Frustration*

When working in a project group that works with stakeholders there are almost always one, or a few, who change each subject into a discussion about money too soon. This often means a derailment of the discussion. People who were supposed to imagine solutions start ‘throwing things off the ship’ too early with the argument that they are not absolutely crucial for the project and will entail additional cost. This causes a non-constructive discussion and means need to be taken to divert the discussion of cost until a later stage.

### *Upgrade attempt*

For the project, a manifest of ambition has been developed collaboratively between the director and project manager. The manifest includes 15 challenges to the project; some examples are:

- (1) The aim is to create a ‘next generation’ solution for the water infrastructure, corresponding to keywords like holistic, new process technology, water stewardship, symbiosis and industry 4.0;
- (2) Production price should be no higher than today (as a 10-year mean);

- (3) Quality of machinery and buildings should be optimised according to the principle of ‘total cost of ownership’.
- (4) The work environment on the plant should correspond to the principles of Vision Zero (a national initiative towards the design of workplaces with the aim of having no work accidents).

It can be very helpful to clarify and define ambitions for a project as illustrated above because such statements help the group manage expectations and reconcile conflicts over values. There may still be disagreement on the interpretation of the challenges, but there is a framework for this discussion which will hopefully prevent the discussion from becoming arbitrary. Then comes the discussion of cost and optimisation.

## Upgrade 2: Voicing expectations for the project execution

### *Frustration*

Sometimes a project group gives up too early on ‘hard problems’, they tend to ‘demand a decision’ from outside, e.g. from top management. Often top management don’t know the answer either and instead, they want the group to help guide them towards a proper solution. Since many of these challenges are ‘wicked problems’ it is even more crucial that the working group can cover many aspects of the problems and possible solutions, and surely this includes much more than technology. It includes people, competences, organization, public relations etc.

### *Upgrade attempt*

Hard questions are questions that are important issues where no answer is available from the start. Instead, top management and project management collaboratively establish ground rules for how to approach a solution in dialogue. Hence a series of CEO challenges to the project team has been declared, some examples are:

- (1) **Project economy:** establish continuous economic overview and transparency. When the economy is only vaguely defined, try to work with intervals of cost for the key factors. Then the cost estimates will become less uncertain as the project progresses.
- (2) **Social sustainability:** Work with at least one element of social responsibility.
- (3) **Water quality requirements:** The project should facilitate the decision on water quality requirements in regards to, for example, water softening and the treatment for pesticides between stakeholders.

This is both challenging and helpful. For example, in the first declaration about project economy, it would have been more convenient for the project group had



it just been provided with a max sum. But obviously, a max sum in this case depends on many unclarified issues, which makes it impossible to provide at this stage. So instead the call is for transparency and overview of and quantification of uncertainty. Based on such an analysis it is possible to have a constructive debate. In declaration 2 for example, it is clear that there is a requirement for an element of social responsibility in the project, but the way this is to be solved is not imposed on the group. The project group is in better shape to find a meaningful way to integrate the element in the project as the project develops. In declaration 3, again, the solution has to be negotiated with the stakeholders taking both requirements, wishes and cost into consideration. The CEO does not know what the customers and other stakeholders are willing to pay for different options at this point. The project must establish a process to find that out.

### **Upgrade 3: Setting goals for sustainability**

#### *Frustration*

Traditionally, the main balance in water projects is between quality/quantity and project costs. Sustainability often comes into the discussion as a ‘side remark’ or as something taken care of by legislation requirements from the local authorities’ terms of permits. This, as we have seen, is a too shallow approach for substantial, sustainable change to happen.

#### *Upgrade attempt*

In the framing phase of the project model, goals have been set for sustainability. The goals are more aspirational than numerical at this point due to lack of knowledge, so eventually they need to be translated into ‘smart’ goals as the project progresses. The defined sustainability goals or aspirations are defined mostly in terms of applicable frameworks of working with sustainability:

- (1) All-new infrastructure elements have to be prepared for water stewardship certification according to the standard defined by the Alliance for Water Stewardship. Whether it is going to go through the certification process is ‘to be decided’ [AWS \(2019a, b\)](#).
- (2) Calculate and minimise the water and CO<sub>2</sub> footprint ([Water Foot Print, 2019](#)).
- (3) The building should live up to the DGNB standard for sustainable constructions. If it is to be certified is ‘to be decided’ (DGNB is the German Sustainable Building Council’s standard for sustainable buildings. Denmark has to a large extent decided to use that as the primary standard as well ([DGNB, 2019](#))).
- (4) The infrastructure should aim at being effectively climate-neutral no later than 2050 as per the national aims for carbon neutrality; emission should

be reduced by 70% before 2030 (Climate Home News, 2019). As the duration of the project is shorter than this horizon, the project must instead find a technical solution that can be adapted in the future to meet the goal.

- (5) Innovation initiatives should include at least one new element of symbiosis and circular economy.

Certification systems are practical tools to effectively get around the critical issues of sustainability. The systematic analysis and goal setting in these certification standards increases factual understanding of the sustainability challenge, differentiates and raises the bar for the defined goals and ensures a higher level of commitment organisationally and individually.

However, there is always the bureaucratic challenge of keeping the certification documentation up to date. Certification and engaging with bureaus of certification causes a workload that to many too often seems excessively administrative and hence diverts attention from more pressing issues. Kalundborg Utility is already certified according to ISO 9000 (quality), ISO 14000 (environment), ISO 22000 (HACCP) and ISO 45000 (Health and safety). There is a limited capacity as to how many certifications can be maintained at a reasonable quality and understanding.

I find the question of certifications – as suggested above – difficult. The rigour of such an investigation and the commitment to ‘answer all questions’ has a positive self-disciplining effect and ensures alignment in the project team or the organisation – ensuring a mutual understanding. But the administration and the paperwork are burdensome.

## **Upgrade 4: Using silent breaks for focus and attention**

### *Frustration*

On a micro level there is often a lack of attention in meetings. While this is annoying on a day-to-day scale, it may also have long-term effects. The lack of concentrated focus and attention was a key challenge in the Tisso II project. Focus and attention are important just to get the job done. It is even more so if we want to succeed in doing something complicated, integrative and extra-ordinary. There has to be a sensibility and awareness that is not there by default. People often have too many tasks and projects on their minds and at their hands.

### *Upgrade attempt*

In the group, the idea of using 2 minutes of silence before commencing a meeting was discussed. I expected the people in the project group would find it too weird, so it was suggested as an experiment. Everybody in the project, regardless of background, found it to be an interesting and worthwhile experiment.

The experiment was straightforward and without a long list of requirements. The only instruction was to sit quietly for 2 minutes after the agenda had been presented, not talking, not reading, just silence.

The first few times we did this together the effect was quite notable. There was no doubt that it caused a grounding in everybody. It also allowed everybody to clear their minds and adjust to being in the project set in contrast to wherever they just came from. It also gave a kind of a friendly and intimate mood in the group in a good way. This has been so successful that it is now also used when the project team conducts external meetings. It has become a kind of ‘identity marker’ for the project and the project team.

## **Upgrade 5: Replacing one expert panel with multiple panels**

### *Frustration*

In the advisory board process of Tisso II the three professors took the role as ‘experts’, and the rest of us took the role as ‘listeners to experts’. But what became apparent in the example when the operator presented was that he was an expert as well in his domain. None of us had decades of observing and maintaining a waterworks plant. Most of us hardly had a few hours of experience. So why should he not be recognised and paid the same respect as an expert?

### *Upgrade attempt*

In the new advisory board process we design the process so that everybody becomes part of each of their advisory board group. This means that meetings consist of several three-person sized advisory board groups – all sitting in a circle:

- A customer advisory board group: includes both private and industrial customers. They are knowledgeable in what the customer requires and hopes for, understanding at least to some extent, the trade-offs between requirements and the total customer cost per m<sup>3</sup>.
- A professor advisory board with three professors knowledgeable in geology, industry 4.0 and circular economy.
- A utility advisory board group with colleagues from other utilities with supplementary knowledge in the field as well as their specific culture of how to do things. Some of the people on the board will also bring recent experience from similar projects.
- An advisory board group with young professionals. They are professionals in the water area or adjacent fields. Their job is to represent their respective fields of expertise as well as to some extent be the voice of the next generation – our collective conscience.

- An advisory board group with operators with internal experience and opinions about the operation of our waterworks. Those are the ones that will operate the system in the future.
- An advisory board group of designers and engineers on the project.
- A steering group advisory board group consisting of the steering group.
- An economy advisory board group consisting of controllers and designers of the economic models for the system.

Having these respective advisory board groups ensures that each viewpoint is represented by a few people who can strengthen and align their input to contribute to the process. It also pays respect to those who would usually not be on an advisory board. And perhaps just as importantly, this construction relieves the pressure for those who would generally be the advisory board, i.e. the professors. They no longer need to 'know it all', but can more freely ask questions and come up with daring new ideas. Most importantly, the hope is that the ensuing dialogue between boards and individuals will bring something new to the table.

## **Upgrade 6: Defining an emotional field to enter the project from**

### *Frustration*

This is a difficult one. The frustration is that most people enter the process with the fundamental goal to take care of their individual needs, wishes and problems as they perceive them – which is fine. However, the problem is that no one person really truly takes the perspective of nature's concern. In the project about Lake Tisso, it ended up being the sport-fishing organisation who were the most outspoken advocates for nature – for their purpose of catching fish. Their concern spurred a solution that resulted in a significant upgrade for the environmental quality of the water system. But what if they had not been there? What if the representative had had other priorities? How can we assure that everybody balances their own needs with the need of nature?

### *Upgrade attempt*

In the Tisso II project 'Respect for water' became a vital headline and it had some good effect, but more could come of this. In this project the headline will be further extended and will be used more extensively throughout the project.

The new 'directives' are:

- (1) Respect for water
- (2) Gratitude towards water
- (3) Humility in the relationship to water

We will attempt to instil this notion as an 'entering' appreciative stance in those working in the advisory boards. The hope is that it will help everybody to focus

on water as the substance all lives depend on and defocus a bit on their own needs and the traditional ‘resource-thinking’. At the end of each session, we will try to track back how this affected our dialogue.

## **Upgrade 7: A different inclusion of operations**

### *Frustration*

Operators play a key role in the project as they will be the ones to operate the resulting plant, but even their importance increases if we want the system to be run according to higher-level aspirations. In the utility we have been struggling to bring all operators on board in previous innovation projects. This is partly due to the mismatch between the competencies of people executing projects and the competencies of people responsible for operations. One difference is that one group have a mindset of what we can create that will be finished years from now, the other group is more used to giving primary attention to the problem of today.

### *Upgrade attempt*

Half the project group is coming from the operational department, so they have a substantial say in the project. Additionally, the chief of operations is included in the steering group. But what has become a central tool for inclusion is an operator’s design manual. The project team has jointly developed the catchphrase: ‘If things are not written down, they do not exist in this project’ to help focus on documentation. This puts pressure on an important pain point for the operators, whose daily work is not focused on a lot of writing. They have a lot of tacit and silent knowledge that often does not arise until the plant is finished and they wanted valves to be placed differently or machinery to be operable from the floor etc. By visiting a large number of plants and noting likes and dislikes we have jointly written an operator’s design manual, which currently consists of close to 200 observations of likes and dislikes. They came about based on photos we took at different plants. These observations will be reasonably easy to include in the future tender material and hence ensuring the preferences and ideas of the operators to be included. We hope this leads to a considerable improvement in operator satisfaction.

## **Upgrade 8: Opening up to adjacent fields of knowledge**

### *Frustration*

How do we think differently when we are always the same people or people from the same tightly knit society?

### *Upgrade attempt*

By inviting people with different skills into the advisory board process a small change is achieved. However, when this is a minority, they often end up

accommodating to the mindset of the rest of the group. So, in order to strengthen that, they are supplemented with presentations from external matter experts. For example, the first expert visiting the advisory boards meeting will present an overview of the field of biomimicry as it relates to water. Biomimicry is an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies. The presentation will be the centre of discussion among the advisory boards. In this sense, a small seed of something differently minded is infused into the process.

## **Upgrade 9: Consciously building up social capital**

### *Frustration*

Why do these large projects often end up being more conflict-ridden than happy achievements of great constructions?

### *Upgrade attempt*

In the Tisso II project we experimented with some radical methods to reduce conflict pressure on the project. It is difficult to evaluate if the project had been more conflict-ridden without these measures. Regardless, the conflict in the project was not very enjoyable. The pressure increased and decreased in strength, but there were only a few peaceful harmonious months in the five-year-long period.

A key hypothesis in this upgrade attempt is that social capital in the project makes the project more resilient to conflict. There are a number of reasons why this may be. First of all, it is more difficult to be unreasonably angry with people with whom you have a strong relationship. Second, more time spent together socialising may make it easier to pick up the phone and ask questions or raise concerns before issues become full-blown conflicts or failures that everybody wants to avoid taking responsibility for.

Hence it has been decided to engage in team-building activities. However, the group has opted out of traditional team building activities and have instead chosen to meet at each other's home every 2–3 months, where the host prepares food for the group.

## **Upgrade 10: Creating maps of the holistic level**

### *Frustration*

Most people have a lot of opinions about the small stuff but tend to shy away from the top-level decisions of the project, where much more is at stake. Hence, holistic full-picture challenges are often left orphaned. While these are the most important questions, they are often also the most complex. How do we ensure that the

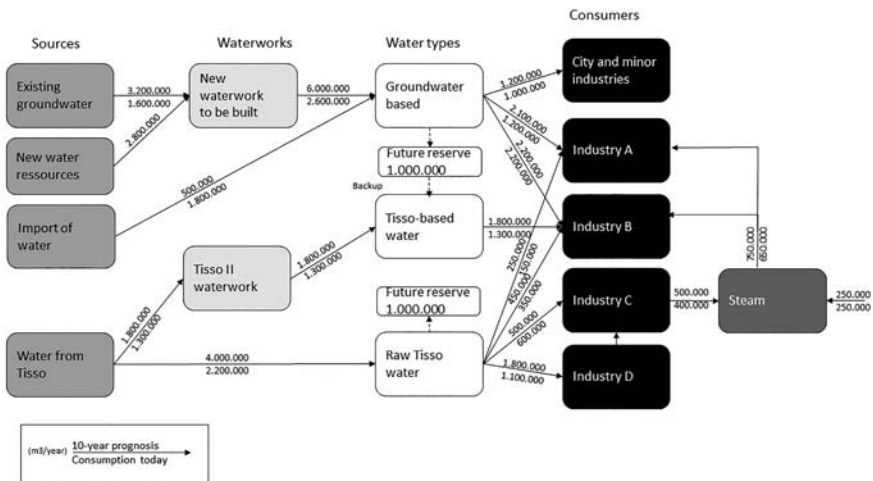
advisory boards and the project group spend time understanding and coming to conclusions on these issues in a meaningful manner?

### Upgrade attempt

A significant difficulty is that the holistic level often remains abstract and invisible. So, in the upgrade attempt, we try to draw maps that explain how things are connected, thereby also helping everybody to gain a sense of proportions on the top level.

One example is drawing a map of the water distribution system with the current water flows and the flows as they are expected to change in the future horizon of 10 years see Figure 13. Such a map is useful for identifying options for a circular economy, for focusing on the right water streams and for determining capacities of the new system. For example, one water stream of an industrial facility may be easy to recycle, however, if it shows up on the map that its consumption is less than 2% of the sum total, it is not really helpful. So though it may be worth pursuing at some point, it is not a game-changer when speaking of different infrastructure concepts.

Another example of a ‘map’ shows the development in consumption over the last 20 years, together with a prediction for the coming 10 years (not shown). This plot gives an understanding of the uncertainty of the predictions and at the same time makes it obvious that building a system where the capacity can both be increased and decreased would be extremely favourable.



**Figure 13** Map of water streams. The numbers are confidential and hence fictional numbers are used here. (Source: Kalundborg Utility)

The project is still in its early phase and time will show which effect these upgrades will have, but just starting to map the high-level issues ensures focus and gives a sense that this will enhance learning.

**Your reflections:** What frustrations have you experienced? Where have you been stuck? What actions could decrease the risk of that happening again? In what way does your work have long-term influence? How do you want that influence to play out? Who can help? How can you help others?

## REFLECTIONS

The inner sensing, studying and contemplation about water and water stewardship is in a continuous dialogue with what happens in ‘life on the outside’. The projects in Kalundborg Utility spans six years and has been a ‘field of experimentation’ and expression of the new ideas. At the same time events, results and failures here have infused the contemplation process with fuel for new emotions and thoughts. Though it is difficult to reproduce the dialogue in writing, it is distinctly clear that such a conversation has taken place and continues to take place.

A personal theme during these years has been the inner work of building a stronger connection to the heart. This gave rise to trackable changes in discussions, in analysis and in decisions. When having a connection to the heart (as in practically having a conscious awareness of one’s own physical heart), something physiologically happens that affects the brain processes. Things seem to slow down and give rise to a different kind of attention. In discussions of conflicting viewpoints, for example, it becomes profoundly clear that despite differences of opinions, our relationship is also important. It becomes possible to hold both – the regard for the feelings of the person and the concern for the overall health of the full system. When the emphasis on relationship is increased, something softens in both parties and common ground is easier found. In the best case, the differences in viewpoints become a strength instead of a conflict. On the other hand, this does not mean to avoid ‘confrontation’ in important topics with, for example, angry people or people of power. It is all about finding a balance with a grounded sense of integrity.

The heart is also helpful in ensuring self-care and self-protection. One need to consider one’s own strength, capacity and balance together with the needs of the more extensive system one is embedded in – here the utility. Brené Brown formulated this balance quite well in ‘we can’t sacrifice the micro for the macro, or the macro for the micro’ in the sense that we can’t sacrifice our personal sense of harmony and equilibrium for the system’s harmony and equilibrium, i.e. my own thriving and sense of balance for the results in projects. But the opposite is



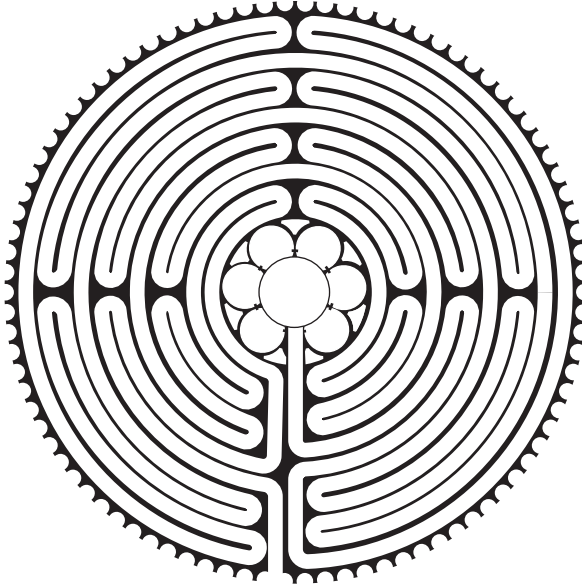
also true, i.e. I will not and should not stay in my comfort zone at all times. To find a proper method and rhythm for walking in and out of balance in a productive way has proven difficult. As I became more sensitive, I could observe how I repeatedly fell 'out of balance' in different ways during the projects and experiments. This process of losing and regaining balance seems today as a kind of underlying soundtrack to the conversational process.

Looking at this occasional painful process as a capacity or capability building process is helpful. Looking at it this way it is clear that integration in, for example, Integrated Water Resource Management, is not a one-off event. Instead it is a continuous integration process, where various aspects of the utility water cycle become increasingly integrated with its surrounding in the form of cities, industries and nature. And even that is too general; it is a process of steps of integrating with this or that part of nature, i.e. a lake, a stream or a groundwater basin, and it is a process of integrating with this industry and then that industry; and that part of town and then that part of town. Similarly, the road to the grand aim of sustainability or to reach the sustainability development goals consists of a multitude of steps taken in all organisations as well as in individuals' lives.

If this journey towards sustainability, SDGs or integration is viewed through the lens of 'a living process' it becomes clear that the purpose is not to reach a definite goal after which we are 'home safe and can rest from there on forever'. A living process continues forever. Hopefully, the world moves back into a safe, sustainable comfort zone again, but that will obviously not be 'the end of history'. The path ahead cannot only be about moving towards sustainability, it has to have another dimension as well – an aspect of 'truth, beauty and goodness'. What is clear of course is that the journey can only continue if we get into a zone of sustainability, but it cannot continue there if it is ruled by lies, ugliness and hardness. We crave beauty, grace and the poetic.

An insight or approach to the work that has helped to make this difficult process a better experience is that though it is 'difficult and often hard', it is also an opportunity to learn. It is well known that more is learned by failure than success. Thinking of this as a learning process takes a bit of the gravity off. A different way to understand this is that when we try to follow the heart, we may easily stretch the experiments so far that failure will arise at some point – only then have we stretched the ambition far enough. This provides a sense of forgiveness for the failures and avoids that we afterwards feel remorse that the bar should have been raised more. Hence perhaps we should stretch our goals so that we make small failures on a regular basis – not big failures and not no failures.

Working towards an ideal of more heart for water, i.e. better and more integrated management of utility use of water, more respect and care for water and nature, ensuring all relevant stakeholders needs through mediation, application of innovative technologies and better methods and codes of collaboration, has



**Figure 14** The Labyrinth of Chartres Cathedral. The process of moving towards sustainability and water stewardship is neither linear nor chaotic; but it is complex like the path through the labyrinth.

been and is an exciting process – it is a good and meaningful life. When going through the above examples, I can see how the process has overall moved towards this aim and how we have succeeded better and better. It is also clear that what we learned in one project is a stepping stone and a sounding board for the next project.

Still, there is a long way to a truly integrative, respectful, effective, nature nurturing system. We are after all still working within the limits of what is possible in many dimensions – technical and social. But boundaries are moving; people seem to become more aware and more caring in these times; not only here in the utility but also around us. The development around us is helpful; it makes it easier and more acceptable to move in this direction. At the same time, the above case stories are not unaffected by the polarisation around sustainability taking place on all scales globally, nationally and locally. Finding ways to understand the underlying needs of both poles is the key to finding workable solutions.

Hence the process towards sustainability is neither linear nor chaotic, it is somewhere in between. In Chartres Cathedral, a famous labyrinth is set into the floor stones in an area covering 130 m<sup>2</sup>, enabling you to walk through it. The labyrinth is not one of those where you get lost. Instead it leads you through a

complex road that moves you in between the four main areas of the labyrinth. Though it generally moves you closer and closer to the centre, there are also times when it moves you further away. All the time moving you forth and back through overlaying stretches. I get the same sense when I try to think of the work and the journey towards water stewardship.

**Your reflections:** How would you describe the journey you are on – or the direction your work is moving? Is it visible in your work? How does it feel?