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# Collaborating for energy efficiency in Swedish shipping industry: interrelating practice and challenges

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## Abstract

As achieving environmental sustainability is a complex problem, it is often recognized that no organization can accomplish this systemic change by itself; thus, multi-actor collaboration is needed. Regarding the specific issue of increased energy efficiency, previous research has highlighted the need for collaboration and knowledge exchange among actors. However, insights from literature suggest that despite all the good intentions, establishing multi-actor collaboration can be both complicated and difficult to achieve in practice. In this paper, an in-depth qualitative, ethnographic-inspired study of an emerging collaboration aiming for increased energy efficiency within the shipping industry is used as a foundation to better understand the practices and challenges involved in the organizing of multi-actor collaboration. The findings reveal how the interrelating of collaboration practices and experienced challenges influenced the development of the collaboration. The paper contributes to the current discussion on how to organize for sustainable development. Also, practitioners managing and participating in multi-actor collaborations addressing complex societal issues can benefit from the findings.

**Keywords** Energy efficiency · Shipping industry · Multi-actor collaboration · Challenges · Practice · Qualitative research

## 1 Introduction

Achieving environmental sustainability is a global priority. But as this is a complex problem, many organizations and policy-makers recognize that no organization can create or implement solutions by itself—multiple competences are needed to create the desired new knowledge and implement systemic change; thus, collaboration among a variety of stakeholders in different forms is needed to achieve innovation and sustainable development (Dougherty 2017).

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This paper focus on a particular aspect of sustainability—the strive for increased energy efficiency in the shipping industry in Sweden. The potential for increased energy efficiency levels within global shipping is considered high (Bouman et al. 2017). However, in practice, this appears to be more challenging, with an *energy efficiency gap* between the rational and the real energy consumption (Johnson and Andersson 2014). In order to implement system-wide change, it is required that actors within the industry come together, share knowledge and experience, and collaborate. To tackle this issue in the Swedish shipping industry, a multi-actor collaboration called *Sweship Energy* was initiated, aiming at closing the energy efficiency gap.

Despite all the good intentions, previous research has taught us that establishing and maintaining multi-actor collaborations can be difficult in practice (Cropper et al. 2008; Ebers 1997; Huxham 1996). It is well known that collaboration around such a complex issue as the energy efficiency gap is riddled with challenges because it is not easy to get disparate actors to agree to work towards a joint goal, or, on how to do it (Huxham and Vangen 2004). This forms a difficult task for managers attempting to coordinate such initiatives. Thus, more research is needed to better understand how multi-actor collaborations in practice can work towards goals of addressing complex societal issues.

The overall aim of this paper is to gain a more profound understanding of the organizing of multi-actor collaboration aiming for energy efficiency. As achieving such high ambitions through multi-actor collaboration is undoubtedly complicated from an organizational and managerial point of view, we argue that important lessons can be learnt from looking into what is done in practice. Thus, in this study, we follow Orlikowski (2002) by adopting a practice-oriented perspective, treating the organization of the collaboration in Sweship Energy as an ongoing social accomplishment evolving over time through interaction and learning; understanding what collaboration is by exploring what is done in the collaboration and how this develops over time. With this position, we recognize the central role of people and that it is their collected actions which constitute the practices in the collaboration (Schmitz and Nadvi 1999).

The paper centres on an emerging collaboration in the shipping industry. We explore the practices that developed in the collaboration by specifically looking into some of the key activities taking place, and furthermore delve into some of the challenges experienced by the practitioners taking part. With this focus and by studying the collaboration over time, we argue that a more in-depth understanding can be gained of why certain practices developed, became prioritized, or seen as more relevant to the continuous process of defining and achieving a desired goal of making a contribution to energy efficiency. The research question guiding our paper is thus: *How do practices and experienced challenges influence the development of emerging collaboration?*

## 2 Theoretical background

*The energy efficiency gap* (see, for example, Nässén et al. 2008; Palm 2009; Ryghaug and Sørensen 2009) is a well-known phenomenon in energy management research and refers to the fact that there is a difference between rational and real energy efficiency levels. This phenomenon has been reported in the shipping industry, as well as in other sectors (Johnson and Andersson 2014). This is a severe concern, as a consequence of this gap is that cost-effective energy efficiency technologies are often not implemented (Palm and Thollander 2010). According to Johnson and Andersson (2011), for the

shipping industry, this is primarily due to market- and organization-related barriers. It can thus be argued that closing the gap is a managerial concern rather than technological problem, because innovations and knowledge to a large extent already exist but fail to be implemented for various reasons. This points to a need for more research utilizing insights from social science to understand the dynamics of how to achieve system-wide transitions to a more sustainable state (Shove 2010). Such knowledge is considered vital if we are to assume that such large-scale change processes can be managed. This can complement more technologically or economically grounded perspectives on transitions.

From an organizational point of view, it has been proposed that platforms for knowledge exchange are important in creating or identifying solutions to the energy efficiency gap (Palm and Thollander 2010). In addition, national as well as international policy-makers tend to propagate collaboration in different forms as a way to find a path forward towards a more sustainable and energy-efficient society. Previous research has shown that collaboration can be a successful means in order to increase energy efficiency performance and efforts, including increased levels of implementation of measures, and reduced transaction costs (Jochem and Gruber 2007; Wohlfarth et al. 2017). Proposed reasons for the positive outcomes include: changed attitudes and behaviours; increased access to resources and information; and eliminated risks (Paramonova et al. 2014).

However, a collaboration encompassing a variety of competences and expertise can look very promising for achieving system-wide change, but while collaboration may be necessary and has its merits, the inherent challenges of engaging in such are often underestimated in practice (Huxham and Vangen 2005). Many collaborative initiatives fail not necessarily due to structural problems, but rather essential relational aspects, such as unwillingness to compromise, political struggles and unrealistic expectations on one another (Bramwell and Lane 2000; Halme 2001), managing different institutional logics (Yström 2013), and lacking critical collaborative capabilities (Gawer and Phillips 2013; Purdy and Gray 2009). The inability to cope with the complexity and ambiguity of dealing with conflicting demands from different partners often result in a collapse of the collaboration (Blomqvist and Levy 2006; Huxham 1993; Swink 2006). It seems that the more individuals that are interacting in a collaboration, the more complex the aims and expectations become (Sivadas and Dwyer 2000). This makes clarifying terms and expectations on the participating partners and individuals a key issue for collaboration management (Håkansson and Snehota 1995). Furthermore, the collaborative work can become tedious by complicated and slow decision-making processes, and there is a risk that the realization that not all partners are working towards the same goal can make them loose faith in what they are doing (Yström et al. 2018).

It is also important to consider how prerequisites for collaborating, such as sources of funding, impact what can be achieved within the collaboration, and ultimately the chances for its long-term survival. Previous research (Jacobsson and Bergek 2011) discusses the importance of government policies in strengthening collaboration, for example by funding coordinators, intermediaries or innovation brokers engaging in coordinating initiatives aiming for increased innovation rates in the industry (Winch and Courtney 2007) or through networks that help to build trust among partners and offer space for interactive learning (Lundvall 1992) as a way to achieve sustainable transition. Still, Hanna and Walsh (2002) suggest that while there are few examples of networks with multiple partners coming together spontaneously, networks with public funding appear to be less likely to succeed, both in terms of survival and in terms of producing innovation. Hanna and Walsh (2002) furthermore show that “what you measure is what you get” (p. 206), concluding

that the source of funding or conditions attached to the funding offered (private or public) will significantly impact network activities.

While research on energy efficiency collaboration has increased over the last decade, the number of studies remains low. Much emphasis has been on a specific type of networks in Swiss and German settings; as previous research has indicated organisational differences depending on national context (Paramonova and Thollander 2016), more studies are needed to better understand the concept in other countries. Moreover, most previous studies exploring the topic have focused on meta-level analysis (Jochem and Gruber 2007; Koewener et al. 2011; Wohlfarth et al. 2017), rather than on in-depth studies investigating day-to-day practices of collaborative initiatives. Consequently, the knowledge about how such arrangements are accomplished in practice is limited (Borg 2018). Thus, further studies specifically addressing the practices involved in collaborative work related to energy efficiency issues are needed. Therefore, this study has a unique opportunity to provide detailed insights about practices and challenges emerging in such a collaboration in a Swedish context.

### 3 Methodology

#### 3.1 Research approach and case description

This paper is based on a longitudinal, in-depth, qualitative case study (Silverman 2014; Yin 2014) of an emerging multi-actor collaboration called *Sweship Energy*. This approach was considered suitable due to the exploratory nature of the research question in focus (Eisenhardt 1989) and because contextual knowledge is important when attempting to understand human activity (Flyvbjerg 2006).

The main purpose of *Sweship Energy* was to increase the energy efficiency levels within the Swedish shipping industry. Since the discussions about establishing a collaboration intensified in 2012, the initiative gradually emerged. As described in Borg (2018), in contrast to the collaborations in a Swiss and German context, there was not much emphasis on creating plans or on developing clear goals within *Sweship Energy*, especially in its initial phase. Instead, the actors involved agreed upon a vision that was vague enough for no one to disagree to, *knowledge sharing for increased energy efficiency*, with little discussions around issues like focus areas, collaborative approach, or organizational structure.

*Sweship Energy*'s partners operated in a single industry, the Swedish shipping sector. The collaboration was administrated and managed by an industry association for Swedish shipowners. The association has approximately 60 organizational members, although not all of them were active in the collaboration (*Sweship Energy* 2016). Despite the fact that all participating actors operated in the same business sector, our findings show that they represented a rather heterogeneous group of organizations with regard to characteristics such as company sizes and energy efficiency performances. A large share of the Swedish shipowners, *the industry mass*, consist of small- or medium-sized companies, with a limited number of ships in their possession and a small land organization. These companies have limited resources dedicated to the issue of energy efficiency. In parallel, there are a few, large companies that have prioritized and worked on the matter of energy efficiency for years. These actors could be described as energy efficiency *champions* as they have advanced more than others. Some of the participating actors in *Sweship Energy* were also

competitors. Other stakeholders in the collaboration included funding agents and representatives from academia.

The collaboration management team varied over time, but during most of the data collection period, the team consisted of an industry association representative (being the manager of the collaboration), a collaboration coordinator employed by the association as well as a senior chairman and a research advisor contracted part-time to the collaboration. The management team's responsibilities included long-term planning, administrative tasks, applying for funding, and managing collaborative activities.

Three primary activities within the collaboration have been identified through the study: (1) a project to build a database of energy efficiency measures, (2) a series of workshops to educate onboard personnel in matters related to energy efficiency, and (3) the establishment of a network of energy efficiency experts in the partner organizations, facilitating knowledge and experience sharing.

The collaboration was financed by public funders. In 2014 and 2015, the initiative received grants for two projects, the database project and the development of the workshop concept. In late 2015, it received a 2-year grant for the administration and management of the collaboration, and the establishment of the network.

### 3.2 Data collection and analysis

To collect data, an ethnographic-inspired research approach was chosen (Hammersley and Atkinson 2007) as such an approach is considered suitable for explorations of practices (Gherardi 2012), and has been proposed as rewarding for investigations of collaborative settings (Ybema 2009; Zilber 2014). Following that tradition, one of the authors was recruited to aid in the development of the studied collaboration. She overtly participated as a researcher while contributing to the work of the management team and in collaborative activities and projects. Between June and November 2015, the author was physically based part-time in the premises of the collaboration's management team. Thus, she was able to observe and take part in the daily work of organizing and managing the collaboration. Since the management team was located in the same premises as the industry association, she also had access to other relevant industry events and meetings. After November 2015 until December 2017, observation and participation in collaboration activities continued, although not on a daily basis.

These rich data were complemented by interviews with people in the management team as well as the partner organizations and other relevant actors. Thirty semi-structured interviews were recorded and transcribed, and in addition, numerous of informal conversations were conducted. Over a 2.5-years period, this totals about 1000 h of field work which was documented in around 250 field notes and interview transcripts, ranging from ½ to 25 pages each. In addition, information material documenting the development of the collaboration supplemented the data collected.

From this material, different themes were highlighted and extracted, through an interpretive method performed in several steps (Charmaz 2014). The first part of the analysis focused on the three primary activities, outlining the practices that evolved and their development over time. Data from interviews, observations and field notes were scrutinized and relevant information to the three primary activities extracted and summarized. The continuing data collection was then adjusted according to previous findings and analysis.

The second step consisted of identifying challenges facing the collaboration at large as expressed by participants and management team. In order to identify and categorize these

challenges, a thematic analysis of the material was executed (Denzin and Lincoln 2011) using the computer software *NVivo*. First, a number of central aspects within the theme were identified. Next, these aspects were grouped together into three overarching experienced challenges: (1) creating engagement, (2) developing a shared vision, and (3) securing funding.

In order to assure the quality of the analysis, two types of *triangulation* were performed: (1) method triangulation, comparing field material compiled from different types of sources, and (2) data triangulation, comparing data from different people at different times around the same phenomenon (Hammersley and Atkinson 2007).

## 4 Findings

The findings are presented in two parts. First, the primary activities of the collaboration are introduced and described. Second, we outline the identified key challenges.

### 4.1 Activities within the collaboration

Within Sweship Energy, three primary activities have been identified over the years: (1) a project to build a database of energy efficiency measures, (2) a series of workshops to educate onboard personnel in matters related to energy efficiency, and (3) the establishment of a network of energy efficiency experts in the partner organizations, facilitating knowledge and experience sharing, see Table 1 for an overview. In the following sections, these activities are described in more detail.

#### 4.1.1 The database project: gathering knowledge about energy efficiency

The initial activity within Sweship Energy was a project aiming to develop a database of energy efficiency measures—indicating an emphasis on creating technical infrastructure. The project was executed mainly during 2014 and supported with project grants from two separate Swedish public funders. A consultant acted as project manager.

The field material showed variations among different actors involved in Sweship Energy regarding perceptions of the database idea and its purpose. The project was not clearly defined before the consultant started to develop the database, and no project plan nor description of the database was developed. This created confusion and uncertainty among collaboration participants about what the purpose and value of the database should be.

In the end, as a result of the lack of direction from the collaboration, it was the consultant's perception of the database and its role in the overall collaboration that guided the project's development, a tool supporting a centrally placed consultant aiming to function as industry catalyst for increased energy efficiency. This consultant would through outreach efforts target the mass of Swedish shipping companies, supporting and motivating ship-owners to increase their energy efficiency by highlighting for the companies what others had already done—and thus transferring knowledge between different organizations.

During 2015, there were discussions about the database project and its outcome. The database was never finalized, and there were concerns about its IT security. Also, the discussions concerned the project outcome in relation to initial expectations as well as of ownership. According to the consultant, he had also difficulties to gain access to the

**Table 1** Primary activities within Sweship Energy

Collaboration activity		Description	Focus and target group	Role of collaboration management	Examples of practices related to the activity
Database project		A project to build a database of energy efficiency measures	Industry mass	Active	Relation-building
		Support for project management consultant aiming to function as industry catalyst	Land-based organizations	Top-down	Anchoring the collaboration idea Knowledge gathering
		The project was never finalized Emphasis on creating technical infrastructure			Developing technical infrastructure Developing pedagogic material Inspiring to energy efficiency efforts
Workshops		Education for onboard personnel	Industry mass	Active	Educating
		Workshops to educate onboard personnel in matters related to energy efficiency	Onboard personnel		Knowledge sharing Inspiring to energy efficiency efforts
Network		Mix of professions and organizations			
		Establishing a network of energy efficiency experts in the partner organizations	Energy efficiency champion	Facilitating	Networking
		Facilitating knowledge and experience sharing	Limited number of companies		Knowledge sharing Knowledge creation
		Improving state-of-the-art	Energy experts Land-based organizations		Relation-building Trust building Benchmarking Competing Inspiring to energy efficiency efforts



companies' data that he was supposed to incorporate into the database. The aim of having a consultant working with outreach activities was never realized.

#### **4.1.2 Workshops for onboard personnel: exchanging knowledge among people in the field**

In parallel with the execution of the database project, a workshop concept aiming to educate onboard personnel in matters related to energy efficiency was developed. The same consultant was also responsible of this task, and the concept development was financed through the same two projects funding as the database project.

All shipowners being members of the industry association that managed and administrated Sweship Energy were welcome to send participants. Also, Swedish publicly employed sea pilots participated at some workshop sessions. The workshops developed into a single occasion of two consecutive half days. They included both informative presentations by experts as well as discussion sessions aiming for knowledge exchange between participants. The intention was to have participants representing a mix of professions, both sea mariners and sea engineers as well as representatives from land organizations. Also, at each session, the collaboration management strived to have a mix of companies represented. The goal for this setup was knowledge exchange across both professions as well as organizations.

The concept development process took place during late 2014 and all of 2015. It included, for example, a series of three tryout sessions as well as a project evaluation that was executed by one of this paper's authors. During 2016, workshops were organized at three separate occasions, with a total of 21 participants. During 2017, all sessions were cancelled due to too few participants. Sweship Energy's chairman has on multiple meetings brought up the issue of weak participant numbers within the network for energy efficiency experts (for more information about the network, see below). Each time these discussions resulted in the decision to continue to organize the workshops, and to make a further effort to attract more participants for coming sessions.

There could be multiple reasons for the low participation rate. Some companies experienced difficulties motivating the participation cost for their company management. Other companies have argued that it has been difficult to motivate the onboard personnel to participate. Since onboard personnel often spend half their time onboard and half their time on land, the workshop must be done on their time on land—which is normally their own free time. One of the energy efficiency industry champions have expressed concerns about the benefits of the workshop concept for their organization, and are therefore not sending participants.

#### **4.1.3 Network for energy experts: peer-learning among leaders**

In February 2016, the Sweship Energy management team organized a kick-off for a new network. The network targeted energy efficiency experts in the initiative's partner organizations, and aimed to offer a platform for knowledge and experience exchange between participating companies. From what could be noted in the data, it appears that the network has now become the core of the Sweship Energy initiative.

The initial vision when establishing the network was to improve state of the art among a few industry champions. This appeared to be in contrast to sharing existing knowledge among a greater number of companies within the industry, which was the purpose of the

two activities previously described. Before the network was established, the management team discussed entrance requirements such as all participating organizations must have an energy management system or equal in place. However, since Sweship Energy is managed by a member-based industry association, the network had to exclude all entrance requirements and be open also for companies with limited previous experience of energy efficiency work. Thus, any member of the industry association willing to sign the non-disclosure agreement required by the network, was welcome to join the collaboration. In late 2017, around nine companies participate in the network on various levels of activity.

The core activity of the network was half day meetings where the participants presented learnings from projects previously implemented in their respective organizations and discussed challenges and opportunities with regard to increased energy efficiency. The aim was to have quarterly meetings. However, during 2017, they had difficulties achieving the aimed frequency, due to aspects such as sick leave in the collaboration's management team. Some companies were represented by the same people each meeting; among others, it varied between occasions. In general, around 15 people attended the meetings, including the collaboration's management team.

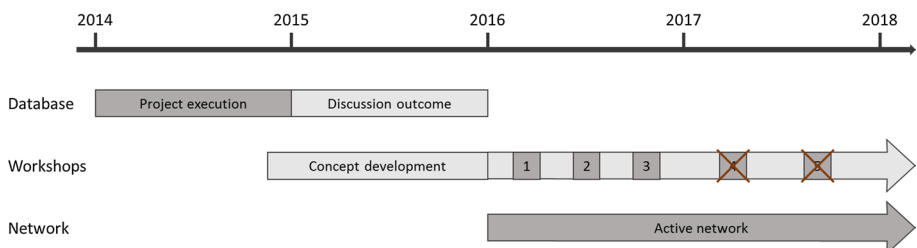
The management team made efforts to implement a rotating chairmanship among the participants for the meetings. The network members did not fully agree on this attempt, but a compromise was agreed upon as the location of the meetings rotated between the participants, but the chairmanship in practice stayed with the management team.

#### 4.1.4 Summary of collaboration activities

A summary and overview of the development of Sweship Energy's activities are presented as a timeline in Fig. 1.

### 4.2 Challenges within the collaboration

As a result of the analysis, some challenges were identified that appear to be of crucial concern to understand the emergence and development of Sweship Energy. In this section, three of the most prominent challenges are highlighted: (1) creating engagement, (2) developing a shared vision, and (3) securing funding. All the challenges have in varying ways and to different degrees been present throughout all three primary activities.



**Fig. 1** Timeline over Sweship Energy's activities

### 4.2.1 Creating engagement

For the first challenge of creating engagement, four aspects appear central (see Table 2 for details): (1) motivating champions to participate, (2) actors not contributing, (3) lack of time and resources, actors not prioritizing participation, and (4) managing conflicting opinions about collaboration structure and goals.

The challenges manifest itself in different ways throughout Sweship Energy's development. For example, the management team has had difficulties with too few participants for the workshops, and several occasions have thus been cancelled. Regarding the database project, the consultant expressed that he experienced difficulties gaining access to companies' data that would have been incorporated into the database. Also, some network participants have stated lack of time as a challenge for participation.

Not only number of participants but also types of participating organizations have been a topic for discussion within the collaboration. A key argument for establishing the network was that it would attract also the industry champions—something that was an issue with the previous two activities.

### 4.2.2 Developing a shared vision

Developing a shared vision was the second challenge identified, encompassing three particularly relevant aspects (see Table 3): (1) focusing on champions versus industry mass, (2) difficulties concretizing visions, and (3) managing conflicting visions.

The main goal of the collaboration, which all actors appeared to agree upon, was increased energy efficiency. But the strategy to achieve this goal, the preferred collaboration structure, or a plan with measurable aims, has not been agreed upon or defined. From the analysis, it appears as if the idea to collaborate has been translated differently among the involved actors. Additionally, there seems to have been different opinions regarding whether to focus on spreading already existing knowledge to a larger share of the industry, the so-called industry mass, or to create new knowledge and improve the state of the art. This would imply differences in target groups. For mainstreaming existing knowledge, the collaboration's focus would be on supporting the companies that are less advanced in their energy efficiency performances, but for improving state of the art, it could be more beneficial to address the champions.

### 4.2.3 Securing funding

The third key challenge highlighted is the collaboration's difficulties to secure funding. Three aspects stand out as central, based on what the practitioners expressed regarding this issue (see Table 4): (1) acquiring funding for collaboration management and administration, (2) getting by with only short-term funding, and (3) dealing with changes in funders' requirements.

As with many similar collaborative initiatives in Sweden, public funding is often considered a prerequisite for initiating and engaging organizations in the type of knowledge sharing and networking activities that was the core of Sweship Energy—especially for actors with limited time and resources. But the public funding appeared to come with a price, a lack of control of the direction of the collaboration. It appears that Sweship Energy became dependent on doing activities which they could get funding for, rather than focusing on what the partners believed was the most beneficial in order to achieve the vision of

**Table 2** Central aspects and illustrative data related to the challenge of creating engagement

Central aspects	Description	Related to which activities	Illustrative data			
			Data	Who	When and data type	Activity
1. Motivating champions to participate	Some industry champions have expressed lack of interest to participate due to concerns of limited gains, arguing “what’s in it for us?”	Database workshops (network)	He says that his feeling after the meeting was: “what’s in it for us?”	Representative, shipping company/network participant	September 2016, field note, telephone interview	Network
2. Actors not contributing	Actors do not want to participate due to not wanting to share their knowledge, and ensuring no free-riding; that all participants contribute	Database network	He says that he has been clear on the meetings that he has participated on, that one cannot be passive participant but must contribute	Representative, shipping company/network participant	May 2016, field note, telephone interview	Network
3. Lack of time and resources, actors not prioritizing participation	For the workshops, there have been difficulties attracting participants. In the network, some participants have highlighted lack of time as a challenge for participation	Workshops network	Q: <i>why is it so hard to attract participants?</i> A: [for some companies] it is about not having the resources, not being able to spare the participants	Collaboration coordinator	September 2016, field note, telephone conversation	Workshops

Table 2 (continued)

Central aspects	Description	Related to which activities	Illustrative data			
			Data	Who	When and data type	Activity
4. Managing conflicting opinions about collaboration structure and goals	Conflicting opinions regarding preferred collaboration goals and structure due to differences between involved organizations have implications on the engagement for participation	Database workshops network	"I have declined working with Sweship Energy several times before. Partly, because I didn't have the time, and partly, because I didn't like the focus it would have then with the development of a database, and so I felt like... Well, someone else can do that"	Collaboration research advisor	February 2017, interview transcript, interview	Database

**Table 3** Central aspects and illustrative data related to the challenge of developing a shared vision

Central aspects	Description	Related to which activities	Illustrative data	Who	When and data type	Activity
1. Focusing on champions v.s. industry mass	The collaboration focus has shifted between the art among the industry champions, and mainstreaming of existing knowledge to the industry mass—and there have been differences in opinions regarding optimal focus	Database workshops network	He highlights that when they joined, it was said that [the participants in the network] would be fewer and only larger shipowners, and there would be requirements about having energy management systems and dedicated resources [for energy efficiency]—it remains to be seen if this will be implemented	Representative, shipping company /network participant	May 2016, field note, telephone interview	Network
2. Difficulties in concretizing visions	It has been challenging for involved actors to concretize and define the collaboration idea	Database network	Everybody thought it was a good idea to have a database, but nobody knew what it meant—like the emperor's new clothes, he says. He thought that the shipowners wanted a database without really knowing why or what it entailed	Consultant	April 2017, field note, conversation	Database

Table 3 (continued)

Central aspects	Description	Related to which activities	Illustrative data			
			Data	Who	When and data type	Activity
3. Managing conflicting visions	Due to differences between involved organizations, there have been conflicting visions regarding among other things preferred collaboration goals and structure	Database network	Both [collaboration chairman] and [collaboration research advisor] have the opinion that a network is something with active members, in contrast to [consultant's] view to establish an energy secretariat that works more top-down to "educate" and inspire shipowners in energy efficiency-related issues through outreach activities. Instead, [collaboration chairman] and [collaboration research advisor] want a network for energy-responsibles where they can learn from (and support) each other	Collaboration chairman and collaboration research advisor	November 2015, field note, meeting	Database network

**Table 4** Central aspects and illustrative data related to the challenge of securing funding

Central aspects	Description	Related to which activities	Illustrative data			
			Data	Who	When and data type	Activity
1. Acquiring funding for collaboration and management and administration	Until late 2015 and the funding for the network, the collaboration received funding for specific projects, rather than for the day-to-day management and administration costs	Database workshops networks	He says that he believes that [collaboration manager] has struggled with getting funding for specific projects rather than for a secretariat	Collaboration chairman	April 2016 field note, telephone conversation	Database network
2. Getting by with only short-term funding	The funding that the collaboration has received are all relatively short-term, 2-3 years each, contributing to the challenges of long-term planning	Database workshops networks	He explains that the workshops were previously funded by public funders (by both [funder 1] and [funder 2]), but this support has now decreased and the workshops thus need to at least in part, be funded by the participants in the future	Collaboration manager	October 2016 field note, meeting	Workshops



Table 4 (continued)

Central aspects	Description	Related to which activities	Illustrative data			
			Data	Who	When and data type	Activity
3. Dealing with changes in funders' requirements	For several years, there were discussions with a public funder for long-term funding of the collaboration. According to the management team, they found it challenging that the funder changed their policies and guidelines for funding several times	Network	He says: Around May 2012, they had their first contact with [funding agent]. But it turned out to be difficult to get funding for a collaborative network. Other similar networks in other industries (so-called "clients' networks") have received funding, but then laws and regulations changed. Now they have received funding from [funding agent] for a so-called "innovation-cluster"	Collaboration chairman	February 2016, field note, meeting	Network

the collaboration. Although the management team of Sweship Energy expressed a desire to shift from public to private funding (for example, related to the workshops), once the concept was up and running, this appeared to be difficult to achieve in practice. The funding situation and the weakened link between what was desired and what needed to be delivered did not help to motivate participating organizations to shift to a mode where they would contribute with their own funding. Consequently, the management team expressed frustration around issues of public funding, especially the early funding which was aimed for specific projects rather than for the management and administration of establishing a long-term collaboration.

The collected data indicate that for the management team, the challenge of securing funding has the implication of high resource demands for applying for further funding. Other consequences include difficulties in long-term planning and direct effects on which activities the collaboration develops—the ones that can be funded, rather than those that follow a long-term strategy for the collaboration.

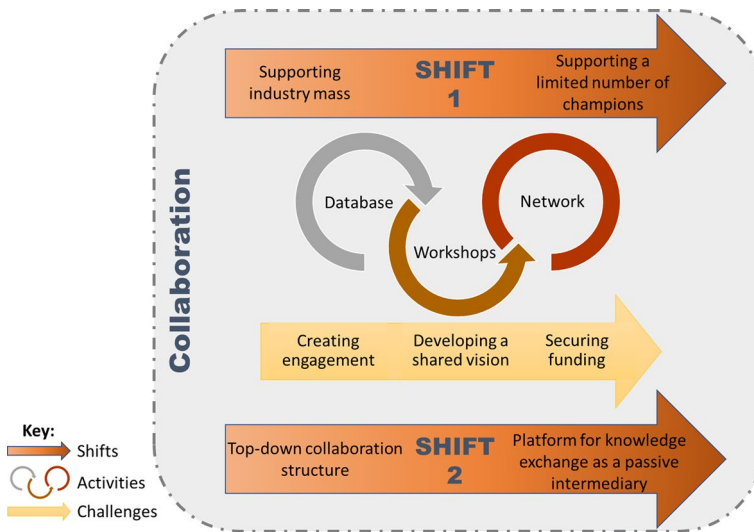
## 5 Discussion and conclusion

This study has aimed to better understand practices and experienced challenges that influence the development of emerging collaboration aiming for increased energy efficiency. The paper has outlined the collaboration's primary activities and how they developed over time as well as the experienced challenges. On the basis of our findings, we argue that: (1) practice and experienced challenges can be considered as interrelated, and (2) that this process of interrelating influenced how the collaboration has developed.

The type of activities carried out within the collaboration appears to be quite typical of what a multi-actor collaboration of this intermediary kind would engage in (Elmqvist et al. 2016) and the challenges expressed by participants confirm previous findings from, for example, Huxham and Vangen (2004), on the intricate nature of making a collaboration work. However, previous research has not explicitly investigated in what way such challenges and practices are influencing how the collaboration develops. While Dougherty (2017) argued the need for collaboration to face complex societal challenges, our findings highlight the value of acknowledge such collaboration as a form of continuous organizing responding to and influencing current developments. Adopting such a perspective has implications for how we can understand what goes on and the difficulties to predict future developments in collaborative settings. A more profound understanding of how collaboration develops over time could prevent such initiatives from failing or getting stuck in states of collaborative inertia (Huxham and Vangen 2004), which is unfortunately a common outcome.

Based on our findings, we argue that how the activities developed over time were influenced by the challenges the collaboration faced at the time—and vice versa—which had implications on what type of activities could be carried out and who could participate. As a consequence, we propose that this interrelating of practice and challenges has resulted in two major shifts within the collaboration (as illustrated in Fig. 2):

1. from focusing on supporting the industry mass to rather directing efforts to a limited number of champions, and



**Fig. 2** Two shifts emerging from the interrelating of practices and challenges in the collaboration

2. from a top-down collaboration structure with a centrally placed consultant functioning as a catalyst, to developing a platform aiming to offer industry actors to meet and exchange knowledge, where the collaboration has a more passive intermediary role.

### 5.1 Shift in focus from industry mass to champions

In their initial activities, Sweship Energy targeted the broad industry, aiming to spread existing knowledge and measures to the mass of the industry in order to support large-scale implementation of new practices. With this approach, the collaboration did not have any defined members; the collaboration targeted the industry as a whole, but members of the shipowners' industry association that manage and administrate Sweship Energy in particular.

However, quite early on, challenges of motivating participants and defining a shared vision arose. Partners did not want to participate in the collaboration out of the goodness of their heart, but because they need to have something to gain from it, especially the industry champions. Clearly, an approach where there are some givers and many takers did not seem to work.

A concrete example was the database project that never really got off the ground and was never finalized, where a central goal was to spread and mainstream existing knowledge and experience broader in the industry. One of the expressed aims of the database was to function as decision support for implementation of energy saving measures. This would support shipowners that did not have as much resources in their own organization and had not reached that far in their energy saving efforts to learn from the industry champions. The educational workshops targeted the shipping industry more broadly than the database project, but seem to have significant trouble attracting participants.

As the collaboration put its energy into starting a network for energy efficiency experts, Sweship Energy's focus shifted. In the network, the aim was instead to push the state of the

art further by facilitating knowledge exchange between a limited number of industry champions. Through the network, the collaboration got a defined set of members, even if the still ongoing workshops continuously targeted the industry mass. Thus, the collaboration had chosen to shift focus to activities that had a clearly defined and motivated set of participants, who had already come quite far in their adoption of energy efficiency practices.

## 5.2 Shift in the collaboration's organizational structure

It was not only the activities that changed over time, but also Sweship Energy's organizational structure shifted as the collaboration developed. In its initial phase, the collaboration was based on a top-down approach, with a central management function, in the form of a consultant, aiming to push energy efficiency-related activities among members and others interested.

The top-down structure was most visible in the first of the identified primary activities; one of the highlighted aims with the database was that it was intended to be a tool for the consultant to catalyse, support, and motivate companies to increase their energy efficiency through outreach activities. The workshops were based on the same reasoning as they were supposed to educate onboard personnel, feeding information from the top. However, it was also an opportunity for the participants to exchange knowledge and experience, where the collaboration had a more facilitating role.

The shift towards a more facilitating role as a platform for knowledge exchange was further emphasized when the network was created, as it was built with less of a top-down structure. Instead, the network offered a platform for knowledge exchange between industry actors working actively on energy efficiency—and the collaboration took on a more passive intermediary role of simply gathering the different actors.

As an attempt to further decrease the initial top-down structure, efforts were made among the management team to move the organizational ownership of the collaboration to the network members, including setting a vision for the collaboration, deciding on future projects as well as for the already existing workshops. In practice, the network members did not fully accept this ownership, for reasons such as lack of time and engagement, and much decisions were still made among the management team. An example is the network members' resistance to taking on the role as network meeting chairman.

## 5.3 Concluding remarks and implications

The findings related to the intertwining of practice and challenges and the resulting shifts in the collaboration points towards the difficulty of maintaining a broad range of actors interested and motivated in collaborating for energy efficiency. In this case, in order to survive, the collaboration has now shifted to primarily target industry champions. It would seem that this type of collaboration is challenging to manage with the initially intended top-down approach. Rather, a more inclusive, peer-based management like in the network seems to have been more successful for the purpose of Sweship Energy. Since previous research has shown that the type of energy efficiency collaborations that exist in Switzerland and Germany seems to have a more top-down approach (Paramonova and Thollander 2016), it would be interesting to delve deeper into this issue, analyzing these potential regional differences further.

We argue that a more in-depth understanding of practices in multi-actor collaboration can form a valuable contribution to current discussions on how to manage and organize

for closing the energy efficiency gap through multi-actor collaboration. By relating what is done in the collaboration to the experienced challenges, our research recognizes the centrality of human action and engagement to the outcomes of such collaboration, providing another perspective of why it is difficult to bridge the energy efficiency gap, thereby complementing previous research which to a large extent focus on policy or systemic levels. Also, by studying the challenging day-to-day operations of this kind of collaboration, this study complements previous research on collaborative arrangements for energy efficiency, as it brings insights from a collaboration initiated and managed by an industry association.

Practitioners and managers of multi-actor collaborations stand to benefit from our findings, as it can enable them to engage more insightfully in their respective activities. Such insights could enable practitioners to act proactively rather than reactively when addressing expected as well as unexpected challenges. Furthermore, policy-makers, who often point to collaboration as a necessity for dealing with societal challenges, can become more inspired and well informed about how collaboration works in practice and develops over time, which can encourage them to be more specific in how they direct policies and resources, and incentivize efforts in this particular area.

## 6 Limitations and further research

This paper is based on a single case study, and its primary contribution is therefore to reveal insights that can be elaborated on in further studies, so-called analytic generalizability. Although one of the points in the paper is to recognize that no collaboration is the same as another, there might still be some general characteristics and aspects in their respective practices and challenges that are valuable to explore and validate in future research through qualitative as well as quantitative studies.

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