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Published in:
Journal of Environmental Assessment Policy and Management

DOI (link to publication from Publisher):
10.1142/S1464333211003857

Publication date:
2011

Document Version
Accepted author manuscript, peer reviewed version

Published in: Journal of Environmental Assessment Policy and Management 2011 13(2), pp. 203-228

Change agents in the field of strategic environmental assessment: What does it involve and what potentials does it have for research and practice?

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Abstract: One of the challenges facing strategic environmental assessment (SEA) is finding ways to work in research and practice allowing critical interrogation and appropriate action to support sustainability. The point of departure for this article is the hypotheses that a certain kind of cooperative knowledge-production, called Mode 3, where SEA researchers interact with the societal milieu as change agents, provides a potential for SEA research and practice to further sustainability. Based on literature and three cases, this paper seeks to contribute to two questions: 'what does acting as a change agent within the field of SEA involve?' and 'what potentials does it have for research and practice?' The three cases illustrate how Mode 3 can support reflective SEA practice and practice-based SEA research. Theoretically the current understanding and discussion on change agents is sharpened through the focus on real-life linkages, putting forward the contextual influence and the unpredictability related hereto.

Keywords: Change agent, Mode 3 research, strategic environmental assessment, knowledge production.

1. Introduction

The point of departure and underlying assumption behind this paper is that different types of cooperation between research and practice influence the knowledge production and the possibility to influence decision-making.

During the last decade science and technology have increasingly been harnessed in the quest for a transitioning towards sustainability, among other things grounded in the belief that for knowledge to be useful from a sustainability perspective, it generally needs to be coproduced through close cooperation between scholars and practitioners (Clark, 2003). The important scholarly discussion about the role and effectiveness of environmental assessment (EA) as a tool to promote sustainable development has simultaneously increased over the last years, and it has been questioned if EA has the wanted impact on the planning and decision making process. The discussion involves questioning whether EA tools are too often developed from an expert-driven perspective without sufficient attention to contextual circumstances including the practitioners' needs and capacities (Emmelin, 2006) and without sufficient understanding and recognition of the actual non-linear decision making processes (Richardson, 2005; Kørnøv and Thissen, 2000; Lawrence, 2000; Nilsson and Dalkmann, 2001; Bina, 2001). The reasons for the experienced gab between EA research and practice can be found in these arguments, and can be due to a non- or low collaborative knowledge production, with a clear demarcation between research and practice.

The practice of connecting theoretical knowledge with practical problems, including a high personal engagement, is by Andrew Jamison (2001; 2008), called 'change-oriented research' and refers to a

knowledge making which is problem-based with the aim"…to intervene creatively and constructively in an ongoing social or political process: to contribute to change. Rather than the traditional notion of enlightenment, by which is usually meant that the role of the scientist is to provide insights for the broader society, derived from a "disinterested" pursuit of the truth, change-oriented research is about empowerment, where the researcher applies knowledge gained from experience to processes of social learning, carried out together with those being 'studied'" (Jamison, 2010: 9). This engagement of the researcher as a change agent is in different fields of research referred to by other names like e.g. empowerment and action research. The change agent research, which is closely linked to current societal needs and is undertaken in close cooperation between research and practice, is also termed 'Mode 3' (Huff and Huff, 2001; Kurek, 2007). Kurek (2007) provides an analytical framework for studying the strategic positioning of the researcher, which makes it possible to distinguish between modes of research, hereunder Mode 3.

This paper is inspired by both Jamison's normative framework and argument about the need for change-oriented research, and by the analytical framework developed by Kurek (2007). These frameworks are used for discussing experiences with connecting research and practice, and thereby approach the mentioned insufficiencies in the field of SEA. The hypothesis, which this paper is based on, is that situated form of knowledge making in which SEA researcher acts a change agent within a Mode 3 positioning has a potential to improve the connection between research and practice and promote sustainable development.

Aim

At Aalborg University's Department of Development and Planning, researchers acting as change agents conduct three research projects on SEA. This paper seeks to collect and communicate experiences from these cases. The paper is aimed at contributing to the following questions:

- What does acting as a change agent within the field of SEA involve? and
- What potentials does it have for research and practice?

All modes of research have their own justification – whether an independent or interdependent relation between research and practice, and the authors also have experience with and value all modes of research being discussed in the next paragraph. The Mode 3 research with its strong cooperative interdependence is though by the authors found to have a distinctive capacity to influence decision-making towards sustainability. The aim of the paper is to explore Mode 3 and make up illustrative analyses of collection of experiences, showing characteristics of Mode 3 and illuminating possible ways of conducting SEA research in Mode 3 and the potentials it may have.

With this aim, first an analytical framework is developed through a discussion of different research modes in section 2. In section 4, this framework is used for presenting and analysing the three cases, in terms of what it involves to conduct Mode 3 research, and acting as a change agent within the field of SEA. This covers discussions of strategic positioning in relation to the formal and informal frames for the research projects. In section 5 this is followed by an analysis of the potentials of Mode 3 research, based on the authors' and collaborating organisations' observations and assessments of the research projects. Thus focus is on the potentials of conducting Mode 3 research, both seen from the perspective of the researcher and from the perspective of the organisation. This underpins the objective of the paper: to identify if and how this specific setup of research provides potentials in terms of practice in the organisation and in terms of research.

2. The Discussion of Research Modes

When discussing the different modes of research with focus on the connection of research and practice, the contribution of Gibbons and colleagues in '*The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies'* from 1994 is found very relevant and inspiring. This work is an influential contribution to the ongoing discussion of the need to improve research relevance and knowledge flows from research to practice. Gibbons et al. distinguish between two modes of knowledge production.

Mode 1, typically produced in universities and named 'ivory tower research' by critics, has the characteristics of largely being discipline-based, intra-scientifically produced and not related to a specific context for application (Gibbons et al., 1994). In Gibbons words "This structure provides the guidelines for researchers about what the important problems are, how they should be tackled, who should tackle them, and what should be regarded as a contribution to the field. In its social dimensions, it also prescribes the rules for accrediting new researchers, procedures for selecting new university faculty, and criteria for their advancement within academic life" (Gibbons, 1999: 9).

The strength of the structured research in Mode 1 is widely acknowledged. However, when it comes to research aiming at changing practice, Mode 1 research meets criticism, e.g. the risk of limited relevance of research for society. Mode 1 research on SEA does not necessarily take point of departure in experienced problems in certain contexts, and therefore it may not be relevant and it may not be applied. In line with this criticism, Gibbons (1999) point at a need for knowledge production, which is 'socially robust', ensured through a new social contract between research and society. It becomes not just a matter of *how* knowledge is produced but also *what* knowledge is produced. Here Mode 2 research offers a different approach.

In Mode 2 the relationship between research and practice is characterised by interaction and cooperation, which according to Gibbons and colleagues leads to change-oriented research in which "the boundaries between the intellectual world and its environment have become blurred" (Gibbons et al., 1994: 81). The characteristics are knowledge produced trans-disciplinarily, jointly and bound to a specific context. Therefore, Mode 2 research is validated by its relevance for practice. Compared to mode 1, mode 2 is argued to be "more timely, more practical, more democratic" (Huff, 2000: 291)

Huff (2000) criticizes Mode 2 research for having limitations "especially as it moves away from science and technology into management" (Huff, 2000: 291). According to Huff (2000: 292), Mode 2 research is too pragmatic and tends to make "big bets on the basis of limited evidence". Another criticism of Mode 2 is the commercialisation of research, e.g. raised by Jamison in 'The Making of Green Knowledge'. Research is defined by market interests in funding organisations rather than by the interest among researchers (Jamison, 2001). Furthermore, Jamison (2001: 124) criticizes Mode 2 for limited change "…many of the actual practices of the companies they run and/or represent all too often continue to follow a 'business as usual' strategy".

The discussion of research modes and trends in knowledge production has received considerable scholarly attention (Nowotny, Scott and Gibbons, 2001). In the midst of these discussions the concept of Mode 3 arose.

Strategic positioning and Mode 3

In line with Jamison's discussion of the need for a 'change-oriented research', the limitations of Mode 2 lead Huff and Huff to suggest Mode 3 knowledge production with the purpose "…to assure survival and promote the common good, at various levels of social aggregation" triggered by "…appreciation and critiques of the human conditions, as it has been, is, and might become" (Huff and Huff, 2001: 53). The researcher within this Mode 3 is closely linked to societal needs and compared to Mode 2 is capable of influencing his milieu by creating demand for the scientific knowledge instead of supplying on an external demand (Kurek, Geurts and Roosendaal, 2007).

Some characteristics, used in the literature on Mode 3, are multiple stakeholder involvement and interdisciplinarity, conversation and cooperation, community driven, engagement in study field, high organisational autonomy and strategic interdependence (Huff and Huff, 2001; Kurek, 2008). The normative element of Mode 3 is explicated by the goal of a 'future good' (Huff and Huff, 2001) and 'giving voice' through science as social advocacy (Jamison, 2009b).

Whereas in Mode 1 the researcher mainly is accountable to oneself, and in Mode 2 accountable to the milieu and financing organisation, the researcher in Mode 3 is mainly accountable to the people and/or environment affected both in the research process and the research outcome. Mode 3 involves not only personal, active engagement and intervention in on-going processes, but also a normative framework within which the researcher works.

The relationship between the change agent and the milieu (researchers, government, industry and NGO) is established through negotiation, and the researcher in Mode 3 must make on-going choices of how much he is willing to let others influence the research. An analytical model of the strategic positioning of the researcher within the milieu is developed by Kurek and colleagues (Kurek, Geurts and Roosendaal, 2008). The model is based upon two dimensions – organisational autonomy and strategic interdependence – and provides a typology with the different modes of researchers positioning, see figure 1.

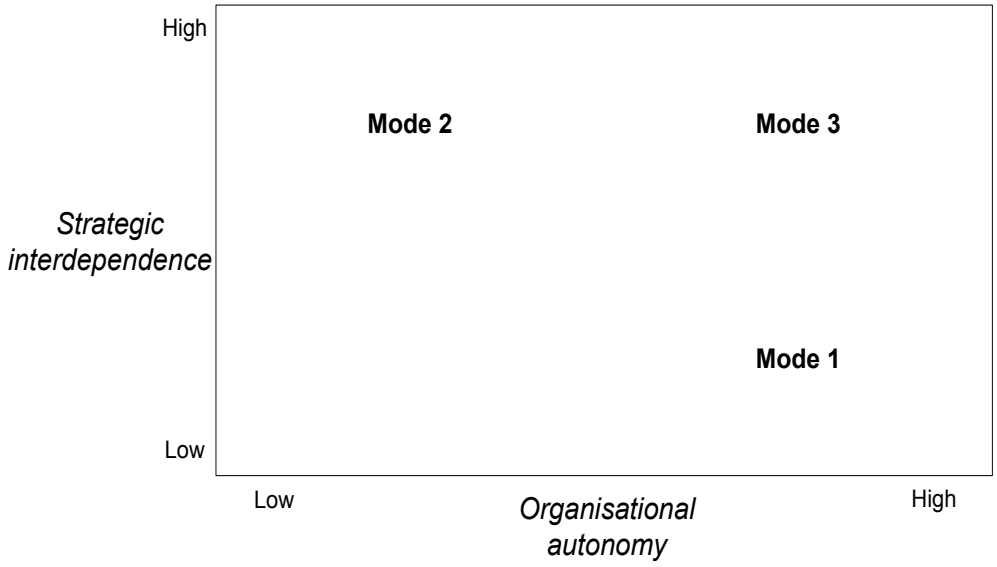

Figure 1: Three modes of strategic positioning. (Based on Kurek, Geurts and Roosendaal, 2007: 503)

We understand Mode 3 as being characterised by high organisational autonomy and strategic interdependence, and at the same time attributed a normativity guiding the on-going knowledge making and negotiation process taking place between the researcher and the milieu. Mode 3 is understood as flexible in terms of the characteristics of the research activities carried out during the process in the efforts of reaching the goals. The autonomous researchers may in periods choose to do studies independently or choose to engage in research that is defined by the partner. Thus, a Mode 3 collaboration may be a heterogeneous process in terms of the characteristics of its research activities, and the specific activities may have characteristics in common with the other modes. The autonomous researcher in Mode 3 may choose activities that help keeping a critical distance or ease the cooperation with the partners. What make the research activities a Mode 3 collaboration are the overall properties of normative orientation, strategic interdependence and organisational autonomy.

In Mode 3, like in Mode 2, the researcher and milieu share resources (money, time, knowledge) but at the same time the researcher "…autonomously determine directions of research. He retains his responsibility for directing a project" (Kurek, Geurts and Roosendaal, 2007: 504). So in Mode 3 both the researcher and the milieu are strong enough to sanction each other, and both the strategic interdependence and organisational autonomy is high. This also means that the normative framework, guiding Mode 3 research, is developed by and acceptable to both the researcher and the milieu. The difference is visualised in figure 2.

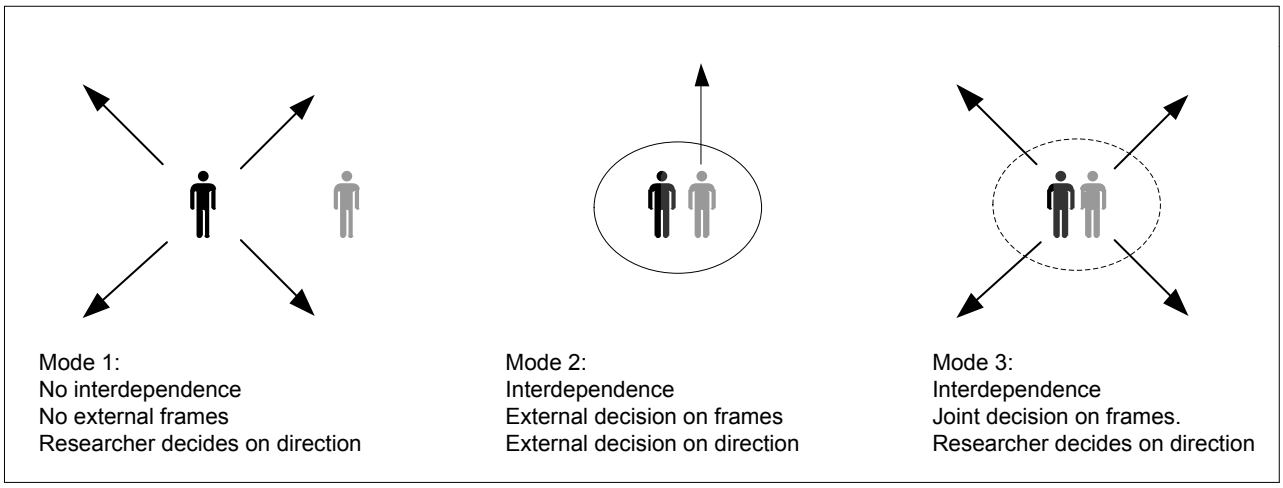

Figure 2: The relation between the researcher and external milieu in the three modes of research. The darker figure represents the researcher, while the lighter figure represents the milieu.

All modes exist within the field of SEA research. Examples of SEA research undertaken by a Mode 1 approach are e.g. theoretical based work (Kørnøv and Thissen, 2000; Richardson, 2005; Wallington, Bina and Thissen, 2007 etc.) and overview articles outlining SEA systems, implementation and experiences (e.g. Therivel, 2002). Several scholars, hereunder Sheate and Partidario (2010) and Seitz, Westbroot and Noble (2010), are discussing and supporting Mode 3 like cooperation between research and practice and the need to strength the policy-science interface. An example of doing Mode 3 SEA research is Asplund and Rydevik's intervention in on-going SEA and planning processes in Sweden (1996), and writing and publishing taking place in cooperation between researchers and practitioners with examples like Ross et al. (2006) and Morrison-Saunders and Arts (2005). An illustration of Mode 2 SEA research is guidance

development with a clear term of reference from the contracting institution. These examples illustrate the relevance and importance of all modes of research within the field of SEA.

Thus we are distinguishing between three different modes of research, all with distinct advantages and disadvantages. The focus of this paper is to shed light on experiences with Mode 3 research, answering the questions of what Mode 3 within SEA research involves and what potentials it may have. However, before turning to these questions the cases and methods applied are presented in the following section.

3. Cases and Methods

The analysis in this paper is based upon case studies, from which experiences with Mode 3 research are drawn. In the following the three cases are introduced, and the methods applied in the two analyses are presented. Further information about the three cases is presented continuously in the paper, where it is included in the analysis. The analyses deal with the strategic positioning of the researchers and the potentials for SEA research and practise. The empirical basis for the analyses is document analysis, the researcher's personal observations, and subjective assessments by the researchers as well as the contact person in the organisations.

Cases studied
The study comprises three cases, where PhD researchers are working on their projects in close cooperation with an organisation outside the university. The three research projects have different foci in relation to SEA and different reasoning for the cooperation between SEA research and practice. In all three cases the organisations have co-financed the research projects.

Case 1
Case 1 is carried out in cooperation with the Danish company Energinet.dk, in charge of Danish energy infrastructure. The project is organised with an AAU-based professor as supervisor and the head of Research and Environment section as main contact person at Energinet.dk.
Aim and methodology: The project concerns the first generation of SEA of plans and programmes in relation to the national energy infrastructure in Denmark (gas and electricity). In this case, Energinet.dk faced implementation of SEA and without sufficient internal professional resources, they initiated cooperation with AAU that ended up with the project aimed at developing and implementing SEA in the energy sector, including SEA methodology targeted at the strategic decision making processes in the sector. The project has theoretical basis in decision-making theory and sense-making theory, which are used to understand practice and develop methodology. The project is based on an interactive research approach, in which the researcher is situated at Energinet.dk for a year, participating in meetings and planning processes. To maintain a critical distance, the remaining two years of the project is carried out at AAU, however, still with periodical participation in meetings at Energinet.dk. The research conducted from AAU is widely based on document analysis and interviews.

Case 2
Case 2 is carried out in cooperation with the Greenlandic Self Government and is furthermore co-funded by the independent Alcoa Foundation. The project has an AAU-based professor as main supervisor and the head of the department of physical planning from the Greenlandic Self Government as co-supervisor.

Aim and methodology: The project concerns SEA of mega industry in Greenland in a system with no legislation or guidelines in place. This case is rooted in the environmental and democratic challenge of planning and assessing an aluminium smelter in Greenland (Hansen and Kørnøv, 2009), with the aim of the research project was to secure a critical and independent view upon the processes and effect of carrying out SEA. The project is conducted as a case study of the SEA and the planning process of an aluminium reduction plant in Greenland. A theoretical approach is taken, combining power theory with impact assessment theory on the concept of effectiveness. These theories are used to setup an analytical frame for the case study. Document analysis is used to determine the chronology, and thus the backbone of the mapping of decisions in the project. Participant observation and statements are collected primarily by qualitative interviews with key persons from the central actor groups, and by attending meetings as an observant. The interviews supplement the document review concerning the case activities and behaviour, also regarding identification of interests among the actor groups and their access to resources. Based on this, reflections regarding effectiveness and power structures relating to the use of SEA as a decision making tool when planning new industries in Greenland will be made in terms of development of process and methodology.

Case 3
Finally, the project in case 3 is carried out in cooperation between AAU and the major Danish engineering consultancy Rambøll. It is organised with an AAU-based professor as main supervisor and a head of department from Rambøll as co-supervisor.
Aim and methodology: The research takes point of departure in the Danish process of preparing river basin management plans (RBMPs), implementing the EUs Water Framework Directive, and preparing SEAs of these plans. Currently, climate change as an environmental factor has been excluded from the planning process, with the reasoning that there is not enough knowledge about climate change to assess its consequences for the water environment and the RBMPs. On this background, the project is aimed at developing the work with climate change in SEA of the RBMPs. A theoretical approach is taken, using sociological risk theory as a framework for research. Document analysis, interviews, and a survey is utilised to uncover the attitudes of different actors towards inclusion of climate change in the RBMPs, while a document analysis and interviews are used to assess the experiences with climate change in SEA in Denmark. Based on this, reflections regarding integration of climate change in SEA will be made in terms of development of process and methodology.

Analysing what it involves to be a change agent within the SEA field
The conclusion upon the formal strategic positioning of the researchers in the three cases, and thus whether and how they conduct Mode 3 research, is first and foremost reached by analysing the content of the project contracts. The standard issues like e.g. time schedule is not perceived interesting and relevant for this paper, but the non-standard and unique issues are more interesting and symbolise the negotiated parts of the cooperation. The analysis of the contracts is focused on the explicated objectives and the clauses. Both are used to indicate the strategic interdependence and organisational autonomy and thereby map the research mode. In addition informal positioning and negotiation takes places in an ongoing dialogue between the SEA researcher, the university and the collaborating organisation. The analysis of the informal process, influencing the research intention, the methods applied, and the out-put of research, is based upon the researchers observations and experience.

Analysing what potentials acting as a change agent has for SEA research and practise?

As stated previously, the hypothesis behind this paper is that Mode 3 research can support SEA and sustainable change via its potentials for connecting research and practise. This constitutes the point of departure for the analysis of what potentials Mode 3 research has. Two sources form the basis for the analysis: The first part is assessments from the researchers that point at potentials for research. These assessments are substantiated by examples from the projects. The second part is based upon open questions related to the potentials for influencing practise. The contact persons at the organisations answer the questions: 1) "How has the involvement of NN and his/her research influenced the organisation? 2) How has the involvement influenced the broader society?, and 3) "In which way has the involvement and cooperation influenced the SEA (understanding of SEA, the SEA process, the documents)?" and 4) "How would you characterise the strengths and weaknesses of the setup of the cooperation between your organisation and the researcher?"

In respect to the premature concept of Mode 3 research, the sources are (intentionally) not constrained by mode classifications or characteristics. The sources are in stead held open to any impact of the research and this inductive approach may support a refinement of the Mode 3 concept.. As the three cases are ongoing research projects, the analysis is primarily focused on the process rather than the outputs. The cases do, however, outline a picture of the potentials of the research mode..

4. What Does Acting as a Change Agent within the Field of SEA Involve?

The Mode 3 research is analysed in terms of the strategic positioning of the researchers in the three cases, and thus it is assessed whether and how they carry out Mode 3 research. Focus is both on formal and informal frames for the research, and these frames will show what it involves to do Mode 3 research.

The analysis begins with the strategic interdependence and the organisational autonomy in accordance with the model of strategic positioning proposed by Kurek et al. The analysis presented in table 1 and 2 are inspired and to a large extent based upon the work of Kurek, Geurts and Roosendaal (2007; 2008) who build upon Talcott Parsons' theories on social systems. Table 1 gives an overview of the parameters chosen to describe and analyse the strategic interdependence and organisational autonomy. These parameters are inspired by Parsons' model of social systems in which four media can function as exchange means: Inducement (e.g. money), deterrence (negative sanctions), commitment and persuasion (Parsons, 1963).

Strategic interdependence - Understood as the deliberate sharing of heterogeneously distributed resources, assets and capabilities between the partners in order to achieve a joint goal.	**Organisational autonomy** - Understood as the researcher's degree of self-governing the research. It is analysed in relation to the researchers autonomy to decide upon:
Economic interdependence Interdependence on exchange of information sources Interdependence on engagement	Research goals Acquiring information Working place and working balance Writing and publishing research results

Table 1: Parameters chosen as basis for describing and analysing modes of research.

Common for the research projects is that most of the strategic positioning is happening in an on-going and informal process between the researcher and the cooperating organisation. This will be analysed and discussed in the following, where the strategic interdependence and the organisational autonomy are analysed separately.

Formal and informal strategic interdependence

Table 2 shows the analysis of whether and how the researchers and organisations have strategic interdependence. The analysis shows an economic interdependence in all three cases. This is partly evident from the contracts and partly evident from the informal negotiations. The economic interdependence gives both parties a possibility for sanctioning.

The analysis of the second parameter, dependence on exchange of information sources, as shown in table 2, reveals some differences. Only case 1 is really highly dependent upon the collaborator. This has to do with the nature of the SEA research: This project has a focus of getting the right environmental information to the right people at the early stage in decision making, and to do so the researcher is very dependent on understanding the processes within the collaborating organisation. The contract in case 1 is a standard contract added restrictions on confidential data that may only be used after approval by Energinet.dk. However, both case 2 and 3 do experience some dependence upon information from other actors in the milieu, which the collaborating organisation either informally hinders or supports access to.

Another kind of interdependence is engagement in the project. The researcher is dependent on engagement from the organisation, since it is necessary that the organisation continues internal activities relating to the research and is able and willing to consider and use the research to achieve change in these activities. If the organisation is not engaged, the researcher cannot change anything. The organisation is likewise dependent on the engagement of the researcher to fulfil the expectations of changes. In case 1, the researcher is dependent on the engagement of the collaborating organisation developing its SEA system, since this is the object of study and change. At the same time, the company relies on engagement from the research in this process of development, e.g. by securing adequacy in terms of regulation. In case 2 the interdependence is similar, since it also revolves around change in the collaborating organisation. Case 3 is different from this, because the change, which is aimed for, is not restricted to the collaborating organisation, but a wider range of actors.

	High interdependence		**Low interdependence**
Economy	Researcher is either fully or partly funded by the organisation and the organisation must get return of their investment in the project		Researcher is economic independent and the organisation is not dependent on return of their investment.
Formal	*Case 1, 2 and 3*		
Exchange of information sources	The organisation is an essential source of information for the researcher and the organisation needs information from the research society		Researcher is not dependent on information from the organisation and opposite
Informal	*Case 1*	*Case 2 and 3*	

Engagement	The researcher and the organisation are mutually dependent on the other parts' engagement in the project		Neither the researcher nor the organisation is dependent on engagement from the other part in the project.
Informal	*Case 1 and 2*	*Case 3*	

Table 2: Analysis of the SEA researcher's strategic interdependence in relation to the collaborating organisation. Whether the dependence is explicated formally (in the contract) or informally in the process is indicated in the left column.

Formal and informal organisational autonomy

Table 3 shows the analysis of whether and how the researchers in the cases have organisational autonomy. Regarding to what extent the researchers set research goals autonomously, the analysis shows both high and medium organisational autonomy for all cases. Formally, based upon the contracts, the autonomy is assessed as high/medium as all cases include a loosely formulated goal - for the research. In case 2, the contract emphasises the need for an autonomous researcher, providing critical and independent guidance based on "insider" knowledge/understanding. It is furthermore emphasised that the researcher must work independently and with high validity in relation to the second co-funder Alcoa Foundation. Differing from this, in case 3 the consultancy expects the PhD-study to "enter directly into Rambøll's work with developing services and having dialogue with costumers", which is limiting the autonomy for setting research goals. Within the broadly stated research goals, the researcher informally decides on the research in negotiation with the collaborating organisation.

The contracts do not mention methods of data collection, besides the data collected through interaction between researcher and collaborating organisation. In all cases the researchers thus have a high autonomy in the acquisition of scientific knowledge.

For case 1 and 3, the organisational autonomy regarding working place and working balance is assessed as medium. For both cases this is due to informal negotiation between the collaborating organisation and the researcher, but also due to the researchers own interest in being close to what is being studied. Additionally, for case 3, the contract is more explicit and includes the expectation that the researcher "…spends the main part of the time at our office in Virum." For case 2, the organisational autonomy is assessed as high, as there are no restrictions or expectations from the collaborating organisation regarding working place and working balance.

Writing autonomy is high in all cases, as the researchers decide on what should be included in publications, and in which journals to publish their results. In all cases, the milieu has interests in certain media, however, which media to use, remains the researchers' decision.

	High autonomy	**Medium autonomy**	**Low autonomy**
Autonomy to decide on research goals	Researcher sets research goals within a negotiated overall frame.	Research goals are based upon the problems of the organisation involving the researcher.	The organisation set specific research goals.
Informal and formal	*Case1, 2 and 3*		
Autonomy in the acquisition of scientific knowledge	Researcher decides on how and what data is collected	Joint decisions are made	Decisions on data collection are made by the organisation.
Informal	*Case 1, 2 and 3*		
Autonomy to decide on working place and	Researcher decides upon where to work and to what	Joint decisions are made continuously.	The organisation decides upon the working

working balance Informal and formal	extent he will do research related work with the organisation. *Case 2*	*Case 1 and 3*	conditions.
Writing autonomy Informal	Researcher suggests the content of publications and gives argument why certain theories etc. are chosen. *Case 1, 2 and 3*	Researcher edits or re-writes publications partly or fully.	Researcher comment on drafts.

Table 3: Analysis of the SEA researcher's organisational autonomy in relation to the cooperating organisation. Whether the dependence is explicated formally (in the contract) or informally in the process is indicated in the left column.

The two analyses presented in table 2 and 3 show that the cases represent predominantly Mode 3 research, which for the researchers involves high and/or medium strategic autonomy, and primarily high organisational autonomy. The Mode 3 research carried out involves a high engagement in the study field and cooperation with exchange of sources and views. At the same time the researchers retain the responsibility for directing the research and freedom to be critical. For the researcher it thus involves freedom to govern the project within a broadly given frame, which differs from the other modes of research, as shown in Figure 2 and discussed in the following.

Despite the categorisation of all three projects as predominantly Mode 3, the analysis reveals that in practice there are differences between what this involves. The differences observed are e.g. different levels of how much the researcher identifies with the study field at a personal level, as well as different levels of critical participation in the processes studied. These differences indicate that within Mode 3 many nuances exist, and that Mode 3 research does not lead to one specific research design and practice. Mode 3 research can be undertaken in various ways, depending upon the specific context including personal preferences, timing, resources etc. After having clarified what conducting Mode 3 research involves in the examples of the three cases, the next step is to analyse the potentials for research and practice.

5. What Potentials does Acting as a Change Agent have for Research and Practice?

The second part of the aim of this paper is to investigate the potentials of mode 3 research for research and practice. Investigating two issues does this: 1) if and how being a change agent in relation to SEA influences the research process and content and 2) if and how the research and cooperation influence the organisation and its work with SEA. These two questions are treated in the following by interpreting the Mode 3 research cases in terms of influences enabled by the combination of high autonomy and high interdependence. The interpretation is based on experiences and observations of the researchers and contact persons respectively.

Potentials for research: The researchers' experience

The first analysis of the potentials for research of Mode 3 research is based on the researchers' experiences from the three cases. This section is organised around main issues of access, dialogue on direction and ownership of the research.

Access to people, processes and information

The researchers point at the potential of access in the close association with the organisations: Access to the right person at the right time and place makes it possible for the researcher to make

suggestions that test hypotheses or theories. With high strategic interdependence, the researcher is provided with insight and access to follow processes in the organisation. At the same time, the researcher has high autonomy, which means that the researcher potentially can make suggestions that are relevant for practice and at the same time tests hypotheses or theories as part of the research process. An example of this potential is from case 1, where the researcher has continuously taken part in organisational processes, which has given possibilities for testing hypotheses, e.g. about the timing of decision aid put forward in theories of organisational decision-making.

At the same time the researcher is allowed to use the information independently, which may improve the research, e.g. by getting feedback on the research from a wider research community. An example of this potential is from case 2, in which the researcher was allowed to use confidential documents on assessment practice as basis for research. The confidential data was a key source for research, which included recommendations for how to improve practice. These recommendations would not otherwise be made, as no one else has interest in using this material for this purpose. The combination of interdependence and autonomy thus made it possible to publish research with a highly relevant content.

The close association with the cooperating organisation through the high strategic interdependence has also been experienced as limiting the research, when the researcher is trying to gain access in areas with opposition towards the associated organisation. For example in case study 3, the task of performing SEA of the river basin management plans, which is the topic of the research project, was tendered and won by a competing consultancy. This meant that the researcher being closely associated with a competing consultancy was excluded from studying the process. In other situations, the high organisational autonomy may make it possible for the researcher to go beyond the organisation and interact with competing organisations. Such an act may be validated by a belief that the result of it is (more) beneficial for the research project and the collaboration. This has been possible in case 2, in which the researcher has experienced being excluded from access because of her association with the respective organisations. The researcher used her autonomy and built her own relationships beyond the cooperating organisation, emphasising her relative independence from it.

Dialogue on direction of research

The researchers point at dialogue about the direction of the research as an important potential of the Mode 3 setup. The dialogue is seen as an opportunity for enhancing the relevance to practise and society.

The high interdependence in the cases is likely to ensure a dialogue with the organisation as the organisation has interest in the output of the research. In the three cases, the dialogue has given valuable input from a practical angle to keep the project relevant to practise. The organisational autonomy means that the researcher is still free to develop the research design and secure a scientific rigour independently of the practical wishes of the organisation. In case 1 and 3 this influence has been experienced through the fact that the research results are continuously being "reality-checked" by practitioners from the organisation. In this way the researcher gets a valuable input on whether suggestions are relevant for practice.

This dialogue also poses a challenge for researchers because the researcher constantly has to balance between the interests of the organisation, scientific demands and the researcher's own interest. In case 3, for example, the organisation has clear wishes for immediately usable

methodology, while the scientific community expects more time to be spent on issues such as theoretical angle and research methodology.

Ownership of outputs of autonomous research
The last influence identified by the researchers is connected to the utilisation of the results of the research projects. The Mode 3 setup is experienced to give the organisations ownership of the output of the autonomous research, meaning that the output is more likely to be used in the organisations. This support is especially relevant as the researcher - retaining the organisational autonomy - may have chosen approaches and theories that the organisation would not have preferred at first although the researcher found these more beneficial. The combinations of interdependence and autonomy may in such situations make it possible to improve research and practice by double-loop learning processes (Argyris, 1977) in the organisations. For example, case 1 is aiming at this by using theory that is not previously related to the field, and the organisation has supported the researcher's choice.

The experience from the case studies is that for the organisations, the sense of ownership is related to getting a return for their investment, cf. table 2. The organisations have invested in the research projects and have had influence on the direction of the research, so that it has relevance, and they will, if at all possible, try to benefit from it in their organisations. The organisations may even work as platforms for disseminating the research results to society and other practitioners. Case 3 is an example of this, because Rambøll will strive to implement any methodology developed, in their subsequent consultancy work, thus communicating it to their clients. The ownership and backing from the collaborating organisation is in case 2 furthermore experienced to give the output of the research a higher status among related institutions.

Potentials for practice: The organisations' experience
The organisations' responses to the questions of potentials shed light on the cooperative mode of research seen from practitioners' experiences. This section is organised around main issues arising in the written response: The importance of linking research and practice closely; the influence observed and assessed; and the risk and weaknesses.

The importance of close linkages between SEA research and SEA practice
The respondents in general stress the importance of a close relationship between research and practice. The respondents from Energinet.dk and Rambøll e.g. express the value for SEA research as:

> *"The strength is that SEA theory is challenged by reality's diversity of asymmetrical courses and sudden political and strategic changes." (Head of Section, Energinet.dk)*

> *"Sanne gets input for understanding everyday life and problems of the practitioners. Thereby the research study adjusts to a more societal beneficial approach."(Head of Department, Rambøll)*

The contextual aspects of practice are hereby put forward as important for enhancing relevancy of SEA research, even though this does not guarantee an easy implementation in practice. The importance for SEA practise is also raised and related to the organisations' motivation for entering a Mode 3 setup. Energinet.dk chose to initiate the cooperation with Aalborg University because they wanted research input to how to practice SEA, on which plans and especially how to integrate SEA into decision making: "It has always been – and still is – the attitude in Energinet.dk, that SEA shall

not be a shallow paper exercise. SEA shall enter the decision making processes at a time and with content that makes SEA an active element". The same line of motivation is found in the Self Rule who puts it this way:

> *"I like to see the units' cooperation with Anne as an expression of a greater openness to external challenges than some other units' ...Whether it can be said to be evidence that we to a higher degree operate with 'governance' administration principles, I will leave for others to objectively assess – but it is what I as manager of the unit strive for as a principle."(Head of Department, The Greenlandic Self-Rule)*

While Energinet.dk and the Self Rule emphasise both the short and long term perspectives in their views upon the importance of a close relationship between SEA practice and SEA research, Rambøll especially stresses the motivation as short-term business expansion through a competency development. On the long term Rambøll views the importance of cooperation with research for the SEA practice in general:

> *"Rambøll gets access to Aalborg University on a more personal level and thereby easier access to future sparring and development of other cooperations.". (Head of Department, Rambøll)*

The researchers' high engagement in practice is by two respondents underlined as important for the cooperative mode and the content of the research. The following statements from Energinet.dk and the Greenlandic Self Rule exemplify this and point to the importance of grounding research in an understanding of specific contextual circumstances:

> *"Ivar has from the first day shown genuine interest in the dilemmas of Energinet.dk, and has very thoroughly acquainted himself with the atypical decision processes behind a decision on large scale infrastructure projects."(Head of Section, Energinet.dk)*

> *"In relation to the societal perspective, it has been an unconditioned benefit – supposedly a precondition – for Anne, that she is an integrated part of the Greenlandic society." (Head of Department, The Greenlandic Self-Rule)*

The physical affiliation, involving staying in the environment for periods, is part of the high engagement by the researchers and is stressed as an important basis for the influence on their SEA work. The first-hand acquaintance with the actual projects and issues are mentioned as a positive consequence of physical affiliation – in addition to the possibility of involving the SEA knowledge in the processes and to challenge the work undertaken continuously. The researcher becomes integrated and "..not just an external consultant or observant" (Head of Section, Energinet.dk).

The influence observed and assessed

A general observation in the answers from the respondents is the conclusion that the close cooperation has influenced the respondents' competences through the developed understanding and actual work on SEA:

> *"On the concrete and praxis-related level, it have had great impact for progress and development of the specific SEA, that Anne has 'wafted over the water' in different*

> *matters. Anne has through the whole process been a really good sparring partner for me being responsible for the SEA." (Head of Department, The Greenlandic Self-Rule)*

Rambøll who also refers to the personal competency development, but finds it difficult to assess the direct competency development for others and the company in general supports this. The reason put forward is, that the application-oriented part of the research is not yet finished. This may have to do with the character of the company being a consultancy, and the expressed need for tool making. Energinet.dk raises the influence on the competences on a more institutional level:

> *"It has qualified the research project and brought valuable knowledge on SEA from Ivar. Several internal workshops have been held to qualify key employers within SEA. Ivar has participated in the development of internal and external minutes on SEA to be used for establishing a proper SEA policy". (Head of Section, Energinet.dk)*

And continues to stress the influence for other actors and society in general: "Energinet.dk and other authorities have a need to get the SEA processes defined and coordinated properly – in that case the project has already been of great importance".

The hidden influence, or indirect influence, for which it is difficult to establish a clear causal relationship between the research and changes in practice, is discussed as important. The respondent from Greenland explains this indirect influence - due to publication, involvement of informants and just general presence by the researcher - through examples like these:

> *"In relation to The Bureau of Minerals and Petroleum (BMP) and Anne's insistence on getting access to the (so-called) SEA's written by BMP, I think that this insistence has had an impact on the decision that BMP in January 2010 for the first time has started to publish their SEA's."*

> *"It is difficult to express but it has to do with a small society, and here Anne's contribution to the debate has made the media image a bit more nuanced – not on the axis advocate versus opponent, but on the axis unreflective versus reflective."*

These influences are from the authors' perspective related to Mode 3 research, with the normative sight on e.g. democratic SEA processes, supplemented at times with research carried out more independently by the researcher to secure the necessary distance to keep a critical stance.

Risks and weaknesses

Working as closely as it has been the case in the three research projects can also be associated with different risks. One is that researchers do not use the synergies between the three modes of research and get too involved in the specific contextual setting with a risk of not keeping enough distance to be critical. The respondent from Energinet.dk raises this risk:

> *"A potential weakness in the cooperation model is if Ivar is not capable of getting the necessary distance to the experiences in Energinet.dk. If he becomes part of the processes because they are interesting, it might be difficult to keep the appropriate academic distance to the experiences… Energinet.dk has in general not experienced*

> *these weaknesses…more to consider as observation points". (Head of Section, Energinet.dk)*

Another risk put forward by the respondents is the unpredictability in the research process and thereby the actual possibilities of creating synergies between practice and research. Rambøll experienced a lower degree of synergies due to lack of jobs of relevance to the research project:

> *"We tried to get jobs within the core of the research field, but unfortunately failed. Had we won just one of these jobs, and especially the environmental assessment of the river basin management plans, it would presumably have meant a greater involvement of Sanne in the production." (Head of Department, Rambøll)*

The opposite situation was the case for Energinet.dk, since they during the research period experienced massive intake of large projects, which has given a large empirical base for the research project. These experiences raise the need to acknowledge the unpredictability in having cooperative processes, and that the benefits for SEA and the organisation as such might appear later than assumed. For Rambøll it was also an unexpected experience that the close cooperation between Rambøll and Aalborg University limited the access to the process of preparing SEA of the new RBMPs: "We were very surprised to experience, that the process was so closed, and that Rambøll's cooperation with the university and Sanne in that respect was hindering the openness of the authorities" (Head of Department, Rambøll). Still the research has a role to play, but the influence is more on the societal level than for the company as such: "…the research project can give the Danish approach to integration of climate in environmental assessments a lift…" (Head of Department, Rambøll).

Another risk mentioned, is the lack of engagement from the organisation in general. It is experienced by the respondents that a risk with the cooperative model is that only the key person is fully engaged in bridging SEA research and practice:

> *"Rambøll only benefits from the cooperation, if individuals in Rambøll have time/interest/will in getting involved in the cooperation – our conditions for this has actually not been the best." (Head of Department, Rambøll)*

In the Self Rule the cooperation has also been solely coupled to the key person, which has not given beneficial and automatic access to other parts of the organisation:

> *"Some specific conditions have meant that I have right of disposal over necessary resources and at the same time taken the necessary decision competence for the cooperation to become a reality, but I do not hold a sufficiently high position to personally spread 'the happy message' to other parts of the Self Rule. This work should have been done by others, but unfortunately no one else has taken on this task." (Head of Department, The Greenlandic Self-Rule)*

Trough examples as above it is stressed by the respondents that the members of the organisations need to be open and accessible to make a bigger difference. This is in line with the emphasis on interdependence in the Mode 3 setup.

6. Conclusion and Discussion

The article has raised the potentials of SEA research being involved in engaged knowledge making starting with the environmental problem. The point of departure has been the international questioning whether SEA is effective in influencing planning and decision-making processes in the quest for sustainable development. The authors further question whether the experienced gab between SEA research and SEA practise can be due to a scientific non- or low cooperative knowledge production. The article, based upon theories on knowledge production and empirical analysis of three cases of SEA research intervention in ongoing processes, reveals results presented and discussed in the following.

What SEA research as Mode 3 involves
The cases analysed show that Mode 3 research involves predominantly high interdependence between the researcher and the organisation, mainly in terms of economy and engagement. Also a predominantly high organisational autonomy is present, mainly related to acquisition of scientific knowledge and writing. Also there is a measure of autonomy in deciding on research goals, where in Mode 3, research goals are set through a negotiation. The cases also show that doing SEA research can involve different issues, such as different degrees of involvement. Borrowing terminology from Andrew Jamison (2009a), three roles for SEA researchers in the process of inclusiveness are shown:

1. *"Taking side":* The researcher identifies with the field of study (The Greenlandic case in which the researcher develops a kind of partisanship with the Greenlandic society possibly impacted by the drive for implementing new mega industries).

2. *"Helping out":* The researcher becomes a 'critical friend' (The Energinet.dk case in which the researcher critically participates in the processes in the organisation to find ways for SEA to influence decision making).

3. *"Giving advice"*: The researcher keeps an academic distance in advising the organisation (The Rambøll case in which the researcher gives professional input to the development of SEA of water plans and incorporation of climate change in SEA).

The three cases indicate that Mode 3 researchers work in a variety of ways. This variety may be triggered by different situations that the researchers adapt to in the process of doing research.

Potentials for Mode 3 to influence SEA research and SEA practice
The empirical analysis, based upon the experience and reflection of both the researcher and the key person in the cooperating organisations, shows that in the three cases Mode 3 influences SEA research and practice in other ways than Mode 1 and 2.

The engagement and involvement in what is being studied has developed a timely and real-life correlated understanding of the processes in which we are trying to integrate and use SEA as a means for sustainable development. The context is being brought to the forefront, which is assessed by all parties in the three cases as positive and important for research to increase relevance for SEA practice and influence this. Some of the main potentials experienced by researchers and organisations in the three cases are:

- The research mode renders possible a critical review of planning, assessments and decision making processes, as well as of research
- The research mode furthers development of attitudes towards SEA and development of specific assessment skills within the organisations.
- The research mode assists in building bridges among actors within the organisation, and between the organisation and external actors, and eases the communication of SEA results to e.g. the public.

By cooperating on knowledge making, the researchers have also gained benefits by getting increased access to information and processes. This is assessed as improving both the quality of research, and ongoing dissemination of knowledge and research results in non-academic forum. The high autonomy in Mode 3 means that the suggestions of the researcher are likely to go beyond the assumptions and rules that govern practice in the milieu.

The overall conclusion from the study is that potentially a researcher, with high autonomy and interdependence, functions as a change agent for more environmentally sustainable decisions by being part of and influencing the field studied – without devaluing or compromising the traditional scholarship.

The challenges for Mode 3 SEA researchers and the organisations involved

Being part of Mode 3 knowledge making is experienced as challenging in different aspects. First, the researcher is putting himself 'in game'. One needs to know and recognise own knowledge, values and delimitations - and at the same time recognise others'. Second, Mode 3 research is, and needs to be, personally driven, based upon a high engagement and clarification of own values. An overall pitfall of Mode 3 research is also the balance of having a close cooperation and at the same time retaining the critical approach of a researcher. It is a challenge to have a high interdependence and at the same time maintain high autonomy, i.e. without compromising slightly with your ability or willingness to be critical to the organisation with which you are associated. For the organisation the study especially shows challenges in getting a broader organisational engagement and commitment in the SEA research.

The analysis of the Mode 3 cooperation shows research activities with characteristics similar to Mode 1 and 2: From time to time, the researcher's work resembles a consultancy for the benefit of the cooperation and in other periods the researcher's efforts resemble traditional research in detailed studies of a specific. In addition to autonomy and interdependence, what distinguishes the Mode 3 researcher from these other modes is also the reflexivity that precedes and follows the activities resembling other modes: The Mode 3 researcher consciously chooses such research activities when these are beneficial for the cooperation and goal.

The point of departure for the article is that if the SEA research society is to make a difference for practice, we need a wide and deep form of cooperation between researchers and practitioners. This cooperation can be achieved through Mode 3 research entailing co-funding, co-formulation of research questions and co-production of results. We as SEA researchers can choose to be close to the SEA practitioners, decision makers and affected parties and at the same time create temporary space of distance to the relevance demands coming from the co-operators to safeguard rigour. The contextually based Mode 3 research, and the appertaining critical pragmatism, can give us one way to minimise the gap between SEA research and SEA practice. Preconditions for this to happen prove to be personal engagement, shared wish for research to make a difference for SEA practice

and dialogue with a confrontation of own research intention listening to the intentions of the society.

Acknowledgement

The authors wish to acknowledge the work on change agents by Professor Andrew Jamison and would like to thank Jamison for helpful commenting on a draft of the work.

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