USING STAG HUNT BOUNDARY OBJECTS FOR ESTABLISHING RESEARCHER-CLIENT AGREEMENTS IN INFORMATION SYSTEMS ACTION RESEARCH

Petter Øgland, Department of Informatics, University of Oslo, P.O. Box 1080 Blindern, 0316 Oslo, Norway, petterog@ifi.uio.no

Abstract

Within the literature on using canonical action research (CAR) for studying information systems it is claimed that the first CAR principle of establishing a researcher-client agreement (RCA) is of fundamental importance. However, an RCA depends on mutual trust and is not always easy to obtain, especially in environments where there is a history of distrust. Describing such situations through the use of the Stag Hunt model from game theory, this paper suggests that insights on how to play the game of repeated Stag Hunt can be carried over to the empirical situation by coordinating a change from mutual distrust to mutual trust by thoughtful selection of boundary objects that intersect the practice communities of the researcher and the client. The claim is empirically investigated by reflecting on a researcher within a public sector organisation wanting to carry out action research within that organisation on behalf of a university information systems research community. In the explanation of why the data appear to support the hypothesis, (1) reifying the CAR intervention as a method, (2) making the method into an immutable mobile by describing it as an algorithm, and (3) adjusting the CAR to make the intervention algorithm the unit of analysis, are three steps that are argued to increase the likelihood of the Stag Hunt to enter the basin of attraction that makes it possible to establish the RCA.

Keywords: Canonical action research (CAR), researcher-client agreement (RCA), stag hunt model, boundary objects.

1 INTRODUCTION

As argued by Davison et al (2004), obtaining a solid researcher-client agreement (RCA) may be of fundamental importance when planning to do canonical action research (CAR) on issues like organisational change through the use of information systems (IS). Without an RCA there may be a risk of the CAR process breaking down as it becomes difficult to get access to the right data, disagreements on how data should be interpreted or conflicts concerning whether and how the results should be disseminated. Although a formal RCA may in many cases be a necessary condition for conducting CAR, it does not necessarily mean that it is a sufficient condition. As pointed out by Brunsson (1989), it is quite common that there are formal agreements inside organisations being systematically violated in practice. Although there may be many and often quite complex reasons for this pattern, in the case of committing to an RCA the issue of trust is an important issue.

Herr & Anderson (2005, p. 92) address this challenge and illustrate it by referring to a situation where a male white professor of psychology at the University of Illinois at Chicago (UIC) wanted to do action research within a black church-based Chicago community but was met with initial suspicion. Although they do not elaborate the suspicion in detail, one might assume that the suspicion or mistrust may not necessarily be one-sided. While the church-based community may fear being misrepresented by the academic “ivory tower” community, the academic community may fear that lack of cooperation from the church-based community may spoil the research. From the viewpoint of Skyrms (2004), such situations can be described by use of the game theoretical Stag Hunt model where two hunters decide to collaborate in hunting stag or decide to defect and hunt hare. If both communities accept the RCA (collaborate on
hunting stag), the outcome can be large. However, if one part backs out after an RCA has been established and CAR has commenced (decide to hunt hare instead), the community backing out may have gained some benefit while the other ends up having wasted lots to time and resources. On the other hand, if both communities realise at an early stage that an RCA cannot be established, early defection will be better than ending up wasting time and resources in the long run.

An interesting feature with the Stag Hunt model is that there are two Nash equilibria. There is a payoff dominant equilibrium of reaching an RCA and collaborating on stag hunt, and there is a risk dominant equilibrium of avoiding the RCA with each member hunting hare on his own. Both equilibria have basins of attraction. If the initial mutual understanding is close to the mutual decision of hunting stag, the evolutionary trajectory moves towards stag hunt in the long run. In a similar way, if the initial mutual understanding is coloured by distrust, the evolutionary trajectory moves towards hunting hare. However, the basis of attraction is larger for hunting hare than hunting stag. A history of distrust is more likely to result in hunting hare than a history of trust is for hunting stag.

In the UIC/RCA story told by Herr and Anderson, something interesting happens when the leader of the church-based community enters the office of the psychology professor. On one of the office walls there is a large poster of jazz drummer Max Roach, and as they both realise that they share a similar enthusiasm for jazz, they realise that their internal values may not be all that different, and sufficient trust is created for allowing an RCA to be established.

In this case, the Max Roach poster functions as a boundary object (Star & Griesemer, 1989; Wenger, 1998; Kaasbøll, 2013) in the sense that it establishes robust communication and possibilities for mutual learning between two different communities of practice. The purpose of this paper is to investigate the moral of the UIC story by trying to characterise effective boundary objects for resolving the RCA Stag Hunt dilemma in environments of limited trust.

The paper consists of six parts. After having explained the background and motivated the research in the initial part, the second part will articulate the nature of the RCA Stag Hunt model in more detail and hypothesise characteristics of an effective boundary object for redirecting an initially distrustful situation onto a trajectory that moves towards mutual trust and collaboration. The third part explains an institutional environment used for empirically investigating the ideas, including diagnosis, planning and execution of strategy for trying to establish an RCA. The fourth part is evaluation by analysis of results. The fifth part represents learning by reflection as the evaluation is discussed by reference to theory and related research. The sixth part concludes the papers by summarising contributions to theory and practice with recommendations for further research.

2 RESEARCH BACKGROUND AND HYPOTHESIS

This section is made up of two parts. The first part is used for explaining the Stag Hunt model in the context of wanting to establish an RCA for doing CAR. The second part is used for proposing characteristics of an effective boundary object design for stimulating trajectories in the Stag Hunt game to move towards the payoff effective Nash equilibrium.

2.1 The RCA Stag Hunt dilemma

The UIC story in the introduction section about mutual distrust between the research community and client community is not unique. On a general level one might assume that part of the reason for mutual mistrust may have something to do with how values and practices in academia may be different from values and practices in business and industry (e.g. Beer, 1968, pp. 22-23), but there may also be more specific reasons having to do with the nature of information systems action research.
If one agrees with McKay and Marshall (2001) in saying that information systems action research involves both practical problem solving and research, thus embedding two circles of action rather than one, it is clear that this is a kind of endeavour that requires a mixture of practical and academic skills that take time to cultivate. Simonsen (2009), who has several decades of extensive experience with action research practice, goes to the length of warning young researchers against doing action research because of the practical complexities and demands associated with the approach. Baskerville (1999), looking at CAR from a theoretical perspective, comments on how the scientific methods used in action research often conflict with methods expected by those responsible for evaluating research grant applications. So, by trying to bridge the academic community and the client community, IS action researchers may end up being mistrusted by both communities.

However, not only may action research stir distrust due to the burden of balancing practical and academic interests, as action research typically consists of diagnosing a social environment through the use of critical theory and designing political interventions, there are those who would argue that action research always deals with political distrust as it directly or indirectly works with issues like false consciousness, critical awareness and emancipation (Kemmis, 2001; Orlikowski & Baroudi, 1991). Coghlan and Brannick (2001) claim that action research is intensely political, and even more so when researching one’s own organisation. In the context of establishing an RCA, they make the following comment:

\[ \text{you may or may not have [...] access to specific parts of the organisation which are relevant to your research. [...] Negotiating access with your superiors is a tricky business, particularly if the research project aims at good work and not something bland (p. 53).} \]

So, just like the UIC example illustrated, action research is political and it is to be expected that the establishment of an RCA may be made problematic due to mistrust, even though the intention of research is to aid the client in solving mutually agreed upon practical problems.

In the introduction it was explained how the decision to cooperate or defect in the establishment of an RCA could be interpreted through the use of the Stag Hunt game. Table 1 gives a more precise description of how the commitment to RCA can be understood as a Stag Hunt game. It is characterised and made mathematically distinguishable from similar games, like the Prisoners’ Dilemma, by having payoff parameters meet with the real number inequalities \( a > b \geq c \geq d \) and \( w > x \geq y > z \).

<table>
<thead>
<tr>
<th>Client</th>
<th>Commit to RCA (stag)</th>
<th>Defect RCA (hare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commit to RCA (stag)</td>
<td>(a, w)</td>
<td>(b, x)</td>
</tr>
<tr>
<td></td>
<td>Greatest payoff for both</td>
<td>Bad for researcher, good for client.</td>
</tr>
<tr>
<td>Defect RCA (hare)</td>
<td>(c, y)</td>
<td>(d, z)</td>
</tr>
<tr>
<td></td>
<td>Good for researcher, bad for client.</td>
<td>Least risky solution in case of distrust</td>
</tr>
</tbody>
</table>

*Table 1. Commitment to RCA understood as Stag Hunt*

The game matrix describes the RCA establishment as a single-shot game, the payoffs representing the outcome of effective CAR after the RCA has been established, but it can also be thought of as a repeated game where the RCA is continually renegotiated at various stages of getting the research funded, doing the research and completing the research. The discussion of basins of attraction in the introductory section was based on the interpretation of the RCA as a repeated game.

In the case of the RCA example from UIC, the starting condition could be interpreted as being close to the risk dominant equilibrium at the bottom right corner in table 1. If an RCA had been signed under the conditions shown in the upper right corner, this would mean that the church-based community would withdraw after having achieved some benefits but before the researcher was able to do anything meaningful. Complementary, in the bottom left corner the church-based community was tricked into
participating while the research community focused only on problems that were of interest to academic debates with no or perhaps even negative impact on the social conditions they had agreed to investigate. Considering these three scenarios, it is evident that the bottom right corner is the only Nash equilibrium in the sense that no player has anything to gain by changing strategy once both players are playing the defect strategy.

On the other hand, the upper left corner is not only an additional Nash equilibrium, it is also Pareto optimal in the sense that it represents the highest payoff for both players, and is thus referred to as payoff dominant. However, it is only rational for a player to cooperate on the RCA if he trusts that the other player is likely to do the same. If the other player defects, he will end up getting the worst payoff. If that is likely to happen, it would have been better for both players to defect and end up with the risk dominant equilibrium at the bottom right corner in table 1.

However, if both players defect, this means that no RCA is established and no CAR is being done. On the other hand, in the case of the story from UIC it was shown that a boundary object in the shape of a poster of jazz drummer Max Roach changed distrust to trust and made it possible to go from the bottom right corner of the table to the top left corner.

### 2.2 Using boundary objects for changing the outcome of Stag Hunt games

If the researcher and client are in a negotiation process, playing the Stag Hunt repeatedly, a challenge of the game is that the basins of attraction of the two equilibriums are different. If the risk dominant equilibrium has been chosen, it is difficult to regain the trust for moving the payoff dominant equilibrium (Binmore, 2007, pp. 68-70).

The problem with repeating the Stag Hunt game after having played the risk dominant solution is that there is little motivation for either player to change strategy. However, in his analysis of a different game with two Nash equilibria known as the Driving Game, Binmore (2007, pp. 57-58) points out how Sweden switched from driving on the left to driving on the right in the early hours of 1 September 1967. He returns to this example when he discusses what needs to be done in the context of making the players of the Stag Hunt game switch from the risk dominant to the payoff dominant equilibrium (ibid, p. 71).

In the case of the Driving Game, the date of 1 September 1967 played the same role as the Max Roach poster in the RCA Stag Hunt problem. In the Driving Game the players are drivers, and the initial choice to play the Nash equilibrium of driving on the left side could be seen as a more or less random choice as some countries practice driving on the left side while others on the right. However, when Sweden wanted to make a transition to the other equilibrium used by the rest of continental Europe, this could not be done in a gradual or evolutionary process. The change had to occur as a planned and controlled change to be carried out at a precise date and time.

According to Star and Griesemer (1989, p. 393), “boundary objects are objects which are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual-site use. They may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of boundary objects is key in developing and maintaining coherence across intersecting social worlds.”

Both the date 1-Sep-67 and the Max Roach poster can be thought of as boundary objects according to this definition. The date is used for communicating between different driving communities. The Max Roach poster is used for communicating values and trust between a client community and a research community. Both objects are used for facilitating dramatic change in games where gradual change may be cumbersome or even impossible.
The date is abstract and the poster is concrete. However, to facilitate the change, the whole road infrastructure has to be prepared by changing road signs, traffic lights and the total road information system in accordance with the planned change, so in this extended sense both boundary objects were visual and physically concrete. As a means for coordinating traffic, the change date and the new road information system was not designed for having different meanings in different social worlds, although it takes time for people to learn how to read traffic signs. In a similar way, the people who designed the Max Roach poster may not have any particular intentions of making it open to different meanings in different social worlds, but in the reported case it worked as a translation of trust and values from one social world to another.

Reflecting on how boundary objects can be used for facilitating learning, Wenger (1998) develops a theory of learning, meaning and identity from the viewpoint of communities of practice (CoP). Kaasbøll (2013) adds examples and insights for explaining what this perspective means in the context developing organisation-wide digital competence through means like action research. Software and documentation are among his key examples when looking at contexts of boundary interaction between the CoP of an IT department in a non-IT company and the CoP of their vendors (p. 154). As his area of focus is on the development of digital competence, he is particularly concerned with areas like IT support and how this functions as boundary interaction between the IT department and the larger organisation where IT solutions and documentation are the boundary objects (p. 164), and where members of IT support are referred to as “brokers” as they may be able to translate and negotiate knowledge between the two practice regimes. This leads him towards a theory of organisational digital competence development through mutual learning (pp. 167-172).

In the UCI action research study, the Max Roach poster functioned as an initial boundary object as it was able to coordinate the two CoPs, but to make the coordination sustainable the action research project itself made sure that it included a black female PhD student being a member of both of communities (Herr & Anderson, 2005, p. 93), thus being assigned the role as a broker. Once the action research on how to develop community leaders and their visions for community change got started, the Max Roach poster was no longer relevant as an active boundary object and was replaced with a “quote book” in terms of a structured overview of codes extracted from conducting a large number of interviews with the members of the client community (p. 95). Although the quote book boundary object could be seen as similar to software and software documentation in the sense that it allows the broker to negotiate knowledge between the two communities of practice, it is not an “immutable mobile” (Wenger, 1998, p. 290) in the same way as software and software documentation in the sense that the meanings transported through the use of a quote book can be interpreted differently by different readers.

If one were to develop boundary objects for changing the RCA Stag Hunt game by following Kaasbøll’s examples, a natural approach might be to replace the quote book with a methods book containing algorithmic description of the interventions to be investigated through the use of CAR. Unlike quotes and free prose that depend on contextual interpretation, an algorithm is a set of rules of solving a problem in a finite number of steps. Alternatively the boundary object can be formulated in the shape of pseudo code or meta-heuristics if the problem is not given a sufficiently precise mathematical formulation.

Hypothesis: If the CAR aims at investigating a change strategy that can be algorithmically described and is perceived as interesting by both the research community and the client community, the outcome of the RCA Stag Hunt game is likely to change by moving from the risk dominant equilibrium to the payoff dominant equilibrium.

Although the hypothesis and argument leading up to the hypothesis are new, the idea of making action research more likely to succeed by thinking in terms of design science research on artefacts (like algorithms) has previously been suggested by Järvinen (2007). In this sense, the ideas described above can be seen as support of Järvinen’s understanding of action research against some of his detractors (e.g. Iivari & Venable, 2009).
3 RESEARCH METHODOLOGY

This section consists of four parts. The first part presents the general description of the action research approach, in this case self-study research based on the CAR cycle. The second part is the diagnosis of the empirical situation, the third part is the action plan, and the fourth part is the implementation of the plan.

3.1 Self-study research

The population for this study consists of members of organisations like the IT-function of the Norwegian Tax Administration (NTAX) wanting to do action research within their own organisation. In broad terms this means potential action researchers within organisations made up of software engineers and technical personnel working within a professional public sector bureaucracy and following the general rules and regulations of that bureaucracy. Examples of such organisations could be the IT-function of an educational bureaucracy, a healthcare bureaucracy or a government bureaucracy.

The research design corresponds to what Coghlan and Brannick (2001, p. 44) call “individual engaged in reflective practice study of professional practice”, and is inspired by Kaasbøll’s (1998) design for investigating the impact of his own university course designs and teaching methods. The self-study research has been structurally aligned with the principles of canonical action research CAR (Davison et al., 2004) but is not conducted as CAR per se.

3.2 Diagnosis

The author has a long history with NTAX. He worked as an advisor and assistant director (head of quality management) from 1999 to 2005. He then did PhD research on the implementation of TQM at NTAX through the use of bootstrap algorithms from 2006 to 2013. This was expanded into postdoctoral research on how to implement IT governance at NTAX through the use of bootstrap algorithms from 2013 to 2015 while an RCA between the University of Oslo (UiO) and NTAX was being negotiated.

As explained in the theory section, the conditions under which the RCA were being negotiated can be understood as a Stag Hunt game. Using ordinal payoffs for differentiating between preferences, table 2 gives a precise diagnosis of the situation where 3 is the best outcome, 2 is the second best outcome, 1 is the second worst outcome and 0 is the worst outcome.

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Client</th>
<th>Commit to RCA (stag)</th>
<th>Defect RCA (hare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commit to RCA (stag)</td>
<td>(3, 3)</td>
<td>(0, 2)</td>
<td>Bad for researcher, good for client.</td>
</tr>
<tr>
<td>Defect RCA (hare)</td>
<td>(2, 0)</td>
<td>Good for researcher, bad for client.</td>
<td>(1, 1)</td>
</tr>
</tbody>
</table>

Table 2. Commitment to RCA in the case of UiO and NTAX

The upper left quadrant represents the situation where both parties collaborate in hunting stag in terms of establishing an RCA and carrying out CAR for the purpose of solving practical problems at NTAX and doing interesting research on behalf of UiO.

The only reason why this payoff equilibrium should not be chosen as a mutual strategy is if there is a real or perceived risk that one or both other the hunters is going to defect and hunt hare instead. The upper right quadrant represents the situation where UiO commits to RCA and CAR while NTAX makes it practically impossible to go through with the research. Although NTAX may get assistance in solving practical problems, UiO is spending resources without being able to carry out publishable research as planned.
The lower left quadrant represents the reverse situation where NTAX is expecting UiO to contribute to practical problem solving according to plan while UiO is spending all resources on “ivory tower” activities or researching political interventions not fitting with the NTAX management agenda.

Although the final solution of neither part committing to the RCA does not result in CAR, it is at least better than doing CAR in a manner of being exploited and gaining nothing. The lower right quadrant shows the inefficient equilibrium based on mutual decision of not to do CAR.

3.3 Action plan

In order to increase the chance of the Stag Hunt game resulting in NTAX and UiO finding a way of establishing an RCA to do CAR, a boundary object in the shape of the Bootstrap Algorithm (BA) for developing information infrastructure (Hanseth & Aanestad, 2003) was selected as a means for connecting the two communities of practice and making the author into a broker by being a member of both communities. Table 3 below shows the current action plan.

<table>
<thead>
<tr>
<th>Initial plan</th>
<th>If initial plan fails</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Make sure there is a network of people at the research institution who are interested in cultivating collaboration with the action researcher and the client organisation</td>
<td>Use BA for negotiating interest at UiO.</td>
</tr>
<tr>
<td>2. Write a post.doc proposal to the client organisation suggesting the PhD research should be extended through a post.doc research project</td>
<td>Use BA for articulating how practical NTAX problems can be solved.</td>
</tr>
<tr>
<td>3. Establish a formal researcher-client agreement (RCA) between the research institution and client organisation</td>
<td>Use the BA as part of the agreed method to be used and investigated</td>
</tr>
<tr>
<td>4. Carry out the action research according to plans</td>
<td>-</td>
</tr>
<tr>
<td>5. Complete a post.doc book summarising the experiences from implementing steps 1-4 and use the book as a starting point for renewed RCA negotiations</td>
<td>Use the BA as the central theme of the book</td>
</tr>
<tr>
<td>6. Develop an NTAX presentation drawing on the ideas from the PhD and post.doc</td>
<td>Use the BA as the central theme in the presentation</td>
</tr>
<tr>
<td>7. Discuss the presentation with UiO</td>
<td>Discuss how to research the BA</td>
</tr>
<tr>
<td>8. Discuss the presentation with CIO at NTAX</td>
<td>Discuss how the BA is to be implemented in practice</td>
</tr>
<tr>
<td>9. Give the presentation (30 minutes + discussion)</td>
<td>Talk about the BA, elicit questions and response related to the BA</td>
</tr>
<tr>
<td>10. Interview individuals for getting more feedback on what are the problems and how the researcher may help</td>
<td>-</td>
</tr>
<tr>
<td>11. Draft a research proposal and be prepared for writing and submitting a grant application on short notice</td>
<td>Use the BA as part of the agreed method to be used and investigated</td>
</tr>
<tr>
<td>12. Present possible tasks from the proposal for MSc students at UiO</td>
<td>-</td>
</tr>
<tr>
<td>13. Carry out work at NTAX while supervising MSc students</td>
<td>-</td>
</tr>
<tr>
<td>14. Unless already established, make sure a written RCA makes it possible to conduct action research in collaboration with UiO at NTAX.</td>
<td>Use the BA as part of the agreed method to be used and investigated (as in step 3 and 11)</td>
</tr>
</tbody>
</table>

Table 3. Action plan with emphasis on the role of the BA as an RCA boundary object for each step
The first half of the plan (steps 1-4) was articulated in an informal manner between the author and UiO in November 2013. The second half (steps 5-14) was articulated in April 2015 after the Stag Hunt game got stuck in the risk dominant lower right quadrant of table 2.

As seen from the right hand column of the action plan table, the BA is used as a boundary object on almost every step of the plan. The only steps where the BA is not mentioned are in steps having to do with the writing and submitting of individual research papers (step 4), interviewing members of NTAX for the purpose of understanding what are the perceived problems and how they believe the action research study can help (step 10), and the supervision of M.Sc. students as means for establishing an RCA with UiO without necessarily being tied up with the BA formulation (steps 12-13).

3.4 Execution of action plan

The first step of the plan was implemented in December 2013 by engaging with a network of scholars at UiO who found the premise of the study interesting. As a consequence, the second step of writing and presenting an initial draft proposal for NTAX was carried out. NTAX responded to the proposal by saying that the idea was interesting if external funding could be found. As a consequence of this, step three started in January 2014 by trying to find ways of getting funded. However, after grant applications failed in June 2014 and February 2015, NTAX felt the grant application process could not continue indefinitely. This meant that step four, which had been running in parallel with the grant application process, ended in March 2015.

Step five and six both started in April 2015. By the end of June 2015, both the post.doc book and the presentation were more or less completed (draft versions). Step seven was run as a control process for discussing the content of the book and presentation for the same period. In June 2015 NTAX expressed satisfaction with the progress on the book and reported that they would be interested in discussing the presentation before getting on with the further steps of the plan.

4 ANALYSIS OF RESULTS

The purpose of this section is to comment on whether the research hypothesis is confirmed by the study in terms of supporting evidence of it being easier to establish an RCA when using an algorithmic representation of the intervention strategy as a boundary object. In the NTAX/UiO case, the intervention was aimed at improving IT governance by bootstrapping, focusing on an algorithmic articulation of the bootstrap strategy known as the Bootstrap Algorithm (BA).

In order to evaluate the success of the approach, table 4 gives an overview of the use of the BA as a boundary object in the various attempts made by the author to negotiate meaning between the research community and the client community.

As the table shows, the BA is used as a boundary object in various formal and informal discussions and negotiations, including three versions of a research proposal, a post.doc book summarising the outcome of the first part of the action plan from section 3.3, and a presentation defined as a means of new RCA negotiations in the second part of the action plan. The BA was also used in some of the research papers written and published while working with the grant application process. The papers are included in the appendix of the post.doc book but did not play an explicit role in the RCA negotiations.

The articulation of the BA was done in different ways in the various documents. In the draft research proposal from December 2013, the BA was explained in broad terms as a solution worth investigating for addressing current challenges in IT governance at NTAX, but it did not include a detailed algorithmic description of the BA. In the grant application that was submitted to a regional research fund (RFFH) in April 2014, the details of the BA were still not written out as the focus was on the need for understanding the conditions that made the BA approach relevant. In the RFFH grant application that was submitted in
October 2014, the BA was written out, translated and explained in the context of wanting to implement IT governance. When reflecting upon the development of the three research proposals in retrospect, it can be noticed that there seems to be a correlation between the proposals being gradually more successful and the clarity in the articulation of the BA. Although the first part of the action plan failed, the more articulate the BA became as a boundary object, the easier it was to elicit meaningful and constructive response both from the research community and the client community.

The first part of the action plan describes a Stag Hunt game where UiO and NTAX collaborate in hunting stag through the belief or hope that the grant applications will result in funding and thus allow the CAR process to start. From the viewpoint of UiO and the author, temporary setbacks by having grant applications rejected were unfortunate but not necessarily critical. Because the process of writing applications and waiting for results also allowed for hunting hare in the sense of doing publishable research that did not involve implementing CAR at NTAX, the Stag Hunt game from the UiO perspective played out from the viewpoint of the lower left quadrant in table 2. UiO got two points, and NTAX got zero. However, from the NTAX situation, this was not an acceptable solution. The repeated game of writing and submitting research applications reached an end when NTAX decided to defect the RCA, and the game ended by reaching the equilibrium in the bottom right quadrant of the table.

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Event Description</th>
<th>Researcher/broker</th>
<th>Research community</th>
<th>Client community</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>Nov</td>
<td>The BA is used in conversations with UiO professor to figure out whether he will be willing to mentor a post.doc CAR project on implementing IT governance at NTAX.</td>
<td>The BA is used in conversations with UiO professor to figure out whether he will be willing to mentor a post.doc CAR project on implementing IT governance at NTAX.</td>
<td>Although the UiO professor is not a BA expert, he has made previous comments about the usefulness of the BA as a means for making research concrete. He finds the idea interesting and accepts the role as mentor.</td>
<td>The CIO at NTAX agrees with certain points made in the research proposal, but makes no comments about the BA. His main concern is that a CAR project has to be externally funded.</td>
</tr>
<tr>
<td>2013</td>
<td>Dec</td>
<td>Research questions related to the BA are articulated in a draft proposal to be discussed with UiO and NTAX.</td>
<td>Research questions related to the BA are articulated in a draft proposal to be discussed with UiO and NTAX.</td>
<td>In addition to the UiO mentor, additional three professors show interest and agree to participate. One of them is the inventor of the BA. The second has no opinion on the BA but is interested in IT governance. The third is both interested in the BA and IT governance.</td>
<td>The CIO at NTAX agrees with certain points made in the research proposal, but makes no comments about the BA. His main concern is that a CAR project has to be externally funded.</td>
</tr>
<tr>
<td>2014</td>
<td>Apr</td>
<td>A research question involving the BA is used in a grant application written and submitted to a regional research fund (RFFH).</td>
<td>The application evaluators did not score the application sufficiently high, and the research grant is rejected (June 2014).</td>
<td>NTAX were not able to endorse the grant before it was submitted.</td>
<td>NTAX were not able to endorse the grant before it was submitted.</td>
</tr>
<tr>
<td>2014</td>
<td>Oct</td>
<td>A new grant application with even stronger focus on the BA is written and submitted.</td>
<td>A new grant application with even stronger focus on the BA is written and submitted.</td>
<td>The RFFH evaluation committee gave the new application higher score (February 2015), but it still failed in competition with other applications.</td>
<td>The application included an endorsement from NTAX.</td>
</tr>
<tr>
<td>2015</td>
<td>Mar</td>
<td>The author wants to complete a first version of the post.doc book as a means for rethinking how to articulate the next grant application.</td>
<td>The author wants to complete a first version of the post.doc book as a means for rethinking how to articulate the next grant application.</td>
<td>A fellow post.doc student at UiO says it sounds like much work, but believes it might be worth a try.</td>
<td>The CIO at NTAX calls off the RCA project and asks the author to return to NTAX and prepare lectures for chosen work groups.</td>
</tr>
<tr>
<td>2015</td>
<td>Jun</td>
<td>The author writes draft versions of post.doc book and NTAX presentation, both using the BA as the central theme.</td>
<td>The author writes draft versions of post.doc book and NTAX presentation, both using the BA as the central theme.</td>
<td>The mentor at UiO commits to writing a foreword to the book, and he gives improvement suggestions on the draft presentation.</td>
<td>The CIO is satisfied with the progress on the book and is interested in discussing the presentation when ready.</td>
</tr>
</tbody>
</table>

Table 4. Overview of how the BA is used as a boundary object in the RCA negotiations
When it comes to the second part of the action plan, where the author and UiO try to use the BA for convincing NTAX to collaborate on a possibly different kind of RCA, it was explained as part of the implementation comments in section 3.4 and it can also be seen in the status in table 4 that the outcome is uncertain. However, steps 5-7 of the action plan in section 3.3 have been completed and the final row in table 4 shows that NTAX is prepared for collaborating on step 8 and 9. What remains to be seen is whether the BA is sufficiently articulated through the book and presentation to allow a formal or informal RCA to emerge in the manner suggested by steps 10-14.

Although it is impossible to predict with full confidence what will happen, the experience so far has been that the more clearly the BA is articulated as a boundary object, the more efficiently it can be used by the broker in coordinating the interests of the two CoPs and thus convince them to move from the presently chosen risk dominant equilibrium and back to the payoff dominant equilibrium.

Based on the current collection and analysis of data, the research hypothesis is weakly confirmed in the sense that the data fit with the hypothesis and seem inconsistent with the null-hypothesis that an algorithmic representation of the intervention strategy has no impact on the ease of establishing an RCA.

5 DISCUSSION

The purpose of the discussion is to comment on what the outcome of the analysis means in the context of theory and related research. The discussion consists of three parts where issues of reification, immutable mobiles and design science research are dealt with.

5.1 Reification and the creation of meaning

Although the analysis of results was concluded by saying that the data confirmed the research hypothesis, it was also pointed out that the idea of using the BA as a boundary object evolved along the process. In the later stages of the action plan, the BA was articulated more clearly and precisely. In the language of Wenger (1998), the boundary object evolved through a process of reification, making the BA more and more relevant for creating meaning and learning. Focusing on the BA as a “thing” made it both possible for the research community and the client community to establish a meaningful dialogue about using the BA, although this would carry a slightly different meaning for each of the communities. For the client community the BA could be useful as a practical or political tool. Although it would hopefully be practical in terms of delivering what it promised, it could also be seen as a political tool in the sense that it might be useful to explain current practice by referring to a documented process. For the research community the BA could be seen as a design hypothesis within a larger perspective of information infrastructure theory, meaning that any confirmation or refutation of claims associated with the hypothesis could be useful for further theory development.

The central concern in this context is that both communities of practice have an understanding of the BA as a something that can be written down on a piece of papers as a flowchart or a sequence of instructions. More generally, the reification of the intervention strategy implies that it is possible to think about the intervention as a physical book. Although the client may have a vague notion of what the BA is and the research may operate with several meanings and definitions, when considering the BA as a boundary object it can be conceptualised as a printed book called something like “The Bootstrap Algorithm: How to develop IT governance infrastructures”. From the client perspective it is a book they have not yet read but expect to be using to implement IT governance in a successful manner. From the research perspective it is a well-known book that is about to be rewritten as a consequence of what will happen when attempts to implement IT governance is carried out in the client organisation.

Although the reification of the BA process contributes in bringing credibility to the claims made in the analysis of results, one might ask whether similar or better results could be obtained by reifying other concepts, such as a the model used for diagnosing the client organisation, and use this as a boundary
object. Much qualitative research is carried out trying to understand how socio-technical systems work, perhaps with particular focus on trying to find patterns that explain why certain systems and processes do not work. For example, in an anthology book on scientific models in science, biology and social studies, Geertz (2007) describes the outcomes of ethnographic research as “model systems” and explains (using different terminology) how the problem situation is reified and used as a boundary object between different communities of anthropological research. However, the problem with this approach in the RCA context is that it may be interesting from the research community, especially if the research community consists of anthropologists wanting to do ethnographical research by investigating and describing client rituals that provide challenges in implementing IT governance, but less obvious that the client community would like to have the action research focused in this manner. When trying to convince a client to do CAR it might be more effective to emphasis what can be gained in terms of improving performance and making things work rather than trying to sell the concept of working out potentially humiliating explanations of why things do not work.

Although the reification of the problem might be a good idea from an action research perspective, as it could be a way of investigating root causes for observed problems rather than testing solutions without being fully aware of whether the problems have been properly understood, it might still be easier to reach collaboration with the client community if the boundary object communicated a positive focus by allowing the CAR to align with whatever the organisation is already focused on in terms of improvement programmes, such as Lean, Six Sigma or TQM.

5.2 Immutable mobiles and the need to make meaning precise

Another important issue that needs to be commented on is the making of the boundary object into an “immutable mobile” (Wenger, 1998, p. 290) by focusing on the algorithmic representation of the intervention strategy. This contrasts the spread and use of business ideas such as Lean, Six Sigma and TQM through “translation theory” (e.g. Røvik, 2007), where the idea is to make use of guidelines that allows the strategy to be translated and contextualised to support the specific needs of the organisational situation. In RCA/CAR case the situation is opposite. The purpose of reifying the intervention process is to make sure that there is little room for interpretation. To make sure an RCA is reached and CAR can commence as planned, it is necessary that the BA does not mutate into different things depending on who is using it and where it is being used.

When considering the BA from the viewpoint of the research community, it has been described in different ways depending on how it is being used. There are three extreme cases; BA as a set of principles (Hanseth & Lyytimen, 2010), the BA as pseudo-code (Hanseth & Aanestad, 2003), and the BA as a precise algorithm (Øgland, 2013). As was pointed out in the analysis of results, these three extreme ways of articulating the BA can also be used for explaining the evolution of the RCA process and how the experimental data support the research hypothesis in terms of saying that the clarification of the BA as a boundary object facilitated the negotiation of meaning.

In the first research proposals the BA was described by indirect reference to the principles of designing for initial usefulness, drawing upon the existing installed base and expanding the installed base by persuasive tactics, as explained by Hanseth and Lyytimen (2010, p. 6). Although this provides a compact description of the BA, it is a much less reified conceptualisation of the process than the original six lines of pseudo-code comprising initialisation instructions and a five-step control loop (Hanseth & Aanestad, 2003, p. 14). Although the pseudo-code version of the BA would still not be an immutable mobile in the sense that it is still open for interpretation, it was nevertheless described in a way that made it feel like a “thing”, and thus made it easier to use when negotiating meaning.

Øgland (2013) discusses strategies for turning the pseudo-code into code, making it into a proper immutable mobile. For the purpose of carrying out the CAR study suggested by the research proposals this would arguably be important, but for the purpose of establishing the RCA the empirical data suggests
that it was sufficient to use the pseudo-code version of the BA and refer to the literature on how to turn it into proper code. When negotiating the RCA the point was not to reach a unified understanding of the BA by seeing it as a precise mathematical object, but it was to reach a common and sufficient understanding to make an RCA attractable. The point was to reach an understanding by way of letting the general pseudo-code represent the immutable mobile while bracketing the fact that the actual immutable mobile in question can only exist as decontextualised code after being precisely articulated to match with some specific context.

At the time of negotiating an initial RCA, the point is not to make sure that the various client understandings and researcher understandings of the BA converge into one single understanding, but it is to prevent differences in understanding that may cause the RCA to break down at a later stage.

5.3 Designing action research as design science research

As was pointed out at the end of the theory section, it has been argued that CAR can be made more successful by thinking about it as doing design science research (DSR) on artefacts (Järvinen, 2007). In the case of planning a CAR study at NTAX, it would mean doing DSR on the BA artefact as a means for developing IT governance. However, the CAR/DSR idea is controversial. Iivari and Venable (2009), for instance, have said that CAR and DSR represent fundamentally different ways of thinking about research. CAR has its roots in social psychology where the method was used for diagnosing states of oppression and studying means of emancipation. DSR, on the other hand, evolved from the tradition of engineering research. By comparing ontology, epistemology, axiology and methodology, CAR and DSR can be seen to represent different research paradigms, and only in special cases would it be possible to design CAR as DSR. Translating CAR into DSR means to translate it into social engineering.

Nevertheless, by designing CAR as DSR on the BA as a means for developing IT governance, the explicitly political nature of the BA approach, in terms of how it develops infrastructure by aligning interests and changing the topology within a network of social power, is translated into a seemingly non-political engineering approach. The nature of this translation also contributes in the explanation of why the empirical data fit with the research hypothesis. By downplaying the political aspects of BA and CAR, it becomes easier to negotiate meaning without having to deal with political values and assumptions built into the BA approach and how they might conflict with those of the client community.

This final point is not at least important in the context of how Hanseth and Lyytinen (2010, p. 16) reflect on the challenge of how the BA approach implies a design practice that often contradicts the institutional norms and patterns in environments where it should be applied. As this study suggests, reification of the BA, using the reified BA as a boundary object for negotiation an RCA and doing CAR as DSR could be a way of making it easier for design communities to accept the BA design principles.

6 CONCLUSION

The conclusion section starts by summarising the implications of the study for research and practice. It then indicates some limitations due to the nature of the study and suggests directions for future research.

6.1 Implications for theory and practice

The study was motivated by the importance of the first principle of canonical action research (CAR), establishing a researcher-client agreement (RCA), and how it may often be difficult to meet this principle in practice. By working with this dilemma, two contributions to theory and practice were made. The first contribution was to think of the establishment of an RCA as a Stag Hunt game where players either collaborate or defect. The second contribution was to reify the intervention process and use this as a boundary object for negotiating meaning that would increasing the likelihood of the Stag Hunt game
resulting in collaboration (establishment of RCA) even in cases where the iterative game was stuck in the equilibrium of mutual defection.

Ongoing efforts of trying to establish an RCA for doing CAR on how to implementing IT governance at the Norwegian Tax Administration (NTAX) by use of bootstrap algorithms (BA) was used to test and illustrate the idea. In this context of using the BA as an intervention strategy, the discussion of how the boundary object aided the outcome of the Stag Hunt game suggested three implications for practice.

1. By communicating the BA as a thing, negotiation of meaning and the likelihood of RCA success may increase
2. By communicating the idea that the BA is a immutable mobile (executable algorithm), conceptual misunderstandings can be avoided and the likelihood of RCA success may increase further
3. By articulating CAR through the focus on the BA, thus making it conceptually similar to design science research (DSR), the project may be conceived as less openly political and the likelihood of RCA success may increase still further

Although the study suggests ways of dealing with well-known challenges in how to adopt BA design practices (Hanseth & Lyytinen, 2010), this is seen as a special case of the main contributions from the study, namely the formulation of the RCA Stag Hunt dilemma and how to solve the dilemma through the use of the conceptualisation of the intervention strategy as a boundary object.

6.2 Limitations and directions for future research

At the completion of the analysis of results it was said that the existing collection and analysis of data provided a weak confirmation of the research hypothesis as they seemed consistent with the hypothesis and inconsistent with the reverse claim (null-hypothesis). However, as was explained in the methods section, the action plan is still not fully implemented, so it is not yet known whether an RCA will be established and the CAR project can commence as anticipated.

In this respect the monitoring of the action plan has to be continued until an RCA is formally achieved or some circumstance makes the RCA impossible. Although the first alternative is the most tractable from the viewpoint of getting started with the CAR process, from the viewpoint of the ideas presented in this paper, a breakdown of the RCA establishing process is more likely to result in further reflection and improved understanding on how to play the RCA Stag Hunt game.

In other words, while the nature of action research studies makes it difficult to provide more than anecdotal evidence on how to design interventions, they are ideally suited for providing deep contextual insights and learning on interventions that go wrong. While future research should be aimed at solving important problems by developing the best possible strategies, as was the aim of this study, it is important for future research to document and reflect upon intervention failure as this may paradoxically be the ultimate strength of the action research paradigm.

References


Järvinen, P. (2007). Action research is similar to design science. *Quality & Quantity, 41*(1), 37-54.


