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Innovation leadership in innovation projects: the application of the reflective practitioner model

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Abstract[1]

In 1983 Donald Schön wrote the *Reflective Practitioner* which implicitly but never explicitly contains a model of steps what it is to act as a reflective practitioner in real life. In this paper we apply that model and try to make this latent (tacit) model into a manifest (explicit) model. Project leaders of innovation teams were studied via in-depth interviewing to assess how they dealt with critical incidents in their projects. Some of these project leaders were able to set in motion actions of recovery which led the project back to the track into which the chances improved to achieve a desired result. Without being aware of it, they applied the steps of Schön's model. These steps are roughly: recognize a problem, research the problem, develop alternative solutions, test solutions and alternatives on their validity, try and experiment with solutions, select and apply a solution, evaluate the process. The results of the study can help innovation leadership in practice.

Keywords: reflective practitioner; organisational learning; project management; innovation leadership

1. Introduction

The process of innovation projects largely depends on the quality of project leaders and their engaging leadership (Burke, Stagl, Klein, Goodwin et al, 2006; Müller & Turner, 2010), although much remains unclear about the best leadership styles in particular circumstances (Clarke, 2012). Innovation projects have their ups and downs. What project leaders do during downs and setbacks in projects is assumed to affect the progress of projects and the innovation that is being developed. Dealing with setbacks is a way of problem solving by project leaders which implies a deviation from rule-based and routinized tasks. Such deviations originate when setbacks are experienced, subsequently reflected upon, lead to learning in terms of modified beliefs, mental models and knowledge, and eventually resulting in active problem-solving behaviour (Schley & Van Woerkom, 2014). Schley and Van Woerkom argue that reflection is basic to learning and problem-solving. Learning is closely related to innovation for which reflective skills are crucial (Verdonschot, 2006)

[1] Book of Abstracts, 3rd ISA Forum of Sociology, ISA and Universität Wien, RC52-595.7 (page 518) www.isa-sociology.org/forum-2016

and therefore relevant to project leaders and their teams executing innovation projects. Learning in the workplace occurs when someone experiences that one's own expertise does not meet the demands to fulfil a given task, and when this problematic task triggers reflection. A problem-solving situation emerges if there are barriers that prevent getting from a present state to a desired goal state, which require new behaviours through thinking and reflection. Reflection is crucial for problem-solving, workplace learning and professional development. Reflection, however, is, in deviation of routine and rule-based behaviour, "only triggered if there is an instruction or the appearance of any failure within routines, for example, through errors, obviously and surprisingly changed conditions, questions and dissatisfaction, and these circumstances offer the possibility of solving the problem or breaking up routines and inducing workplace learning" (Schley & Van Woerkom, 2014: 115). Schley and Van Woerkom define reflection as "the deliberate realisation and critical analysis of a memory content (object of reflection as a thought) using the mechanisms of recapitulation and reconstruction". According to them "the reflectitioner looks at various perspectives and varying viewpoints (extent of reflection), in regard to different qualitative outcomes of the learning potentials (levels of reflection) and its possibilities to learn and solve problems as a kind of Munchhausen trick, to lift oneself up by one's own bootstraps" (Schley & Van Woerkom, 2014: 118). Reflection to them is a conscious, voluntary, cognitive process (Dewey, 2004: 6) and happens once it is triggered by errors, mistakes and surprises, either positive or negative. But positive or negative emotion-based evaluations, such as "(1) surprise, interest and fright; (2) palatableness, approximation / prevention and passion / disinclination; (3) fright and anger vs. pleasure and satisfaction", are not enough as triggers. Schley and Van Woerkom claim that reflection processes only start when the appraisal comes from the fourth level of intellectual regulation, "(4) confidence vs. fear, awkwardness and depression", otherwise, people perform routines and automated autonomous reactions, sometimes rule-based (Schley & Van Woerkom, 2014: 120), which have in common that these are unconscious or subconscious. To authors like Schley and Van Woerkom (2014) and Van Woerkom and Croon (2008) reflection and learning are conscious processes, where others state that people also learn from routine and rule-based processes, albeit that these processes are tacit and unconscious or subconscious (Argyris & Schön; 1974, 1996; and Schön, 1983, 1987, 1991a), to whom we turn below.

First we point to some differences between related terms as reflection, reflexivity and reflective practices, and critical reflection and reflexivity (Fook, 2013: 3-4). Reflection is a process of learning from experience, and involves the process of questioning the foundations of beliefs with a preparedness to change them in the light of that questioning. Reflexivity refers to an acknowledgement of how our self plays a role in the knowledge that people recognise and develop. Thus how we see the world, others, and our place in relation to it and to them. Critical reflection or reflexivity links individual thinking and practice and the social and historical context in which they occur, which includes elements such as power relations, politics and institutions. Reflective practice is a notion developed by Schön, and central in this contribution, namely that tacit knowledge of practitioners can be made explicit by reflection and thus improve their practice.

Second we address the fact that several authors write about reflection or reflective practices (also) as a self-reflective and self-evaluating process of individuals, who, consequently may change their own behaviour, attitudes or thinking. They regard a reflective practitioner as a person who applying reflection on itself, and a qualified reflective practitioner as a person who is capable to apply this to a certain level of introspection (learning from experience) enabling to bring about change and

personal or professional growth (for example Finlay, 2002, 2008; Fook, 2002, 2013; Greenwood, 1998; Kressel, 1997; Johns, 2013; Ollila, 2000). While there is nothing wrong with that, we just want to stress that this article focuses on how project leaders deal with critical incidents in innovation projects by reflective practices. These project leaders apply a research methodology as a tool for problem-solving that resembles an implicit or tacit model proposed by Schön. While they consciously solve the problem at hand, they subconsciously or unconsciously apply a variant of Schön's model. For Schön tacit or implicit knowledge are embedded in practice; practice, therefore, should be scrutinized to make this implicit knowledge explicit and thus improve the practice (Fook, 2013). This means that practitioners already 'know' about their practice, but not always explicitly. Our interest is on the model applied, and not so much on intrapsychic introspection and reflection by these project leaders. We will connect this model to the notion of organizational learning.

2. Reflective practitioner and organizational learning

Reflection as research

For Schön the reflective practitioner is the opposite of a technical rational problem solver. Technical rationality is the model in which professional activity consists in instrumental problem solving made rigorous by the application of scientific theory and technique (Schön, 1983: 21). However, this rational model is inadequate to help society achieve its objectives and solve its problems, as we increasingly have become aware that the actual practice of these problems is complex, uncertain, unstable, and inclined to value-conflict, for which the technical rationality model is unfit (Schön, 1983: 39). As a result, professionals suffer from a legitimacy crisis, because they are being swinged back and forth between (positivist) rigor on the one hand and (everyday practical) relevance on the other. Schön proposes to leave aside the technical rationality model and "search, instead, for an epistemology of practice that is implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict" (Schön, 1983: 49). For Schön, competent professionals have much knowledge that they apply in solving issues more or less unaware, which he calls tacit knowing-in-action. With this knowledge, professionals are able to achieve desired results based on skills and experience unreflective, as a repertoire of 'automated behaviours'. The tacit knowing-in-action are spontaneous actions, of which people are often unware of having learned to do them, and of which people are often usually unable to describe the (internalised) knowing which their action reveals (Schön, 1983: 54). But sometimes professional practitioners think about what they are doing, or while they are doing it, because they are stimulated by surprise (Schön, 1983: 50).

Reflecting-in-action is a concept meaning that we not only can think about doing, but that we can think about doing something while doing it (Schön, 1983: 50). Big-league baseball pitchers, for example, can have 'a special feel for the ball', by which they can command the ball to repeat exact the same successful thing, or 'find the groove', which is trying to repeat winning habits every time they perform on the pitch. In such instances players can not only reflect-on-action, but also reflect-in-action. Much reflection-in-action hinges on the experience of surprise, on unexpected effects. Surprise often evokes a response like reflection-in-action. Schön mentions the example of an improvising jazz ensemble, where players all know the basic theme, but where individual musicians respond to one another in order to create a coherent performance of the ensemble. 'They are

reflecting-in-action on the music they are collectively making and on their individual contribution to it, think what they are doing and, in the process, evolving their way of doing it" (Schön, 1983: 56). A practitioner's reflection-in-action is bounded by the 'action-present', the zone of time in which action can still make a difference to the situations. The action-present may stretch over seconds for a sportsman, to days for a lawyer, or even months for a project manager, depending on the pace of the activity and the situational boundaries of the practice (Schön, 1983: 62).

Reflective practitioners function in a practice, which can be seen as the professional situation one is working in. For project leaders these are 'cases' like projects. A professional practitioner is a specialist who encounters certain types of situations again and again (Schön, 1983: 60). Practicing the practice, the professional develops a repertoire of expectations, images, and techniques. Eventually, the built up knowing-in-practice tends to become increasingly tacit, spontaneous and automatic through which the professional can largely act highly effective by tacit knowing-in-action. Most professionals, however, experience variations in their work situation, due to the complexity of practices these days, and as a consequence they have to learn new skills. Practitioners thus reflect on their knowing-in-practice as well.

Schön would never say that reflective practitioners follow certain steps in performing reflection-in-action, because that would come very close to an instrumental approach resembling technical rationality which he criticises. But when you read closely what he is writing there is a model underlying his thinking. And although this model must not be seen as a simplified linear way of thinking how professionals deal with surprises, it is helpful to try to understand which steps are involved (Schön, 1983: 68-69; 1987: 26-29). Professionals think on their feet, they improvise, and they act both intuitively and creatively (Finlay, 2008). Step 0 is when persons act routinely without being conscious that they are skilled professionals.

0. In a routine situation there is no reflection-in-action because a task or operation runs smoothly. "There is, to begin with, a situation of action to which we bring spontaneous, routinized responses. These reveal knowing-in-action that may be described in terms of strategies, understandings of phenomena, and ways of framing a task or problem appropriate to the situation. The knowing-in-action is tacit, spontaneously delivered without conscious deliberation; and it works, yielding intended outcomes so long as the situation falls within the boundaries of what we have learned to treat as normal" (Schön, 1987: 28).
1. The practitioner allows him/herself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. This may happen in a situation which is 'not normal'. "Routine responses produce a surprise – an unexpected outcome, pleasant or unpleasant, that does not fit the categories of our knowing-in-action. Inherent in a surprise is the fact that it gets our attention" (Schön, 1987: 28).
2. The practitioner reflects on the phenomena and on the prior understandings which have been implicit is his / her behaviour and experience. "Surprise leads to a reflection within an action-present. Reflection is at least in some measure conscious, although it need not occur in the medium of words. We consider both the unexpected event and the knowing-in-action that led up to it, asking ourselves, as it were, "'What is this?' And, at the same time, 'How have I been thinking about it?'. Our thought turns back on the surprising phenomenon and, at the same time, back on itself" (Schön, 1987: 28).

3. The practitioner rephrases the situation. “Reflection-in-action has a critical function, questioning the assumptional structure of knowing-in-action. We think critically about the thinking that got us into this fix or this opportunity; and we may, in the process, restructure strategies of action, understanding of phenomena, or ways of framing problems” (Schön, 1987: 28).
4. The practitioner carries out an experiment which serves to generate both a new understanding of the phenomena and a change in the situation. “Reflection gives rise to on-the-spot experiment. We think up and try out new actions intended to explore the newly observed phenomena, test our tentative understandings of them, or affirm the moves we have invented to change things for the better (…). On-the-spot experiment may work, again in the sense of yielding intended results, or it may produce surprises that call for further reflection and experiment” (Schön, 1987: 28).

When reflecting-in-action the practitioner becomes a researcher in the practice context. The practitioner acts independent of the established theory and technique, and constructs a new theory of the unique case; the inquiries are not limited by predefined means and ends; in ratiocinating (logical reasoning) towards a decision, the practitioner does not separate thinking from doing, builds implementation into the inquiry and experiment, and converts the decision to action; because this reflection-in-action is not bound by the limitations of technical rationality it can proceed even in situations of uncertainty or uniqueness (Schön, 1983: 68).

The practitioner as a researcher thus implicitly applies a research methodology: 1] to acknowledge or recognize a situation as a problem (or issue that demands a response), 2] to investigate the problem, 3] to develop alternative solutions, 4] to test solutions and alternatives on their validity, and to try and experiment with solutions, 5] to select and apply a solution, 6] to evaluate the result of the (new) process. The research approach is at the same time a learning activity, because reflection and learning are closely related.

Reflection as learning

The reflective practitioner is a professional who learns. Learning is essential in innovation projects to prevent failure and disinvestment. The model of the reflective practitioner can be linked to that of organisational learning, which distincts single, double and triple loop learning (Argyris, 1999: 68; Argyris & Schön, 1974: 18-19; Tosey et al, 2011). When a professional is carrying out a task based on tacit knowing-in-action the learning is limited to building up experience by the execution of routine tasks. A novice learns more than an expert in such an instance. If a task is carried out with the intended result, there is no reflection. When there is a mismatch between the expected result and the actual result, a professional may apply an alternative, yet available, action as a solution. This is a single loop learning activity which means learning what is already available as knowledge-in-action, for example among colleagues. “Single-loop learning occurs whenever an error is detected and corrected without questioning or altering the underlying values of the system (…) when matches are created, or when mismatches are corrected by changing actions” (Argyris, 1999: 68).

If a single loop action does not render a solution, the mismatch remains. The professional may apply a double loop learning action as a solution. This may lead to variating the norms including the variation of the existing governing values. It might be a new solution and therefore a new action that

is broadening the action repertoire. "Double-loop learning occurs when mismatches are corrected by first examining and altering the governing variables and then the actions" (Argyris, 1999: 68).

If this action (still) does not result in a solution, and the mismatch remains, a professional, with enough experience and expertise, unlikely a novice, may develop triple loop learning actions as a solution. At this level a professional 'learns-to-learn' and is able to not only variate the norms and change them, but to come up with totally new values. This implies that new governing values may emerge because former ones are being rejected. The system as a whole changes, as if there is a paradigm shift, resulting in "a corrective change in the system of sets of alternatives from which choice is made" (Tosey et al, 2011)[2]. From time to time serendipity, charismatic behaviours, reckless risk taking, and foolishness, for example, are appearing, and these can set systemic change in motion. Such triple loop learning hardly appears, however, and is not present in the models of Argyris & Schön or Schön (Visser, 2007; Tosey et al, 2011). Moreover, triple loop learning has 'a dark side, is non-instrumental, exists beyond language and is recursive' (Tosey et al, 2011: 303). Because it is risky as well – i.e., its dark side –, triple loop learning is no guarantee for improvement; like innovation itself is not a guarantee for improvement (Sveiby, Gripenberg & Segercrants, 2012). Triple loop learning "cannot be actively planned and may not necessarily have beneficial outcomes" (Tosey et al, 2011: 304). While triple loop learning bears conceptual relevance to organisational learning, there is not much empirical data (Tosey et al, 2011). And while Schön nor Argyris give examples of such learning[3], it has conceptual relevance for the reflective practice. Hypothetically it is conceivable that professionals set disruptive, systemic change in motion as serendipity-driven agents, charismatic change leaders or as foolish and reckless, sensation seeking individuals.

Integrating the reflective practitioner and organizational learning models

Figure 1 exhibits a control cycle model that integrates the reflective practitioner model with the organisational learning model (single, double and triple loop learning). It is based on Schön, (1983, 1987), Argyris and Schön (1974), and Bateson's learning levels model (in: Tosey et al, 2011). The steps of the reflective practitioner model are positioned in the Figure as well: 1] within existing norms and governing values a tacit 'knowing-in-action' is selected unconsciously to execute a task; A] after execution of the task the effect is assessed in terms of match / mismatch which will only lead to a conscious 'reflection-on-action' in the case of a mismatch; 2] simultaneously the professional will experience a surprise due to the unexpected outcome; 3] instantaneously a 'reflection within the action-present' is triggered resulting in a decision to choose a single loop action (a known remedy that will lead to a solution); or in a 4] 'reflection-in-action'. Subsequently, two options for action can be chosen. One is a double loop action, namely to adapt the norms within the boundaries of the governing values to design a new solution and to experiment and test this on the spot. The other is to cross boundaries and besides changing the norms also redesign the governing values. The ball game then actually changes. In all instances the professional will arrive at B] the 'ante-action-reflection'. This is a pre-assessment by the professional to make a judgment if the solution will work. Greenwood (1993) criticised Schön for omitting reflection-before-action. She

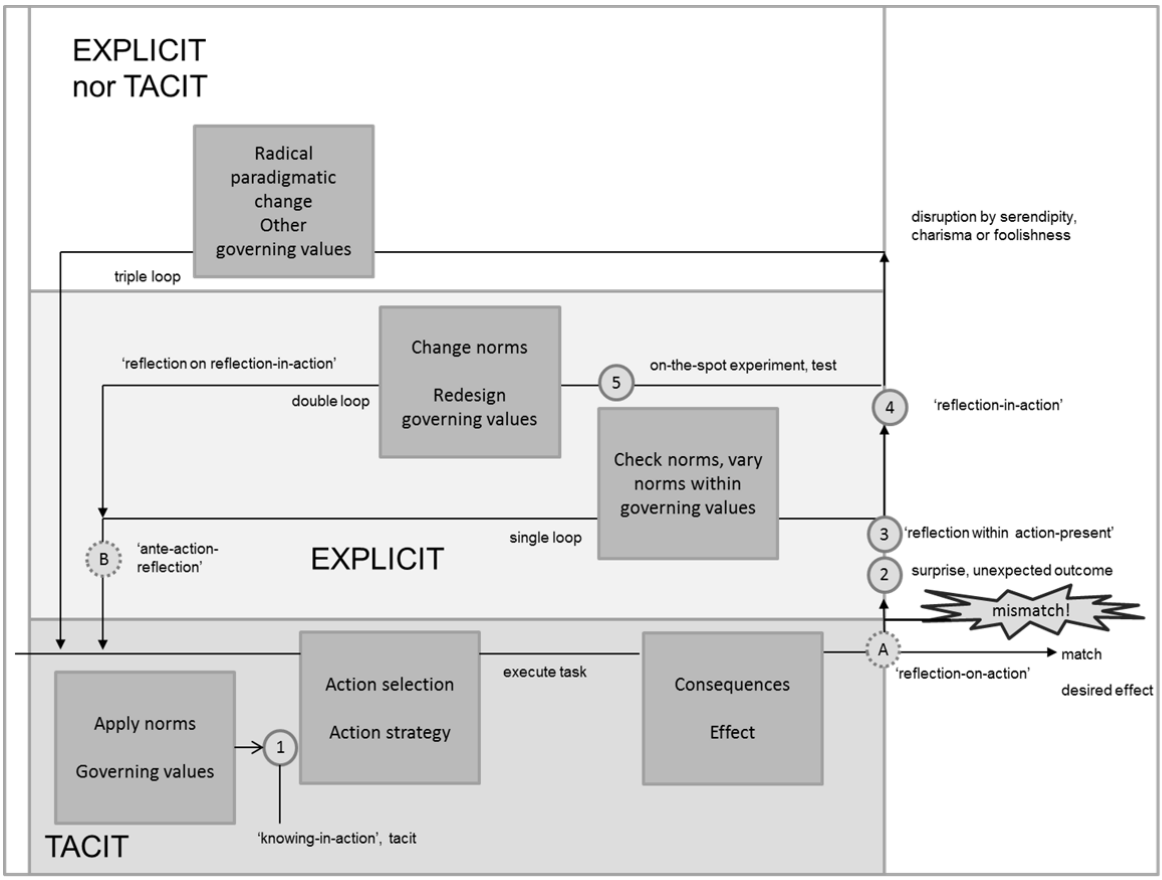
[2] Tosey et al are referring to Bateson's III-rd level of learning which they regard as exemplary for triple-loop learning.

[3] Argyris and Schön do talk about deutero learning, which is not equivalent to triple loop learning, but points at reflexivity about processes of learning at either single-loop or double-loop learning levels (Visser, 2007; Tosey et al, 2011), which Visser (2007) dubs as meta-learning.

has a point concerning the design of a new action (double and triple loop) that is not coming from knowing-in-action. We do not agree with that viewpoint regards routine actions, because such knowing-in-action is actually automated behaviour (single loop). But it is possible that Schön himself would have argued that this reflection-before-action is in fact part of reflection-on-action, because looking back on one's own (and others) experiences in general can be applied before one undertakes an action, and is not limited to one's latest action per se.

The final option, which is not in the models of Argyris nor Schön is to effectuate a triple loop action, which is disruptive and a radical paradigmatic change compared to norms and governing values that are in place. This is however not a controllable and plannable process and goes beyond what is fully and consciously a reflective act, as one does not know what he/she is doing or causing. Triple loop actions can be spontaneous, impulsive and untested. Paradoxically conscious reflection can get lost in the action. That is why it is partly explicit and partly tacit[4].

[4] As in Bateson's level III of learning (Tosey et al, 2011).



Legend:
1 tacit 'knowing in action' to select an action and execute a task
A 'reflection-on-action' to assess a match(not per se conscious) or mismatch (conscious)
2 (immediately) experience surprise due to unexpected outcome
3assess next options as 'reflection within the action-present'; select an available single loop action as alternative (norms and governing values remain unchanged) or select to design a new action
4 select as a newly to design action a double loop or triple loop action via 'reflection-in-action'; in case of triple loop action (serendipity, reckless risk taking) a paradigmatic change is ignited
5 test the action and gather validated data; norms and governing values are adapted
B pre-evaluate the action's effect by 'ante-action-reflection' (does not happen with triple loop untested or spontaneous actions); execute the task and return to A

Figure 1. Reflective practitioner model integrated in organizational learning model

In Figure 1 the circles with figures correspond to the 'reflection-in-action' model of Schön and its implicit sequence of steps. The circle with A is a rather separate activity in his approach and the circle with B seems to be missing in his writing (Greenwood, 1993).

Reflective practice and innovation leadership

Innovation leadership, a style to influence employees to produce creative ideas, products, and services (Gliddon, 2006; also Deschamps, 2008), is usually associated with psychological leadership

theories, such as transactional and transformational leadership. Transactional leadership is directed at getting concrete results and is related to and exploitative type of innovation in order to improve results, whereas transformational leadership is targeted at developing new and creative ideas and related to an explorative type of innovation with the goal to achieve radical renewal (Janssen et al, 2006; Oke et al, 2009). Transactional leadership seems linked to single loop learning, developing 'alternative solutions', and transformational leadership to double loop learning, developing 'improved solutions', and triple loop learning, developing 'innovative solutions' (Figure 1). While psychological approaches of innovation leadership pay much attention to the interaction between leaders and followers on the one hand, and the relation between leadership and organisational aspects (like culture) (Amabile et al, 1996; Basu & Green, 1997; Jassawalla & Sashittal, 2002; Lee, 2008; Sarros et al, 2008), we are, contrary to that, especially focusing on the project leader of an innovation project. But we do not intend to limit ourselves to a 'trait approach' (Zaccaro, 2007), which is for example dominant in Deschamps (2008), as we acknowledge that behaviour is a result of the interaction between persons and their environment. We are interested in what this person does regard the innovation that is central in the execution of the project. The reflective practice of this person is seen as an actionable form of innovation leadership, namely as leading the project by solving a problem; more specifically, in applying a research-oriented methodology in a tacit, reflective fashion, which leads the innovation process of the project forward. In addition, project leaders perform these behaviours tacitly, which means that they are likely not fully aware that they are applying a stepwise research methodology.

Key research hypothesis

Based on the former our primary purpose is to reveal the process of problem-solving in the light of the Schönian model, and, consequently, to deduce theoretical notions from organizational learning to support future innovation management processes of project teams. The main hypothesis for this investigation is: sometimes, problem-solving project leaders of innovation teams apply a research method that resembles the Schönian reflective practice model and they are not aware of it.

Method of research

Data collection and embedment in an overall study

This particular analysis is part of an overall study into team dynamics of innovation projects. During that study the researchers observed that certain project leaders showed particular behaviours that resembled reflective practices. For this reason we decided to perform a secondary data analysis on the collected interview data. Eighteen innovation projects were studied as cases that are carried out by eighteen different project teams. An innovation project is a temporary task, organised as team work, with the goal to develop a new product, service or process, which can improve an organisation's market share or its internal production process of goods and services. Each case study included face-to-face interviews with project leaders, team members and the managers responsible for the innovation projects, and a survey among these respondents and similar project teams in the same organisations. For this analysis the face-to-face interview data of project leaders are used.

Method for analysing the data

During the interviews with project leaders their project's progress was discussed by identifying critical incidents as milestones: "Through the use of the critical incident technique one may collect specific and significant behavioral facts, providing (…)" a sound basis for making inferences as to requirements "for measures of typical performance (criteria), measures of proficiency (standard samples), training, selection and classification, job design and purification, operating procedures, equipment design, motivation and leadership (attitudes), and counseling and psychotherapy" (Flanagan, 1954). Critical incidents are occurrences or conditions that interrupt the normal procedure of the project. Critical incidents are significant deviations from the project plan resulting in setbacks, delays or terminating of the project. Contrarily, critical recoveries imply getting back on track toward the intended or adjusted goal caused by a 'speeding up' activity, such as solution, decision or a serendipity. Critical incidents for delay and critical recoveries for speed-up situations and getting back on track were assessed with the project team leader. Applying critical incident method ensures the focus on the unit of analysis in the case study, in this instance, the problem-solving behaviour of the project leader. The method of critical incidents is also used or recommended to study reflective practices by other researchers (for example Kressel, 1997; Verdonschot, 2006; Fook, 2002, 2013; Schley & Van Woerkom, 2014). As Fook writes: "One of my favourite tools for accessing practice is the description of critical incidents by practitioners (…), because, if I am aiming to theorize from practice as it is *experienced* by others, I find it best to elicit their own descriptions of their practice, rather than to study accounts which have been constructed in some other way or for some other purpose" (Fook, 2002: 89-90, italics in original).

In the interviews project leaders were asked how they and their teams dealt with the critical incidents. It proved that several of them apply an implicit research methodology that resembles the Model of Schön, which we 'operationalised' in Table 1 by mapping this model on the steps of a general research methodology[5].

[5] The steps (circles with figures and letters) of Figure 1 are incorporated in the left column of Table 1.

Table 1: Mapping Schön's Reflective practitioner to a research methodology applied by project leaders of innovation projects

Reflective practice	**Innovation leadership by applying a research methodology as a stepwise approach**
1 Tacit 'knowing in action': perform a task unreflectively	0 Unconscious task performance
A Assess if a task execution matches or mismatches a desired effect: in case of a match this is an unconscious / subconscious process; in case of a mismatch: 'reflection-on-action'	1 Sensing an unexpected outcome: what is going on? Reflect on one's understanding, feelings and experience of an incident
2 Surprise: a mismatch is assessed as the outcome of the task execution is unexpected (positive or negative)	2 Experiencing and acknowledging an unexpected outcome: is there a problem? Structuring the incident and bringing it to the surface (explicating what is implicit)
3 'Reflection within the action-present' *	3 Scoping the implication of the outcome (defining boundaries and governing values; critical evaluation of outcomes)
4 Reflection-in-action	4 Assessing the outputs and outcomes and Developing alternatives (conceptualising, restructuring)
5 On-the-spot experiment and testing	5 Experimenting and testing alternatives (general hypothesizing, [re]designing new actions) and striving for validated data (operationalisation; embody new actions into a testable framework)
B Ante-action-reflection (not per se in the case of triple-loop learning)	6 Anticipating effects of the newly chosen solution; pre-evaluation (specific hypothesizing)
Perform the task: 'reflection-on-action'	7 Executing the new solution (intervention, implementation of new action)
(return to) A Reflection-on-action	8 Evaluating the outcome of the new action or solution (feedback, a return to 'reflection-in-action' and 'on-action' which are difficult to separate here)

* Finding a solution at this level is single loop; going beyond this stage is double loop. Single loop is instrumental means-end reflection on actions (technical rationality), whereas double loop learning is the result of reflection on the norms and values and social relationships (Greenwood, 1998: 1052).

Schön's model is regarded as a form of problem-solving, contrary to trouble-shooting. Problem-solving strategies are the steps that one would use to find the problem(s) that are in the way to getting to one's own goal, as if it were a 'problem-solving cycle'. This cycle contains to recognize the problem, define the problem, develop a strategy to fix the problem, organize the knowledge of the problem cycle, acquire the resources at the user's disposal, monitor progress, and evaluate the solution for accuracy (Bransford & Stein, 1993). Troubleshooting is a form of problem solving, often applied to repair failed products or processes. In general, troubleshooting is the identification of diagnosis of "trouble" in the management flow of a corporation or a system caused by a failure of

some kind. The problem is initially described as symptoms of malfunction, and troubleshooting is the process of determining and remedying the causes of these symptoms[6].

Data and cases

Three cases were selected from the eighteen cases. Criteria for selection were twofold. In the first place a critical incident, or the anticipation of such incidents, had to be identified in the innovation project, as a situation that demanded problem-solving behaviour. That behaviour could result in a success, namely a critical recovery, or it could not. The success of problem-solving behaviour does not solely depend on the project leader's behaviour. External factors such as the behaviour of clients, partners, and higher management, may negatively affect the action undertaken by the project leader. For the purpose of the study the performance of problem-solving behaviour of the project leader, therefore surpasses the relevance of its effect in terms of success. In the second place it should be possible to reconstruct the research methodology's steps that were implicitly undertaken by the project leader. The data are extracted from interview recordings with the project leaders.

The decision for this analysis is based on a serendipitous experience during the interviews of the eighteen cases. As a 'reflection-on-action' the researchers realised that some project leaders applied a research methodology analogous to Schön's professional artistry. "Artistry is an exercise of intelligence, a kind of knowing, though different in crucial respects from our standard model of professional knowledge (i.e., technical rationality, authors). It is not inherently mysterious; it is rigorous in its own terms; and we can learn a great deal about it (…) by carefully studying the performance of unusually competent performers. (…) applied science and research-based technique occupy a critically important though limited territory, bounded on several sides by artistry. There are an art of problem framing, an art of implementation, and an art of improvisation – all necessary to mediate the use in practice of applied science and technique" (Schön, 1p87: 13). Schön is not against a scientific approach, he merely criticizes that professionalization meant the "replacement of artistry by systematic, preferably scientific knowledge" (1987: 14), repudiating that professionals are also to be understood "as artists to refer to practitioners unusually adept at handling situations of uncertainty, uniqueness, and conflict" (1987: 16). Some project leaders had developed their own ways and means to deal with critical incidents that qualify them as reflective practitioners. In fact, they combine reflective practice and elements of technical rationality in using a research methodology in an implicit manner. They are not exclusively technical rational because they do not apply instrumental problem solving solely based on a rigorous application of scientific theory and technique (Schön, 1983: 21).

Of the eighteen project leaders (13 males; 5 females) three examples stand out, as these (male) persons clearly reflect on the situation and on their own behaviour. The other fifteen cases are unsuited. Not because their project leaders are not reflective, but these cases either had no critical incidents, or they did not present reflective turns in a clear manner. The three selected cases are presented in Table 2.

[6] https://en.wikipedia.org/wiki/Troubleshooting (accessed January 3, 2016).

Table 2: Cases

Main target of the project leader's reflective practice	Organisation and innovation project
1. Project leader AgriR&D project: get stakeholders aboard	AgriR&D is an R&D team in the dairy industry and the project is a co-innovation with another company to develop a specific substance as an ingredient for food products.
2. Project leader CosmR&D2: continuous impact management	CosmR&D2 is an R&D-team of a food and care products producer. The project was to deploy a new product much faster than normal. In this project were no critical incidents, only limited incidents, but several high risks for critical incidents.
3. Project leader ManTran1: redesign the product	ManTran1 is an R&D team of a company producing automated material handling systems. This team's project was to develop an automatic detection system of human beings by measuring body form and body heath of objects.

Results: reflective practices by project leaders

1. Project leader AgriR&D project: get stakeholders aboard

William is a highly experienced project manager of innovation projects and about 50 years of age. The innovation project was to develop a substance as an ingredient for food products, together with a co-innovation partner, another company. His role was to bring the right people together from the management side of both companies, in his R&D team, and in the cooperation with the R&D team of the partner. To support him in his work, over the years William had developed his own set of project management tools, enabling him to steer the project on 5Ps, namely Pace (tempo, timing, meeting), Points (issues), Persons (internal and external stakeholders), Presentation (framing and communication), and Place (where things happen). Based on his experience he could anticipate certain issues in certain phases in the project. This 'reflection-on-action' of the past experiences structured his actions. It took two years before the actual start of the project to 'get the right people', William explained. It listened very closely to approach the right managers at the right moment to build a business case for the project. Once the project was launched critical incidents arose in conjunction with the co-innovation partner. The main two incidents were disputes about IP-rights (intellectual property) and the fact that the co-innovation partner had troubles to convince their business side that the innovation objective was good for their business. The first incident was not unexpected to William, as IP-disputes are more or less normal business. It is complex and absorbs much time. This time an external expert was needed to function as a mediator, but William had anticipated on that and could quickly apply that scenario. "It was critical, we almost walked out of the project". The second incident was a 'hidden' incident, because their partner was not informing them that their business had not given a green light to go along with the project and finance the research activities. In fact, their partner continuously redefined the objective of the project, which, in retrospect, was meant to convince their internal business partner with changing

specs and scopes. Meanwhile, when it happened, William had to act on the popping up of unexpected delay. Right after the project start the partner already wanted to redefine the specs. Not only this threatened the progress but also the acquisition of internal resources from their own business side, who got nervous. To ensure progress of the project William designed a session in which the project teams of both partners were given the assignment to make a system description. This means developing 10 to 12 routes to realise the requirements in so-called conceptual approaches, and then select a limited number of the most likely routes. Eventually this resulted in five prototypes, with enough cogency to keep the internal business department aboard, and to get the team to continue their research work. Striking for the project leader's professional artistry is his conviction of the relevance of regular team meetings, even when no new results are realised. "Projects need rhythm. Regular meetings provide rhythm but also create a sense of urgency and cohesion. I firmly belief in doing things together, make plans together, and listen to what people have to say. Even when you do not have a clear reason to meet, it is always valuable". This is because it leads to new ideas, hunches, and unexpected yields.

2. Project leader CosmR&D2: continuous impact management

Marcus is an energetic and experienced project manager in his early forties. The innovation project was to deploy a new product on the market, which implies to prepare the production process including its packaging and transport, and to get it 'on time in full on shelf' of targeted retail businesses. The normal time for a deployment needed to be cut in half, which was deemed as nearly impossible. This was not yet a critical incident, but a risky situation that could easily become an incident. The purpose was to be quicker on the market with a new product line than competitors in the same market segment. Marcus accepted the challenge, built a project team, and scrutinized and anticipated possible caveats, after which he and his team closely monitored the process of preparing, testing and executing the production from factories to customers. His reflection-in-action is grounded on his reflection-on-action of former deploy projects. The project went well, despite the presence of high risks for critical incidents due to the extremely tight planning. Preparation, testing, production and transportation are tightly coupled, and one serious mishap would mean a product launch delay of six months. Unplanned issues that emerged where sudden change of production lines, a cap missing a matching colour, a new tube that bursts during production, spare parts too late delivered to another production site. The project leader and his team anticipated possible problems at every stage of the project; they ongoing 'went up and down the project' to assess and monitor possible risks and possible consequences of these risks; and for these risks they developed back up plans. "We had an extremely high number of back-up plans like I've never seen before". During the project they intensively communicated with their partners at local test sites and production sites. For the mentioned unplanned issues solutions were developed instantaneously. Meanwhile, the project leader closely communicated progress and setbacks with the business side, the marketing department who is in fact commissioning the project. The project leader, therefore, continuously goes through the research methodology as if it was a cycle. Whilst the organisation uses tools for continuous impact management and consequence management, and trains its staff in these tools, the professional artistry of the project leader is in how he manages the expectations of stakeholders and suppliers. "You must know how the game is played here". He knows what marketing and the business want. He talks with them about every relevant detail, makes them feel well served, to get their immediate feedback how to move on. He is familiar how higher management judges and evaluates the progress of the process. The mismatch colour cap, for example, can be a showstopper

when uttered to soon in the process, but by timing this cleverly at a point of no return, its acceptance is traded off against reaching the deadline. “You know when a deadline approaches fast, details become less important, like the colour of the cap. They decided to leave it as it is, on which we had anticipated”. He knows how to put the right (contractual) pressure on suppliers, in order for them to timely solve the issues they are responsible for themselves, so his project is not confronted with extra delay. One mitigation measure was to split up production lines to minimize risks. Another one was to first plan production and the tubes later. In all these activities the golden rule is: provide the solution before you mention the problem.

3. Project leader ManTran1: redesign the product

Alexander, an entrepreneurial person in his mid-thirties, is working as a project manager since a few years. The purpose of his team’s innovation project is to develop an automatic detection system of persons by measuring form and body heath (3D and infrared) on a conveyer belt system. He and his present team members joined the project at a later stage, inheriting the project from their predecessors. These predecessors performed the feasibility study and the defined scope. The new team continued to carry out those tasks from where the old team had stopped. Along the way there were technical setbacks as critical incidents, such as camera hardware, image processing, and software from an external supplier. The project had arrived at an impasse. The accountable manager wanted the team to continue according to plan because much investment was put into it and the business case was still valid. The project leader sensed the plan would not work and wanted to explore alternative ways, of which he sensitized fruitful avenues. He started to talk with other R&D-people, organised a work session with his team and some new ideas emerged, which he wanted to test. “A conversation of one hour with a software developer resulted in a new concept, which we further elaborated with the team”. The accountable manager, however, wanted the team to continue with the original plan, which the team followed, until that lead to a dead end road a few months later. This opened up the way to present the new idea to the management team, who soon got convinced of the possibilities, after a couple of presentations by the team. The reflection-in-action of the project leader was to try another tack when he sensed the old idea did not work and a new idea looked promising. He consulted others on his first hunches and gradually developed new ideas. He let the team prepare presentations grounded with the evidence needed for the management team to take a turn. The evidence-based presentations were important to convince the project manager and the management team.

4 Overall view

Table 3 summarises the findings against the research methodology (of Table 2)

Table 3: The research methodology applied by project leaders of innovation projects

Innovation leadership by applying a research methodology as a stepwise approach	**AgriR&D project leader** [A and B here refer to 2 critical incidents]	**CosmR&D3 project leader**	**ManTran1 project leader**
1 Sensing an unexpected outcome: what is going on? Reflect on one’s understanding,	A]Pre-sensing possible risks with IP-rights B]Experiencing delay and	Anticipating on issues that are expected to emerge	Sensing that present design is not going to work

feelings and experience of an incident	redefinition of objectives		
2 Experiencing and acknowledging an unexpected outcome: is there a problem? Structuring the incident and bringing it to the surface (explicating what is implicit)	A] IP-distribution needs to be settled B] Objective must be made clear into system description	No unexpected outcomes due to anticipating and being alert; risks are explicit	Acknowledging that a new design is needed
3 Scoping the implication of the outcome (defining boundaries and governing values; critical evaluation of outcomes)	A] Action is a single loop solution: intervention by expert B] Action is a double loop solution: arranging a special session	Action is single loop: containing risks within manageable proportions; and double loop: create work arounds where needed	Action is single loop: finding new ideas partly based on former feasibility studies; and double loop: develop additional solutions on new technical insights
4 Assessing the outputs and outcomes and developing alternatives (conceptualising, restructuring)	A] Agreement on IP-rights will continue the project with the partner B] Developing routes will continue the cooperation and team work	Back-up plans are made for thinkable deviations	Developing a new design by consultation of others and team
5 Experimenting and testing alternatives (general hypothesizing, [re]designing new actions) and striving for validated data (operationalisation; embody new actions into a testable framework)	A] Consensus is driver to share business with partner B] Trust is a driver for collaboration with the partner team but not fully present	Solutions for emerging issues are designed on the spot	Gathering evidence-based information, preparing and giving presentations
6 Anticipating effects of the newly chosen solution; pre-evaluation (specific hypothesizing)	A] IP-right distribution is a condition for sharing B] A good business case will convince business side of partner	Solutions for issues are provided to stakeholders in advance to gauge their responses	Building a business case for the new design
7 Executing the new solution (intervention, implementation of new action)	A] Effectuated B] Effectuated	Effectuated	Effectuating of new plan
8 Evaluating the outcome of the new action or solution (feedback, a return to 'reflection-in-action' and 'on-action' which are difficult to separate here)	A] Cooperation continued B] Five prototypes were eventually developed	Project debriefed to gather lessons learned	Execution is underway; expectations are favourable

In all three cases reflection is present, therefore there is more than tacit 'knowing in action' or performing a task unreflectively. In every case the project leader assesses whether the execution of the task matches or mismatches a desired effect, and they all assess a possible risk of a mismatch: 'reflection-on-action' is triggered to look back on what actually is happening (Alexander; William in the case of B) or what might be happening (William in the case of A; Marcus). In the case of William's case B (the partner redefines the scope) and Alexander (the design does not work as planned) there is what Schön would call a surprise, as the mismatch is assessed as the unexpected outcome of the task execution. In all three situations the project leader's reflection remains within

the ‘action-present’, which implies that their solutions are at least partly single loop actions. And this means that their solutions are, partly, instrumental means-end reflection on actions (technical rationality), because they are partly within the existing values and norms. Yet, at the same time, they are also double loop learning actions, namely as the result of reflection on the norms and governing values. Marcus’ solutions to keep the deployment project on track remains within the boundaries of deadlines and quality norms and therefore is single loop; but in how he is dealing with suppliers he is crossing those values; moreover, when he accepted the assignment he negotiated with his managers to loosen the rules of the stage-gate model that is usually applied for deployment projects. Alexander and his team developed a new design that was partly based on the former feasibility studies, but they added new technical insights that lifted the solution to a double loop. William’s solution for the IP-rights issue, namely incorporating the help of an external expert, was a single loop solution that was a foreseeable intervention. His solution to deal with the continuous redefinition of the objective and scope of the innovation by the partner, required solutions beyond the standard model of his own project management tools. Although true that his approach is equipped to cope with unexpected situations, William’s design of the system description session included elements of improvisation to reach consensus with external and internal partners. The stretching of rules to keep partners on board and to keep a business case in sight for his own commercial department made this a double loop solution.

While this reflection-in-action of the project leaders took place within the action-present, the experimenting and testing was also done within the action-present. In a broad-minded fashion one could still speak of ‘on-the-spot experiment and testing’. Before implementing the solution there was reflecting of the possible effect of these actions by the project leaders, something that one could see as ante-action-reflection. The clearest examples were the presentations given by Alexander and his team, which are a pre-evaluation of what might be expected from the new design. This return to reflection-on-action by the project leaders closes the circle of the Schönian model.

Conclusion

In three cases project leaders of innovation projects perform as problem-solver and apply a Schönian model of reflective practice that resembles a research methodology. This research methodology goes beyond rational technical instrumentalism as it is combined with professional artistry of the project leaders which efficiently and effectively support them in sensing, designing, testing and implementing solutions. Largely unaware of this model, project leaders have their own problem solving way of dealing with critical incidents. But their problem solving is not instrumental. Yet, they largely follow the same kind of steps. They sense or foresee undesired outcomes. This triggers to find out what is going on which then leads to seeking alternatives. These alternatives are tested on their consequences and then put in place. After the implementation the solutions are monitored. Project leaders likely reflect on passed action and on future outcomes when they reflect-in-action. When they design solutions consciously and deliberately they seem to apply ante-action-reflection. When project leaders anticipate critical incidents, as in the case of William and Marcus, they can put single loop actions in place. And yet, they are flexible to add double loop actions when needed, as was observed when William and Marcus created work arounds to stretch their ‘action present’ as it were.

These findings have consequences for innovation projects from the perspectives of organizational learning and innovation leadership . The organizational learning model makes a distinction between single, double and triple loop learning. In our small sample the three project leaders applied single loop learning action for solutions that were already part and parcel of their repertoire of available actions. Double loop learning actions were designed to perform solutions that went beyond present norms (standards) but predominantly within governing values (corporate rules of the game). The double loop learning actions, however, presented more of the professional's artistry of the project leaders. Professional artistry is a personalised capability to design solutions according to one's reflective appraisal of events, situations and relations, which cannot always be expressed in words. Triple loop learning did not occur in our cases. Innovation leadership means influencing others to achieve innovation success. Reflective practice is not always or easily observable to others. Like professional artistry, however, reflective practice is observable in its effects. And these effects can be the object of reflection and imitation by team members and, thus, offer opportunities for learning and obtaining new knowledge-on-action. Making this tacit research methodology of project leaders explicit would be beneficial for other project leaders and for project teams doing innovation projects.

Discussion

From a research point of view some critical remarks should be made about this study. First of all, our sample is very small, which does not allow generalisations to populations. Second, the sample of our 18 projects was not targeted at analysing the reflective practice of project leaders but at a broader understanding of team dynamic in innovation projects. This investigation followed an unexpected serendipitous hunch after having done the fieldwork. Third, deducting reflective behaviour of professionals from face-to-face interviews is taking the stance that the researcher can retrospectively objectify what a practitioner is doing unaware. This thinking for others might be odd and arrogant and invalid if not tested. Therefore, we publish our findings with all proper reserves. A final critical self reflection is that we may have given the impression that by making Schön's tacit model explicit we have taken a rational technical turn. To a certain extent this is true, yet, it seems inescapable for understanding what goes on in organisations. Such tensions between wanting to know and realising it is not all that rational is hard to avoid. Our integration of reflective practice and organisational learning is therefore a 'too neat' exercise, reminding us of the 'paradox of coerced freedom' (Dalton, 1959: 243), identified long ago, that leaders and managers have a certain freedom to act on their own (informal organisation) insofar as it does not harm superiors (formal organisation). Double and triple loop actions may need such freedom necessary for innovation, yet are in conflict with the organisational standard model, which then touches upon a conflict between espoused values about what is the best way to move forward.

From a theoretical point of view we limit reflective practice to problem solving in innovation projects by project leaders. We could be easily criticised for ignoring team contexts, interaction with others, and too uncritically connect intrapsychic and extrapsychic behaviours of an individual. We acknowledge these are important issues, perhaps to be taken up by others (for criticism on Schön see also Finlay, 2008). However, we would like to underline the relevance for individual reflection for innovation brought about by teams. Reflection is essentially an individual's intrapsychic activity.

"What presents a large challenge for individuals is all the more so for teams and especially teams that are working together in projects as they are faced with problems that can seldom rely on routines as project work is highly problem based"(Schley & Van Woerkom, 2014: 116). This means that reflection within teams, team reflexivity - the extent to which teams collectively reflect upon and adapt their working methods and functioning - is crucial for team learning and innovation (Schippers, den Hartog & Koopman, 2007; Schippers, Den Hartog, Koopman & Van Knippenberg, 2008; Schippers, West & Dawson, 2015), in order for teams to arrive at effective and efficient work in groups (Schley & Van Woerkom, 2014). Among favourable conditions of team reflexivity research points to transformative leadership (Ollila, 2000), the team leader as initiator, and psychological safety (Schley & Van Woerkom, 2014). In order to promote innovativeness at the project level, project leaders need to consider how their leadership is influencing the behaviour of the project members (Ollila, 2000; Clarke, 2012). Innovation at team level can benefit from creating organisational facilitation. One example of this is developing mindful infrastructures (Weick & Sutcliffe, 2007) that stimulate team mindfulness, team psychological safety and team learning (Oeij, Dhondt, Gaspersz & De Vroome, 2016). Such organisational facilitations could become better grounds for a reflective practice for teams when debriefings and briefings are implemented (Schley & Van Woerkom, 2014). Debriefings, or reviews afterwards, and briefings, or preparations in advance, are consonant with team reflection-on-action and team ante-action-reflection respectively. Such briefings and debriefings are common in High-Reliability Organizations (Weick & Sutcliffe, 2007), but, perhaps, miss a lack of urgency for being implemented in market and public sector organisations with a very urgent need to be or remain innovative, for the sake of competition, cost effectiveness and quality of products and services, and the quality of staff and their innovative capabilities.

For practitioners our take home message is built upon the notion that critical reflection is a weapon against organisational inertia and covering up of undesired situations that requires a change, as can sometimes be the case in innovation projects. Technical rationality is like the dominant theories-in-use in an organisation. Theories-in-use often represent the single loop norms and governing values on which everybody unconsciously agrees. Even if theories-in-use do not work, people will be hesitant to refute them, for fear of appearing incompetent or not being loyal (Argyris & Schön, 1974, 1996; Schön, 1983). However, due to reflective practices and professional artistry, a new theory-in-use can emerge, one that represents double loop norms and governing values on which most people agree when made explicit: namely valid information, free and informed choice, internal commitment to the choices (Argyris & Schön, 1974: 87). This theory-in-use, based on espoused norms and values, demands critical opinion sharing and critical reflection. When it enables conversation with and feedback from others, such reflection may critically scrutinize what has been taken for granted (Brooks, 1999; Van Woerkom & Croon, 2008). That is why Schön stressed the importance to create space for professionals and why space is a condition to make defensive mechanisms discussable. This requires that professional artistry and its value for innovation are made explicit. Ultimately, all should realise that a paradoxical tension between technical rationality and the 'arts' of professionals will always remain; but at least organisational members have become aware of their choice about their espoused and applied theory-in-use. A practical means to align one's espoused values with the theory-in-use is to apply the steps of the reflective practitioner and organizational learning model (Table 1 and Figure 1) when mismatches are experienced. To make innovation leadership a team

attribute, our recommendation is to apply this at the level of the (project) teams when critical incidents have to be dealt with.

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