Action Research as a leadership strategy for innovation: The case of a global high-technology organisation

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The paper describes two sets of Action Research within an iconic global high-tech company. Two teams within the organisation (one in New York and one in Sydney) were selected to participate, on the basis of their failure to have achieved any technical innovation over the previous three years. The Action Research had the practical goal of generating valuable technical innovations, and the research goal of gaining insight into any social (leadership) practices that may have facilitated the technical innovation. The research delivered novel insights into the nature of the leadership practices that enabled these two teams to deliver four company-lauded technical innovations. The principal finding of the research: that *social innovation precedes technical innovation,* highlights the role Action Research can play in the creation of a social environment conducive to technical innovation within enterprises.

Key words: innovation, leadership, Action Research, social innovation

Investigación acción como una estrategia de liderazgo para la innovación: El caso de una organización global de alta tecnología

El artículo describe dos grupos de investigación acción dentro de una empresa global icónica de alta tecnología. Dos equipos dentro de la organización (uno en New York y otro en Sydney) fueron seleccionados para participar en base a su fracaso para lograr cualquier innovación

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técnica en los tres años anteriores. La investigación acción tuvo el objetivo práctico de generar valiosas innovaciones técnicas y el objetivo de la investigación de obtener conocimiento sobre algunas prácticas sociales (de liderazgo) que pueden haber facilitado la innovación técnica. La investigación arrojó nuevos conocimientos sobre la naturaleza de las prácticas de liderazgo, que permitieron que estos dos equipos entregaran cuatro innovaciones técnicas elogiadas por la compañía. El principal hallazgo de la investigación -que la innovación social precede a la innovación técnica- destaca el papel que la investigación acción puede desempeñar en la creación de un entorno social propicio para la innovación técnica dentro de las empresas.

Palabras clave: innovación; liderazgo; investigación acción; innovación social

Introduction

In spite of the wealth of material written on the topic of innovation, our understanding of this complex, but vitally important, phenomenon remains elusive. As Dovey and McCabe (2014) point out, in many organisations the rhetoric of innovation substitutes for its practice. They go on to argue that an issue that exacerbates this problem is that of the 'politics' of innovation. As an endeavour that threatens the *status quo*, innovation is always likely to be resisted by those (often powerful) stakeholders who have a vested interest in the retention of the *status quo*. Furthermore, these authors argue, the inability to address these politics effectively is a consequence of the positivist assumptions that underpin the efforts of the research and development (R&D) function in most organisations. Traditional research in technical domains, as a consequence of embedded ontological and epistemological assumptions, rarely attempts to understand the political (power) dynamics that underpin the social reality of a particular organisation.

In order to address the political dimension of innovation, the research outlined in this paper adopted an Action Research methodology: a choice compatible with the nature of the research question and with our ontological and epistemological assumptions. This Action Research sought to achieve tech-

nical innovation outcomes within an iconic global high-tech organisation and to document, and make transparent to others, the social dynamics: in particular, social practices that may be deemed 'leadership-in-action', that facilitated any technical innovation achieved through this process.

The phenomenon of disruptive innovation

Joseph Schumpeter, an early conceptualiser of disruptive innovation, defined this phenomenon as 'waves of creative destruction' and argued that,

> In capitalist reality, it is not that kind of competition [price competition] which counts but the competition from the new commodity, the new technology, the new source of supply, the new type of organization: competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives (Schumpeter, 1942, p. 84).

The predictions of Drucker (1986) and Giersch (1984) that Schumpeterian 'waves of creative destruction' would be a feature of the first decades of the 21st Century, are proving accurate, as disruptive innovation increasingly impacts the global economy, destroying and creating industries, and the enterprises within them, and challenging cultural assumptions and mental models that have prevailed for centuries. As a consequence, with enterprises struggling to surf these 'waves of creative destruction', traditional assumptions about most aspects of business endeavour are beginning to be scrutinised; in particular assumptions about organisational leadership, governance, structure/culture and research are coming into question (Verhoeff, 2011; Tzeng, 2009; Barsh, 2008; Barsh, Capozzi, & Davidson 2008; Dovey & Fenech, 2007; Henderson, 2006; Henderson & Kaplan, 2005). At the heart of this struggle to respond appropriately to these transformational pressures seems to be an inability to address the political dynamics of organisational change (Dovey & McCabe, 2014). Historically, the most common strategy for addressing these politics was that of the establishment of a *skunkworks* : the setting up of an alternative organisation, separate from the original organisation, wherein new ideas and practices could be implemented without contaminating prevailing cultural assumptions, and without disrupting the

norms and routines of the traditional organisation (Büschgens, Bausch, & Balkin, 2013; Harris & Woolley, 2009; Rich & Janos, 1994). However, in the fast moving, ever changing, contexts of the current global economy, one-off innovation through a *skunkworks* strategy is insufficient to guarantee survival. Instead, organisations need to develop 'ambidextrous' capabilities by paradoxically being able to exploit current opportunities through existing arrangements/practices and gear for future opportunities through transformative endeavour (O'Reilly & Tushman, 2004). One method of attempting to address these challenges has been the creation of a *skunkworks team* (rather than a separate organisation). Located within the heart of the organisation, such teams are given high ownership of the innovation process and are buffered from the 'business as usual' routines and permissions regimes that operate throughout the rest of the organisation (Peters, 1997). This is a risky strategy in that the visibly-preferential treatment given to such teams threatens political harmony within the organisation (Martinic & Dovey, 2011). *Skunkworks* teams have often used Action Research as an 'innovation methodology' and have been successful in their specific domain of innovation endeavour (see, for example, Harris and Woolley, 2009). However, they have mostly failed to sustain their innovation efforts as, once the targeted innovation has been achieved, the organisation resorts back to traditional practices (see Dovey & White, 2005; White & Dovey, 2004). This can be viewed as a consequence of leadership reluctance/failure to recognise the strategic value of Action Research as an innovation methodology and, thus, to embed it within the culture of the organisation. This failure usually has political dimensions, particularly with respect to the issues of vested interests, power relations and control over organisational endeavour and purpose (Dovey & White, 2005). The adoption of Action Research as an organisational approach to innovation requires new forms of leadership, governance and ownership; something many business leaders fear (see Martinic & Dovey, 2011)

Challenges to the traditional conceptualisation of 'leadership'

Current challenges to the ability of organisations to compete successfully and to sustain any such competitive advantage, have raised questions concerning

the historical consensus on the ontology of leadership; a consensus that rests on the assumption that leadership refers to a set of individual attributes, traits and competencies [see Yukl (2008) for an overview of this perspective, and the critique thereof offered by Carroll, Levy, and Richmond (2008)]. More recently, attempts to move away from an individualistic conception of leadership have taken many forms but, as Crevani, Lindgren, and Packendorff (2010) point out, all still retain the individuality of the leader, in spite of now ensconcing him/her within a group.

Gradually, however, increased questioning of the view of the heroic individual, as the epitome of leadership, is leading to more collectivist conceptualisations of this phenomenon, such as those of shared leadership (Pearce, Manz, & Sims, 2009), distributed leadership (Gronn, 2009) and collaborative leadership (Collinson, 2007). However, like Burdon and Dovey (2015), Peltokorpi, Nonaka, and Kodama, (2007) argue that individual leaders (usually business owners/founders) still have one important role to play in the innovation project and that is the establishment, and championing, of a non-negotiable strategic intent to innovate.

The growing awareness that innovation depends upon multiple forms of leadership within, and beyond, an enterprise, and that the form of leadership likely to manifest within an enterprise is a function of the prevailing organisational structure/culture, reflects the late recognition of Schein's (1988, p. 15) comment thirty years ago that leaders would err in regarding structure and culture as separate entities:

> the basic organisation design in terms of who reports to whom and who is accountable for what are typically thought of as the major elements of the "formal" structure. But as in the case of organisational processes, these structures are ultimately a reflection of the underlying cultural assumptions. One of the common misconceptions in this area is that structure can be analysed as a factor separate from culture … one cannot separate structure from culture. One can, however, ask whether some formal structures are more likely to facilitate or encourage learning, adaptation, and innovation, and, if so, what kinds of cultural assumptions will favour the evolution of such structures?

Structure and culture thus exist in dialectical relationship, co-producing each other and, in the process, the leadership practices that are able to manifest

within an enterprise. In a similar fashion structure/culture and leadership co-produce each other and, in the process, the enterprise's capability (if any) to innovate. This point is endorsed by Burdon and Dovey (2015), in their analysis of four Australasian organisations widely recognised for their innovation capabilities. They found that, in each of these organisations, structurally embedded cultural assumptions played a major part in their ability to innovate continuously. Furthermore, Naim (2013) argues that the recent success of many smaller 'insurgent' organisations, in challenging the market dominance of large organisations, is due in large part to the adoption of a structural form that allows more appropriate assumptions about organisational life to manifest in everyday behaviours that fuel continuous innovation. Similarly, in their comprehensive coverage of the research into creative leadership, Mainemelis, Kark, and Epitropaki (2015) argue that the manner in which leadership is perceived and enacted in organisations is *ex-ante socially structured* in a way which favours the emergence of a particular conceptualisation thereof. With respect to the generation of the creativity that underpins successful innovation, these authors identify three generic styles of creative leadership that are spawned by particular structural forms: *directive*, *facilitative* and *integrative.* Directive creative leadership is enacted when the leader (structurally cast in the role of generator of the requisite creativity) needs to mobilise stakeholders in support of his/her creative endeavour. Facilitative creative leadership occurs when structurally endorsed stakeholder creativity needs to be nurtured and brought to innovative fruition through the facilitative capabilities of the leader. Integrative creative leadership is enacted in flat structures where all stakeholders are perceived to be leaders who need to collaborate in order to realise their collective creativity in innovative new outcomes.

The notion of integrative leadership, thus, can be seen as a precursor to the recent 'practice turn' in leadership (Crevani et al., 2010; Carroll, Levy, & Richmond, 2008). This conceptualisation has introduced a new, radically different, set of assumptions about the nature of leadership, and has shifted the focus from the individual-as-leader to that of the manifestation of collective assumptions in *practices* which endorse all stakeholders as leaders in some way. This 'collective' form of leadership is implied in the term 'prac-

tices', which Whittington (2006, p. 619) defines as 'shared routines of behaviour, including traditions, norms and procedures for thinking, acting and using 'things', this last in the broadest sense'. This perspective on leadership, challenges the ontological and epistemological assumptions of traditional (positivist) research and creates the socio-political conditions for the recognition of contextual and other contingent factors (for example, temporal factors and social interests) in the manifestation of leadership-as-practice.

Challenges to the dominant research paradigm: The promise of Action Research

A contributing factor to the innovation challenges faced by enterprises is the fact that the vast body of research on innovation is located within the positivist research paradigm: a paradigm that features realist ontological, and objectivist epistemological, assumptions and that seeks context-free and apolitical, or value-neutral, knowledge of this phenomenon. As mentioned above, the 'practice turn' in leadership studies has shifted the focus from individual leaders towards a conceptualisation of leadership as a collective achievement. Embedded in this shift is the transformation of ontological and epistemological assumptions about the phenomenon of 'leadership' and, thus, a broadening of methodological perspective with respect to leadership research. This transformation reflects significant global contextual changes as the digital era challenges traditional organisational forms and cultural assumptions, and endorses the collaborative nature of knowledge work. The pressures to innovate in order to survive in a fiercely competitive global economy are thus leading to more collaborative work domains and greater scrutiny of power relations, governance regimes, and the social bases of learning and knowledge creation.

Action Research as an innovation strategy

The ontological and epistemological assumptions embedded in Action Research reflect the recognition of the political nature of the social realities of enterprises. Furthermore, the methodological emphasis upon democratic governance frameworks for Action Research projects, and upon dialogue as a

critical communicative strategy amongst stakeholders, has anticipated the increasing emphasis upon collective leadership and collaborative endeavor as an engine of innovation in enterprises.

The Action Research reported upon in this paper attempted to address the following research question:

> *What practices of leadership, if any, play a role in the fostering of repeatable, valuable technical innovation?*

The research question assumes a social reality that is co-constructed through human practices and cognitive endeavour. This implies an inter-subjectively created and sustained social reality that has no objective basis, and in which the concepts of 'leadership' and 'innovation' only make sense as social constructs. These ontological assumptions pointed to the location of this research within a constructionist research paradigm. As De Figueiredo and da Cunha (2007, p. 70) comment, the assumption within this paradigm is that social reality is co-constructed 'through our interactions with the world, in an emergent process that changes knowledge as we keep interacting with the world'. This means that social realities are in a continual state of flux, as they are created and re-created according to human interests, values, beliefs, assumptions and interpretations of experience.

Having located the research within the constructionist paradigm, an epistemological assumption is that the knowledge sought through this research is inter-subjective in nature and manifests in everyday practices, activities and discourse. An implication of this is that this knowledge is emergent; that it is accessed through self-reflexive and collectively-reflexive processes, and that aspects of it can only be accessed through action. Thus certain forms of knowledge, or *knowing,* only manifest *in practice* (that is, in *doing*) and accessing such knowledge requires participation in the actions through which such knowledge manifests. In this respect, Denzin and Lincoln (2005, p. 24) point out that this subjectivist epistemology means that access to the requisite knowledge involves social processes (such as dialogue).

These epistemological assumptions raise issues relating to the meaning of 'leadership' as a practice. As a human construct that is contingent on context, what differentiates 'leading' from other social practices? Addressing this issue became an important aspect of this research as it attempted to identify

that which differentiates those social practices that enhance the possibility of innovative high-tech products and services being created within a specific organisational context.

Given the assumption of an emergent, inter-subjectively constructed reality and a subjectivist epistemology that endorses critical enquiry as the primary mode of knowledge acquisition, an Action Research methodology was selected for this research. Reason and Bradbury (2001, p. 1) define Action Research as:

> a participatory, democratic process concerned with developing practical knowledge in the pursuit of worthwhile human purposes, grounded in a participatory world view... It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions.

Action research embraces the practice of *praxis* whereby theory and action are viewed as being in a dialectical relationship wherein theoretically-informed-action and action-informed-theory constantly co-produce each other. Action research has two focal points: the achievement of a practical goal (for example, the creation of innovative products) and a research goal (which involves transparency of the research process and the bases upon which action is founded, in the interests of generating new knowledge). As Action Research usually requires the transformation of a particular social reality (in order to achieve its practical goal) it is a politically challenging research methodology in that such transformation impacts the interests of those committed to the retention of the *status quo*. Where such people have strong power bases, Action Research becomes a politically dangerous research activity (Martincic & Dovey, 2011) and requires sophisticated intrapreneurial skills (Dovey & McCabe, 2014).

Action research can be conceptualised as a sustained, collectively constructed, form of reflexive action that emphasises dialogue, analysis, and synthesis in a transparent form of *praxis* that leads to relevant learning and mission-pertinent knowledge creation. As such, this methodology offered the necessary framework to analyse the social practices adopted by each of two research teams, operating in different geographic locations of an iconic global high-tech organisation, in their attempts to realise technical innovation.

Research methods

The objective of the research was to gain access to knowledge of the means through which technical innovation within a specific global high-technology company (hereafter referred to as ABC Corp.) is achieved. The initial planning for the field work was undertaken in 2009 and 2010, with the research commencing in 2011 and concluding in 2013. The Action Research was conducted by two teams (one based in New York and the other in Sydney), and was focused upon scrutinising the nature of the everyday experience of the members of these two teams as they enacted spirals of Action Research aimed at creating new innovative technical products and services.

Selection of participants in the research

Teams across the global span of ABC Corp.'s operations were invited to participate in an Action Research process aimed at improving a team's attempts at technical innovation. From the strong positive global response, two teams were selected to engage in the Action Research, with the primary criterion for the choice of these two teams being that neither team had been able to produce a technical innovation of any sort, over the previous three years.

The Action Research spirals

For a thorough documentation of the details of each spiral of Action Research, see Allen (2015). Team One, based in Sydney, was engaged in a variety of projects and had links to various management chains. Even prior to the introduction of the Action Research methodology, the work style of this team was egalitarian: a common cultural aspect of work across ABC Corp. but which appears to be more pronounced in the Sydney office. This team conducted five spirals of Action Research over the two-year period covered by this paper. The Action Research has continued (subsequent to the completion of the researcher's role) and has spread to other teams, who are coached in the methodology by members of Team One.

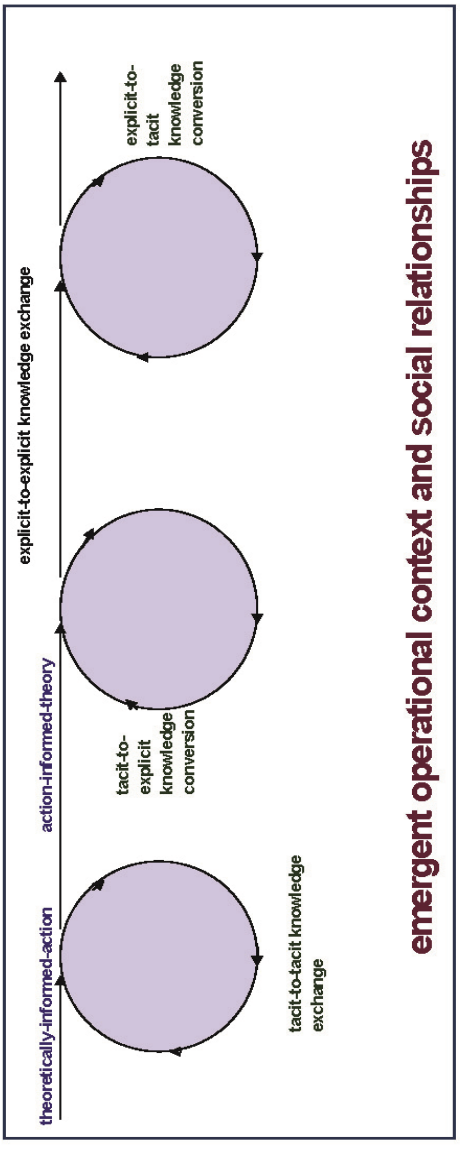
Team Two, based in New York, was an intact team that had been acquired by ABC Corp. several years prior to the commencement of the Action Research. Known internally as the DTech software development team, this team conducted eight spirals of Action Research over the two-year period covered by this paper. The Action Research continues in this team and is championed by its manager whose embrace of the Action Research methodology is captured in his recent comment to the researcher that 'to be part of the DTech team is to be an Action Researcher'.

Grant (the researcher and first author of this paper) shared his time equally with the two teams over the two-year period of this research; becoming a de facto member of each team.

As to the differences in political, social and cultural context between the two sites, the only difference that was noticeable was the effect of 'distance' (from the ABC Corp. headquarters) on Team One in Sydney. Several entries in the research diaries reflect a degree of powerlessness amongst Team One members with respect to initiating new Action Research projects across the Sydney office. However, the successful technical innovations that emerged from both teams were recognised by ABC Corp.'s head office and the researcher (Grant) was subsequently engaged to introduce the Action Research methodology to several ABC Corp. teams located in other countries.

In general, each spiral of Action Research encompassed thought (planning), action, reflection, learning (new knowledge creation) and transformed action (on the basis of the learning and reflexivity that each specific spiral engendered). These activities were documented and a broad range of data was collected and made accessible to others. In this way, the evidence of the consequences of the research action was scrutinised, and decisions based thereon contested. Through the collective interpretation of the outcomes of the action and the implications thereof for subsequent action, each team managed its 'reading' of the research process in the interests of achieving its practical goal. This interplay of action and reflection within a continuum of spirals of Action Research is shown in Figure 1.

Figure 1: Continuing spirals of Action Research, embodying the concept of praxis



Data gathering

Data was gathered in a variety of ways. These included:

- Personal and team journals, blogs and web sites
- Interpersonal email communication
- Personal and team presentations to both team members and other peers and colleagues
- Pre- and post-spiral interviews
- Notes and minutes of pre- and post-action (reflexive) meetings

Quantitative data was available for areas such as:

- Technology designs
- Software code written
- Code review and comment on peer software code
- New valuable products/services taken to market

Data analysis

Methods for analysis of qualitative data included hermeneutic analysis of texts and transcripts, group dialogue, and the monitoring of development of innovative new technical products and services.

Analysis of quantitative data incorporated a number of techniques developed with the input and consensus of the research participants. These included measures of absolute volumes, rates of change, and perceived impact of the various categories listed under the *Data Gathering* heading above.

Results and discussion

The Action Research process within each team was conducted over a period of two years. During this time, the research scrutiny was focused upon the practical goal (producing technical innovation) and the research goal (identifying and documenting those social practices within each team that appeared

to enable the achievement of the practical goal of technical innovation). In particular, the research goal was focussed upon gaining insight on the granular dimensions of these social practices in order to make explicit *what it was about the behaviour of individuals within these teams* that facilitated the co-production of innovative outcomes. In this sense, the research attempted to articulate the inter-personal and intra-personal dimensions of effective collaborative behaviour (and, thus, of leadership as a 'collective achievement'). One reviewer of this paper felt that the four practices outlined below were 'too general'; however from our perspective they shine light on dimensions of collaborative behaviour that are rarely articulated in enterprises, or in the body of research into leadership. In particular, they illuminate the relationship between the personal and the political in collective endeavour.

The outstanding insight generated by the data collected over the spirals of Action Research within each of the two teams is that *social innovation precedes technical innovation.* This is something upon which the literature on business and technical innovation is almost silent. Verhoeff's (2011) work with the AWVN in the Netherlands is the only direct reference to this phenomenon that we located in the business literature. However, while recognising the importance of social innovation as an antecedent for technical innovation, he does not articulate the nature of the social innovation required to facilitate technical innovation. The only other relevant references to this insight that we found were located within the territorial development literature, where researchers such as Karlsen and Larrea (2014); Moulaert, MacCallum, and Hillier (2013) and González, Moulaert, and Martinelli (2010) argue for transformation of social/power relations, and modes of governance, amongst regional actors as a requisite antecedent for the manifestation of technical innovation in a region.

Leadership practices that facilitated social innovation

Four distinct practices were observed to transform the technical innovation capabilities of the two teams. Interestingly, these practices all address the intra- and inter-personal dynamics which impact collective endeavour, in a specific way. In particular, they address the psychological aspects of effective

collaboration and the role played by social capital resources (such as *trust* and *identity* resources) therein. As we see it, the articulation of these practices contributes to making the 'black box' of what teams 'actually do' in addressing effectively the politics of innovation, less opaque. In our articulation of these practices we have attempted to provide some insight into their emergence by locating their advent in particular spirals of each team's Action Research (while the full strategic narrative of the enactment of each team's spirals of Action Research would illuminate their advent more clearly, this is not possible here because of space restrictions).

1. The practice of seeing self-in-the-other and other-in-the-self

Conspicuously absent from the literature reviewed earlier is an adequate discussion of the psychology of interpersonal dynamics which deals effectively with interpersonal perception in the highly politicised environments of workplaces. Questions about how team members recognise the 'other' in their work environment, and how that recognition affects their own identity, motivation, agency and, thus, contribution towards the innovation agenda, are rarely raised in the literature [two exceptions are Contu and Willmot (2003) and Coopey (1995)].

Interpersonal perception began to transform within Team One during the initial spiral of Action Research, when dialogue was raised as an alternative to the prevailing approach to team management. Over this and the subsequent spiral, realisation of the shared discomfort engendered by the communicative *status quo* within the group grew until it was finally made explicit through the vocal claim of one team member during spiral 3 that 'it's not just me'. Thus individuals, who had viewed their frustrations as unique to themselves and the lack of organisational support as particular to them, began to see in others the same thwarted desire and obstructed effort. These transformed interpersonal perceptions impacted the social context of the team as members began to recognise the commonality of their personal experiences and situations. In this way, powerful *identity resources* were generated and leveraged, which led to the accrual of greater social capital: *trust* in particular, and facilitated members' commitment to a shared and collectively-valued cause.

As each member identified with others (saw the self-in-others), the consequent resources of empathy and generosity of spirit facilitated the capacity for intense collaboration and a form of 'fighting for excellence' (*creatively abrasive* discussion and debate) that generated valuable ideas and the resilience necessary to realise those ideas in the contested 'political' environment in which any innovation needed to manifest. Similarly, the reciprocal practice of seeing the 'other-in-the-self' contributed greatly to self-awareness and, in the context of collaborative endeavour, to the realisation of personal responsibility for, and commitment to, the group's shared mission. Personal defences and rationalisations, and/or passionate commitment to task, became transparent to the self in the perceptual reflections of others' behaviour.

Within the subsequent Action Research spirals of Team One, each member gradually assumed the identity of a 'significant other' in the eyes of the other members. This perceptual transformation opened the door to new emotional and intellectual connections between members; connections that greatly accelerated group collaboration through the mutual acceptance of risk and a shared understanding of the responsibilities embedded therein.

2. The practice of intellectual humility

During the course of the Action Research within Team One, the participants coined the term 'leadership confidant' to describe the practice of confiding (in their peers) their frustrations, anxieties, self-doubts, and areas of ignorance that they believed were impeding the collective attempt at innovation. Importantly, the manifestation of this practice of exercising appropriate intellectual humility as a precursor to insightful learning was both a consequence of, and a contributor to, the transformation of power relations within the team. By eliminating hubris and competitive ego battles with respect to personal knowledge bases, this practice enhanced the ability of the team members to tolerate feelings of personal vulnerability in order to become open to learning. The term 'leadership confidant' offered the team a linguistic reminder of its acceptance of this practice: a practice that we re-brand with the more formal term of 'intellectual humility'. This notion has little currency in the business leadership literature apart from raising the issues of arrogance

and hubris as inhibitors to leaders' capability to reflect critically on their practices [see Hoekstra (2008) and Shapiro (1987)]. Furthermore, the effective transformation of such dispositions is less clearly addressed. Root-Bernstein (2003) comes closest to the offering of ways to address these issues when referring to the usefulness of a 'problem generation' discussion as an indirect way of encouraging the admission of ignorance in attempting to build innovation capabilities. However, in this Action Research, the two teams were able to spur multiple probing discussions that were underpinned by the premise of collective ignorance of the way forward to the achievement of specific forms of technical innovation. Productive dialogue in these situations arose from transformed personal identities that tolerated the imperfection of knowing in self and others, and thus the concomitant openness to learning from others. Consequently the Action Research spirals reflected greater personal and collective maturity and interactive sophistication. In this way, ignorance began to give way to insight and (what had appeared to be intractable) problems became negotiable as this practice became a feature of the everyday life of the team.

The team's practice of intellectual humility created the confidence for members to commence a 'shared inquiry toward knowledge' (Hoekstra, 2008, p. 164). Collectively owning the associated risk, they turned this questioning of their own knowledge bases into a positive, constructive part of the innovation challenge. By embedding this approach in a social contract, they created powerful morale capital resources and liberated members from the fear of failure. Furthermore, the practice allowed the team to admit the complexities and difficulties involved in innovation. Such admission runs counter to some of the cultural norms around leadership within the company, and more broadly in the technology industry, where leaders are expected to continuously demonstrate an unrealistic level of perfection of *knowing*. We saw in Team One how the willingness to admit imperfection of knowledge allowed the desire to learn and understand to manifest, leading to the creation of innovative new technologies and knowledge bases. This practice created new insights for team members: in particular the realisation that it is not enough to be a domain expert with vast amounts of technical knowledge. One must also be able to share what one knows in ways that expose what one *does not*

know, and open oneself to the risk of vulnerability that comes with acknowledged ignorance. This practice can only be enacted in a context of high-trust as admission of ignorance, of lack of understanding (or dissatisfaction with the current understanding) within highly competitive conventional organisational contexts could be self-destructive. As Kofman and Senge (1993, p. 20) comment, '… only with support, insight, and fellowship of a community can we face the dangers of learning meaningful things'. By creating a social environment in which practices such as intellectual humility can be executed without fear, social innovation lays the relational foundations for technical innovation and meaningful knowledge creation.

An additional dimension to the practice of intellectual humility became apparent as the two teams of research concluded. Each team in its own way experienced an epiphany: that embracing the principle of dialogue embedded in Action Research and, through it, embarking on a course of self- and collectively-reflexive learning and discovery, they had opened up an entirely new repeatable mode of investigating problems and facilitating innovation. Most importantly, they had discovered a way of effectively addressing the politics of the organisational context in which they sought such innovative outcomes. As a researcher, there was pleasing irony at seeing Zuber-Skerrit's (2002) suggestion of admission of ignorance as a component foundation of the Action Research methodology becoming manifest in the teams' utilisation of this methodology, and in the outcomes of its application.

3. Creation of a negotiated order

In the first and second Action Research spirals of Team Two, the seeds of the leadership practice of creating a 'negotiated order' began to emerge. Within a team with historic tensions around priorities issued by fiat, a triggering moment occurred in response to the remonstrations of the team's manager; a response that results in an entirely different outcome to that demanded by him. The manager's disgruntled departure from the team at the end of spiral two of the Action Research leads directly to the significant changes witnessed in spirals three and four, where the team seizes control not just of the prioritisation process but also of the bases of power that support strategic decisions

governing innovative intent. This establishment of a democratic order, and one negotiated between the members of the team, lays the decision-making foundations with respect to the team's on-going approach to its attempts at technical innovation. This 'new order' bears similarity to Strauss' (1978) notion of 'negotiated order' with respect to collective decisions about what work is to be done; the division of labour required to achieve it; who the actors are; and what form and manner accountability will take. In this Action Research, however, the negotiated order went far deeper than Strauss' relatively superficial issues requiring collective decision-making; in Team Two the team empowered itself to question fundamental aspects of its existence, role and agency within the organisation. The nature and significance of outcomes of the actions that emerged from this new negotiated order, demonstrated the genuine transformation of power relations within the team as each spiral of Action Research was enacted. These included:

- The decision to discard the old priorities and strike out on the team's own path. The team insisted on establishing its own priorities and exercised a high degree of rigour and critical thought in appraising the initial set of priorities.
- The critical scrutiny of choices; consideration of all opinions; and continuous negotiations on the current set of priorities in an ever-changing work context. This led to the team discovering its 'collective voice' when declaring the initial set of priorities to be too ambitious; and its 'collective agency' in determining a realistic subset of priorities that was attainable. By achieving consensus on critical issues, the team avoided falling back into a state of dysfunction.
- The team's recognition of the evanescent nature of social reality; that states-of-flux are a consequence of the emergent strategy (typical of Action Research) that is appropriate within a dynamic operational context.
- The tolerance exercised by the team as its composition changed through necessity as two sub-teams were spun-out of it when required. The agility of the team (in membership and function) became possible as a conse-

quence of the intangible resources (personal flexibility and readiness to transform) generated and leveraged by the negotiated order.

The leadership practices that underpinned the negotiated order established the rules of engagement through which the team tackled subsequent challenges, ambiguous situations, and the politics of change. Negotiating order was a continuous aspect of the Action Research process, with full participation ensuring the grounding of this process in dialogue and democratic ideals.

4. Intelligent caring

Another important practice to develop within both teams participating in the Action Research was that of direct-but-empathic communication among members. Members learnt, through each Action Research spiral, the value of constructively honest critique. Recognising the need to 'fight for excellence' in their strategic intent to innovate technically, participants developed the capacity for interpersonal confrontation that enhanced rather than diminished the team's performance. Similar to the colloquial term of *tough love*, where difficult conversations are held as an act of caring for the development of the individual as well as the achievement of a shared mission, the practice of *intelligent caring* emerged in each team as a form of service to the team. A significant example of this practice occurred when Team Two members demanded a clearer set of prioritised goals without seeking to lay blame on others for previously missed targets. Even under the stress of their manager's emotional outbursts, and subsequent departure from the team, members managed the task of re-setting priorities and goals in a mature, collaborative way that made no excuses for their lack of progress up to that point. The team's collective rejection of their manager's command (during the first two spirals of Action Research) to 'just do their job' and, instead, to question and challenge his imposed list of priorities, was conducted with the sensitivity and courage required not to jeopardise the team's innovative aspirations. The level of analysis, debate, reflection, and, above all, constructive critique of the team's actions within each Action Research spiral, reflected the strength of commitment and depth of caring within the team with respect to each other, and to the team's strategic intent to innovate. This collective readiness

to ‘fight for excellence’ rather than engage in blame attribution and victimisation, bears similarities to the form of constructive confrontation championed by Andy Grove [see Yu (1998)] in his description of the culture at Intel. De Long and Fahey (2000, p. 124) paraphrase Grove's assessment of this style of interpersonal confrontation as ‘ferocious arguing with one another while remaining friends’. While, in this research, the emotional level was intense without being ferocious, we saw an excellent example of intelligent caring in spiral five of Team Two’s Action Research, where individual frustrations did not manifest in accusations and negative questioning but, rather, were expressed using humour and role-play. No research plan could have predicted the innovative outcomes of these processes. The technical innovation that followed was a direct consequence of the transformed power relations within the team: relations that empowered members to attack problems and explore solutions with mature communicative competence and critical yet respectful responses to under-performance. Rather than passing negative judgement on individuals’ performance, the team exercised collective responsibility for understanding the bases of any failure, and for moving forward through constructive confrontation, collaboration and learning.

Technical innovations achieved through the Action Research

A number of key product and technological innovations were achieved directly as the result of the Action Research. While many additional smaller innovations were apparent, the four most prominent technological innovations were in the areas of Network Management, Software Security, Validation, and Reporting.

1. Technological innovation in network management

At its core, the new (BWM) system developed by Team One acts as a market for network bandwidth for online systems. In providing online services to customers, ABC Corp's networks are always under higher and higher demand, leading to perpetual cycles of saturation, contention, provision of new capacity, and a subsequent spiral of new demand. The BWM system incorporates a novel market for real-time calculation of the maximum utility, and, at

its most basic, revenue generating value, when the last fraction of spare capacity is sought by multiple competing services. Rather than allocating this capacity at random, those services that would return the most value on the marginal network use are allocated the capacity.

A complementary innovation was the technology built to feed this data back to service owners and designers, allowing them to consider the use of network bandwidth for return-on-investment forecasts. Here, software development teams could calculate if the human effort and cost in making their software services more network-efficient would see the desired marginal revenue return in times of network saturation.

2. Technological innovation in software security mechanisms

Another major innovative development from Team One was the creation and development of an entirely new approach to embedding security mechanisms, protocols and standards within ABC Corp software products. This changed the nature of software development within ABC Corp; changing company-wide practices from a common design philosophy re-implemented countless times by numerous groups, to an approach that provides software security mechanisms and policy implementations as building blocks, built once to be re-used more easily and at much lower overhead than the previous approach.

Initially there were doubts about whether this radical change in approach would be adopted more widely by the company, but now the new approach to security has been adopted broadly across ABC Corp, and is the *de facto* standard for all new software development projects.

3. Technological innovation in the revolutionary DTech validation product

This technology targets the needs of the very large advertising buyers in the market: both global content and publishing companies, as well as the advertising agencies, brokers and buyers who represent them. The technology includes a combination of prescriptive rules and preferences, provided by the publisher and content generation clients, together with the team's innovative development of a machine-learning pipeline, trained to assess advertising for validation and optional exclusion. Over and above what the software per-

forms, the engineering expertise injected by the DTech team (Team Two) means that individual validation decisions can be performed in under 200ms, from the moment the intent to display content and a possible advertisement is initiated, through the assessment and validation process, to packaging the advertisement for delivery with the content by the publisher or advertiser systems. This speed of operation is as ground-breaking as the validation capability itself. At the time of the writing of this paper in 2015, ABC Corp is the only company to be able to offer this service in real-time to the satisfaction of the market, despite several attempts by competitors to enter the arena.

4. Technological innovation in the DTech reporting system

The existing system made customisability and user-governed selection of criteria, difficult when generating reports on advertising campaign effectiveness, return on investment, conversion rates, etc. Attempting to demonstrate the effect, correlation or causation of any one, or combination, of variables continuously ran into the challenge of the end-user needing to sift through all possible variables and combinations to find results of interest.

The new system provides an interface with visual 'thematic overlays' that do not rely on lists and grouping of variables in text form. This cohesive approach to displaying the effect of the hundreds of variables contributing to the outcome: as well as the forecasting capabilities it builds and deploys, is considered to be generations ahead of other software offerings on the market.

Conclusions

In this paper we have argued that, traditionally, research on technical innovation has been conducted within Research and Development (R&D) functions that operate within the positivist research paradigm. The assumptions underpinning this research paradigm have constrained such research to purely technical processes, thereby eschewing social and political dimensions of the innovation phenomenon. Similarly, as our review of literature shows, much of the traditional research literature on leadership is located within a positivist paradigm with leadership being viewed as a set of traits and competencies held by specific individuals charged with the responsibility for organisational

success. As a consequence of its paradigmatic assumptions, this research literature has had little-to-nothing to say about the contingencies that may impact this complex phenomenon that we refer to as 'leadership'. The 'practice turn' in leadership, also mentioned in the literature review, has opened up a far broader discourse on the complexity of the concept of leadership, and has taken the discussion thereof away from individual competencies towards a more social and *situated* understanding of leadership. Similarly, research literature that is located in the constructionist research paradigm, with its assumptions of an inter-subjectively constructed and sustained social reality, has opened up a discourse around the role of politics (human interests, values, assumptions, interpretative biases, etc.) in the processes of innovation and, in particular, the reasons why the rhetoric of innovation substitutes for its practice in many organisations.

From the perspective of the practical goal of this Action Research, the two teams that participated in this research produced four highly innovative products/services. These innovations have been lauded within the company and are currently used by millions of customers.

In terms of the generation of new knowledge, the major finding of this research was that, in both Action Research settings, *social innovation preceded technical innovation*. The results show that, previous to the adoption of this Action Research, both teams under study had struggled to innovate technically because of social and governance dysfunction. It was only once the relational environment was able to support direct, 'creatively abrasive', communication among team members that technical innovation began to manifest. In particular, the building of inter-personal trust was a critical innovation-related achievement. In this respect, the results point to the need to manage the politics of innovation by crafting group power relations in ways conducive to constructive relationship building and effective communicative practices.

The results show that four leadership practices, collectively developed and leveraged in each team through the Action Research processes, laid the foundation for technical creativity and innovation:

– *The facilitation of interpersonal empathy and mutual identification among team members*. This practice generated significant *identity resources* - intangible capital resources such a trust and commitment that become avail-

able when shared identities are realised. These relationship-based resources underpinned the resilience of the two research teams as they sought collectively-cherished outcomes through aligned action. Such resources enhanced the absorptive capacity of these teams as members projected themselves into the situation of 'the other' and thereby became able to enhance their communication skills (particularly listening skills) and reduce the 'stickiness' of the tacit knowledge being explored through the collective action. This practice also led to the teams becoming more open to collaborative risk-taking.

- *The inculcation of mutual openness to the correction or counsel of others, irrespective of status or role.* Team members began to exercise a form of humility that allowed them to open themselves to learning from others; to admit to not knowing and to trust that such an admission would not be exploited for competitive advantage by team members. This practice eliminated hubris and other forms of destructive politics from the social context of the innovation effort and set the stage for the collective focus on insightful learning;
- *The development of an authentic 'negotiated order'*; one that laid the social foundations for innovative endeavour. This practice, of collectively establishing the principles upon which all interpersonal interaction and engagement were to be based, enabled direct and open communication to flourish in the interests of mission achievement. An important aspect of this practice was reaching consensus on the team's mission and the interpersonal framework (or 'rules') for effective collective action. In this respect, the choice of an Action Research methodology greatly facilitated the manifestation and effectiveness of this practice;
- *The framing of interpersonal confrontation in positive terms*, which enabled each team to deal effectively with the difficult political and personal issues that periodically stalled progress on technical innovation. Thought of as 'tough love', this practice re-framed confrontation as a form of caring; one in which the interests of the person/group being confronted are being honoured and addressed empathically. As such, it endorsed the value placed on that individual/group by the rest of the team

and appealed for the confronting action to be viewed as an invitation from the team to re-engage with it constructively in the collective interest. Through this practice, potentially toxic issues were addressed without endangering team solidarity, as may have been the case if negative approaches to failure and adversity, such as the assignation of blame and the enactment of personal victimisation, had been condoned. In this way, the personal passion that often fuels innovative action in teams was managed in ways that demonstrated interpersonal care and respect without compromising the innovation intent of the team.

Limits of the research and scope for further exploration

From a traditional perspective of limitations, constructionist research is *situated research* and accesses knowledge that is context-bound. As such, it would be argued that the results of this research cannot be generalised with confidence to other settings although the insights generated by it may be useful to others attempting to create a sustained capability for technical innovation. In addressing the challenge that Action Research faces in transcending the 'single case' without losing the action element, Gustavsen (2003) presents an argument for viewing cases of Action Research as part of a *social movement* focussed upon a core theme or concern. Reason (2003, p. 281), however, while endorsing Gustavsen's point, adds that,

> (i)ssues of scale must be approached not only through distributive Action Research, as Gustavsen advocates, but also by expanding the emancipatory inquiry space of face-to-face inquiry practices. The integration of the personal with the political is seen as absolutely central to this type of work.

In the case of this research, the action can be seen as a contributor to a broad social movement towards creating leadership ('political') practices that are more effective than those of the *status quo*, in addressing the huge challenges faced by humankind on this planet. Similarly, the results of the Action Research show how, in collaborative endeavour, the personal can become political and *vice versa*, in ways that illuminate Reason's point. While the technical innovations produced through this Action Research can hardly be

described as contributions to societal wellbeing, the process through which they were achieved is representative of a new form of collaborative endeavour: leadership as a collective achievement, the 'politics' of which are addressed transparently with a view to personal and collective emancipation. In this respect, an encouraging aspect of the results from the Action Research reported on in this paper is the similarity of findings - in particular that social innovation precedes technical innovation – to those of some of the territorial development Action Research being conducted in the Basque country of Spain (see Karlsen & Larrea, 2014). While the research settings vary considerably, the notion that has emerged from these very different research contexts, that technical innovation is tied in complex ways to situated socio-political issues and practices, reflects a growing sensitivity to the political nature of social realities and, thus, the need for research paradigms that can address these politics effectively.

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