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Exploiting the Reach to Explore the Richness in Inter-organizational Action Research

David Coghlan, Paul Coughlan

Exploring and exploiting the richness and reach of large scale action research projects is a challenge. This challenge focuses inwards as it addresses critical issues of enacting, managing and coordinating the actions of the project and engaging in the reflective processes of learning-in-action and knowledge generation by multiple actors and groups engaged in the project. It simultaneously focuses outwards as it seeks to exploit both the processes of the action research itself and the dissemination of actionable knowledge to multiple audiences. This article describes and reflects upon the challenges of exploring and exploiting richness and reach arising in the CO-IMPROVE project, a European Union (EU) funded initiative involving action research in complex networks of academics and business. The objectives of CO-IMPROVE included the facilitation of collaborative improvement of operations practice and performance in the extended manufacturing enterprise through action research among both managers and academics.

Key words: action research, richness and reach, exploration and exploitation, supply chain networks, CO-IMPROVE

Actionable knowledge in a collaborative situation does not arise of its own accord. While latent in the collaborative actions of the actors, it may be overwhelmed by the complexity of inter-organizational relationships and processes. Expressed differently, issues of exploitation and exploration arise in relation to the richness in the situation. These are established pairs of

concepts which form the basis of this article: exploration and exploitation; richness and reach. Each pair has developed in differing contexts. In this article, we bring them together around two combinations: exploiting the reach of a collaborative network in order to explore the richness of the actionable knowledge generated. We introduce first the two pairs of concepts before introducing the empirical opportunity to relate them in a novel way.

Exploitation and exploration, richness and reach

March (1991) presents two central processes for organizational learning, exploitation and exploration. *Exploitation* refers to the exploitation of old certainties and includes such things as: refinement, choice, production, efficiency, selection, implementation and execution. *Exploration* refers to the exploration of new possibilities and includes things captured by terms such as: search, variation, risk taking, experimentation, play, flexibility, discovery and innovation. Holmqvist (2003) comments that intra-organizational learning favours exploitation while inter-organizational learning favours exploration and he notes that exploitation within an organization is a prerequisite for exploration between organizations. Inter-organizational and intra-organizational learning are interdependent in that both create the conditions for exploration and exploitation in one another.

Evans and Wurster (1997) contend that a fundamental shift in the economics of information is evident as companies have adapted their operating processes to new information technologies. They described this shift in terms of the trade-off between richness and reach. *Richness* is defined by three aspects of the information itself: bandwidth – the amount of information that can be moved from sender to receiver in a given time; customised – the degree to which information can be customised; interactivity – dialogue versus monologue. *Reach* means the number of people at home or at work exchanging information. Underlying these two concepts is the notion of a tradeoff. Originally, tradeoffs were seen as relationships which were largely fixed. More recently, tradeoffs have been seen as relationships between performance objectives which hold true for a given set of factors and, so, can be changed. Traditional businesses always had to make a tradeoff between

richness and reach. Doing both was prohibitively expensive. Through e-commerce, businesses have begun to overcome this tradeoff.

In a research setting, these two pairs of concepts are applicable – but in a potentially insightful combination. First, we look at richness and reach. Systematic collaboration between practitioners within a complex and dynamic context is increasing as supply chains become supply networks and as firms increase the degree to which they outsource key aspects of their activities. The information generated and exchanged is high volume, customised and generated through dialogue – rich in terms of Evans and Wurster. However, issues are encountered and, correspondingly, an empirical opportunity for research exists. The scale of the networks of firms challenges the scope, or reach, of research approaches to overcome the tradeoff between richness and reach. Collaborative management research has been defined as ‘an emergent and systemic inquiry process, embedded in a true partnership between researchers and members of living system for the purpose of generating actionable scientific knowledge’ (Shani et al. 2008). Some defining features of collaborative management research that seem to be held in common include: the integration of the knowledge of diverse stakeholders in the process of yielding new management/ organizational approaches; the need to achieve collaboration between these actors; a model of learning in practice seems to guide the inquiry process; scholars engage with the world of practice in an effort to yield knowledge useful for both theory and action.

It would seem, then, that the application of a collaborative management research approach would overcome the tradeoff. However, the nature of the research context suggests that two separate, but related, processes are running: the exploitation of the reach of the network relationships; and, the exploration the richness in the co-generated data. ‘The new production of knowledge’ as articulated by Gibbons and his colleagues (1994) is a network activity and research needs move away from a model whereby it is embedded currently in the expertise of isolated individuals operating from a top-down expert model (Gustavsen 2003). In other words, the need is to expand the reach. Correspondingly, contemporary research approaches, known as Mode 2 research, are characterised by: knowledge that is produced in the context of application, transdisciplinarity, heterogeneity and organizational diversity,

social accountability and reflexivity and that quality control is structured in the context of application and set by a wide set of criteria (Gibbons et al. 1994; Notowny/Scott/Gibbons 2001). These approaches are characterised by richness. Together, the combination of contemporary research approaches and the new production of knowledge require that such a richness-reach tradeoff is overcome. A number of the features attributed to Mode 2 research might be applied to such established action-oriented approaches as action learning and action research (MacLean/MacIntosh/Grant 2002).

Exploiting the reach to explore the richness of the empirical opportunity in inter-organizational action research

Having introduced the conceptual and methodological underpinning, the article now describes and reflects upon the challenges of exploiting the reach to explore the richness arising in the CO-IMPROVE project, a European Union (EU) funded initiative involving action research in complex networks of academics and business (Coghlan/Coughlan 2005). The objectives of CO-IMPROVE included the facilitation of collaborative improvement of operations practice and performance in the extended manufacturing enterprise through action research among both managers and academics. In the context of emerging calls for research into learning by networks and to complement learning in networks this research contributes the learning and knowledge that emerges from an action research approach where the researchers, comprising both academics and managers, both managed and studied the process. It contributes also to the growing action research literature on large scale inter-organizational action research.

CO-IMPROVE

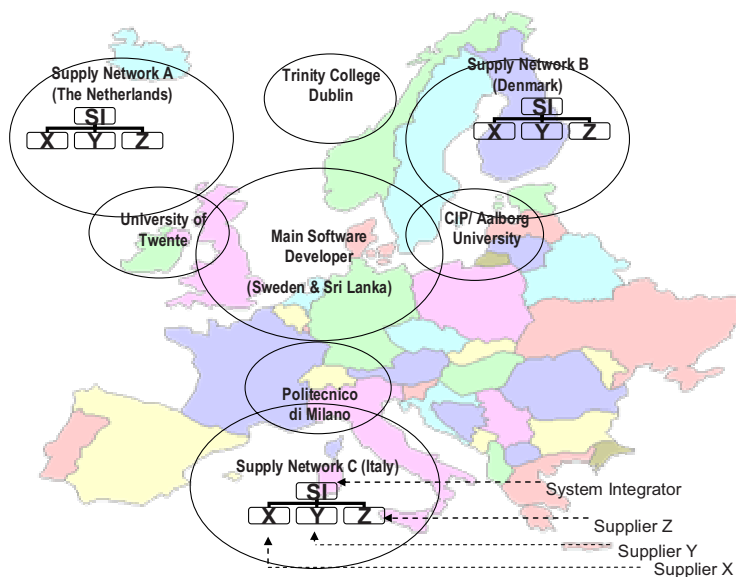
The CO-IMPROVE project explored the premise of consistency, regularity and balance suggested by the concept of collaboration, focusing, in particular, on the learning required to enhance collaborative improvement of the performance of EMEs. CO-IMPROVE was an EU-funded project of three years duration, which commenced in March 2001. The objectives of CO-IMPROVE were to develop a business model, supported by a web-based

software system, and action learning-based implementation guidelines to support the design, implementation and ongoing development of collaborative improvement between partners in EMEs.

The proposition underlying the CO-IMPROVE project was that EMEs and researchers need a well-developed collaborative learning capability at the inter-organizational level, supported by information and communication technology, to bridge geographical, time and academic discipline barriers, to create and maximise synergy between the capabilities of the parties involved, while allowing each individual party to realise its own strategic goals. Such a proposition articulates an envisioned and desired future state, characterised by consistency, regularity and balance but does not show to how achieve it.

Industry partners in CO-IMPROVE were organized as three company networks centred on Denmark, Italy and The Netherlands, as illustrated in Figure 1. Each network comprised of a system integrator with some strategic suppliers drawn from Denmark, The Netherlands, Italy, Sweden, Austria and

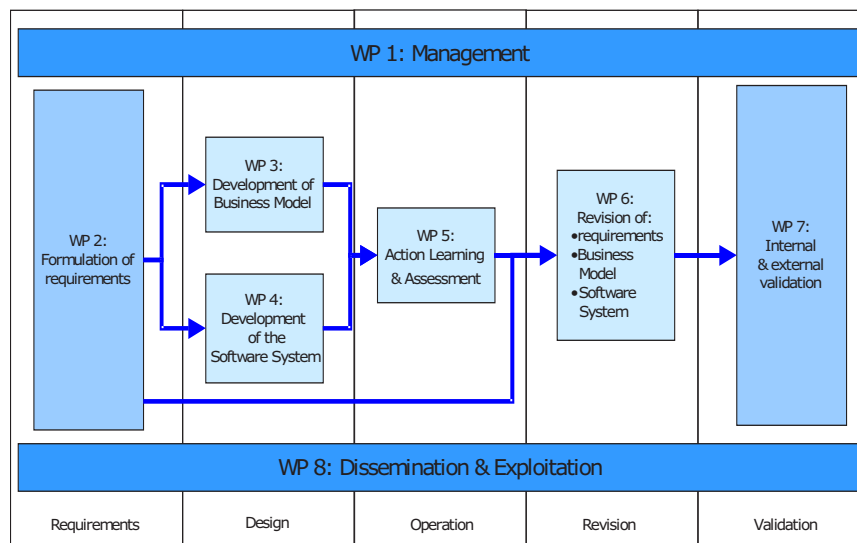
Figure 1: CO-IMPROVE integrated research and supply networks



Germany. Academic partners were comprised of Aalborg University (Denmark), Politecnico di Milano (Italy), Trinity College Dublin (Ireland) and University of Twente (The Netherlands) and came from a variety of academic disciplines: operations management, continuous innovation, international business, information systems and organizational change and development. Two IT companies facilitated the development of the software system central to the project: an ICT developer from Sweden - specialised in the development of enterprise resource planning applications for industry; and their Sri Lankan subcontractor.

The project extended over a three-year period and was broken down into a series of work packages, illustrated in Figure 2. These work packages constituted the sequential stages of the project: investigating requirements, design, operation, revision and validation. The action learning work package was the largest individual work component and constituted the operation stage during which the companies engaged in collaborative improvement initiatives.

Figure 2: The design of CO-IMPROVE was planned as major phases and work packages



Action learning engaged the participants in explicit learning-in-action. The networks met and followed a plan-do-check-act cycle in relation to the initiatives in their own network. Each network submitted progress reports, based on the action learning framework, in advance of partner meetings which were discussed and reflected on at the meetings. Next steps were planned and then implemented in the next cycle of action. As the project proceeded, these reports became more comprehensive in their operational detail and more effective in their attempt to internalise and integrate the learning achieved. Accordingly, adaptive learning was primary. In this respect the interaction of the action learning and action research processes was key.

The CO-IMPROVE project was undertaken through an action research approach where the researchers were both managing the project and studying it at the same time (Reason/Torbert 2001; Coughlan/Coughlan 2002; Coughlan/Brannick 2005; Middel et al. 2005; Greenwood/Levin 2007). The company networks were comprised of the managers from the system integrators and their suppliers, while the researcher network was comprised of academic researchers and the system integrator managers working in outsider-insider researcher teams (Bartunek/Louis 1996).

In sum, the CO-IMPROVE project was a large-scale action research project. It took place in a complex inter-organizational setting. It was characterised particularly by discrete borders and boundaries. The borders were those country borders between the nine countries participating in the project. The boundaries were those organizational boundaries between buyers and suppliers with previous commercial and collaborative histories, between the four academic institutions involved, between the various academic participants and between the business and academic participants.

Collaboration in CO-IMPROVE

The imperative for inter-organizational collaboration arises from the necessity to respond to complex problems, which are created by discontinuous, turbulent environmental conditions (Coughlan et al. 2003). Each of the networks faced such problems and developed a number of improvement

initiatives in response. A selection of these initiatives is outlined in Table 1. Collaboration is an appreciative process in which strategies of cooperative advantage, affirmation of contributions to the collaboration, relationships of mutuality through shared understandings of multiple perspectives and lateral coordination of power are enacted to develop capacities for inter-organizational learning (Bilimoria/Wilmot/Cooperrider 1996). Inter-organizational alliances require that the participating organizations emphasise working at their perimeters, rather than at their cores (Bilimoria/Wilmot/Cooperrider 1996).

Table 1: EMEs a

EME	Industry	Suppliers	Examples of Improvement Areas
Italy	Aerospace	4	Reduce parts and equipment delays Staff certification Reduce order lead times
Denmark	Hydraulic pumps	3	Total productive maintenance Reduce change-over time Purchasing agreement management Planning information sharing
The Netherlands	Automotive components	3	Reduction of delays Management of personnel qualifications

Collaboration in CO-IMPROVE focused on two separate areas. First, managers from the system integrators and suppliers, with whom they had a previous (and current) commercial relationship, collaborated to make improvements towards commercial ends. For example, in the Danish network, they sought to improve the information flow regarding the ordering process. In this dynamic environment, four weeks could pass without the system integrator passing out information to the supplier. Such a situation was neither desirable nor sustainable from a competitive perspective. The objective was to change the planning process so that when the system integrator carried through changes in forecast and incoming orders, the supplier would know this immediately. Secondly, academic researchers collaborated both with managers and with one another by engaging in action research towards actionable knowledge ends (Coughlan/Coughlan 2005, 2008). In the researcher network,

the structure of the relationships between the academic researchers and the managers enabled the enactment of collaborative research as discussed by Adler, Shani and Styhre (2004: 359). In their view, collaborative research aims at "...generating new insights that can simultaneously serve both action and the creation of new theoretical development". In CO-IMPROVE, collaborative research encompassed action research and action learning, and worked across boundaries and disciplines by integrating practices in successful improvement projects with existing bodies of knowledge.

Exploiting the reach: The establishment of the learning networks

As in Evans and Wurster (1997), the CO-IMPROVE networks, which comprised people engaged in exchanging information, defined the reach; the establishment of the networks was an essential component in the exploitation of the reach. As in March (1991), exploitation included choice, production, implementation and execution by networks. Holmqvist (2003) suggests that exploitation at the network level is enacted through joint acting, that is, jointly exploiting the experience of the participating organizations.

Company Network Collaboration: In CO-IMPROVE, the company networks, as action learning groups, were inter-organizational in composition, comprising senior managers from the system integrators and from their supplier companies. Planned originally to start after 15 months and to extend over the following 15 months, the key objective of this action learning work package was to facilitate collaborative improvement of operations practice and performance in the extended manufacturing enterprise through collaborative action learning in the three company networks.

A central feature of CO-IMPROVE was the pre-existing, commercial nature of the relationships between system integrators and supplier companies. Many of these supplier relationships were long-term and dyadic with some previous experience of collaborative improvement, while others were more recently established. Regardless of duration however, the ongoing effect of the current global downturn formed a common turbulent backdrop to these supplier relationships (Coughlan et al. 2003). Pre-existing concerns for the future of their relationships brought a commercial reality to plans both for

introducing the collaborative improvement concepts of CO-IMPROVE and for establishing a valuable role for the initiative in the eyes of the participant companies.

Researcher Network Collaboration: The researchers in CO-IMPROVE were organized into four teams, each drawn from one of 4 institutions noted earlier: Aalborg University, Trinity College Dublin, Politecnico di Milano, and University of Twente. The researchers came from a range of academic fields: operations management, international business, innovation and organization development. Each team included a combination both of researchers with a wide range of research experience and doctoral students planning to complete their doctoral research through participation in CO-IMPROVE. Together these four teams formed the researcher learning network.

A critical interval for the research learning network was the beginning of the project. The network met three times over a five-month period prior to the start of action learning workpackage. In the first two meetings, the Dublin researchers led workshops on action research and action learning in order to achieve a common understanding of the action learning and action research imperatives. The third meeting focused on detailed preparation of the assignments for each company network and of the tracking of what would go on within each company learning network.

There were three levels in the researcher learning network.

1. *The local researcher network in each country.* Researchers from Aalborg University, Politecnico di Milano, and University of Twente facilitate their “local” company network and, as such, constitute local researcher networks. The Trinity College Dublin researchers facilitate the action learning process undertaken by each local research network. As such, the local researcher networks are engaging in action learning with their local company network, and action research on the development of the project from their local perspective.
2. *The workpackage researcher network.* The ongoing development and application of the business and technical models and the action learning process were each the responsibility of the institutions who were leading the workpackages dealing with these three elements. Each represented a

work package researcher network. As such, the workpackage researcher networks were engaging in action learning in relation to their area of responsibility, and action research on the development of the particular element of the project within their area of responsibility.

3. *The project researcher network.* The project researcher network encompassed the three local researcher networks and the three workpackage researcher networks. This network was co-ordinated by the Trinity College Dublin researchers who were responsible for the development of the action learning process.

Structures for Communication

Each of the researcher teams gathered, documented and made sense of data with respect to their respective research area for the duration of the action learning process. Data were gathered through

- Instrumentation
 - An assessment tool was developed and applied to try to determine the readiness of each company network to engage in collaborative improvement
- Minutes and notes of company network meetings
 - Each of the researcher teams developed, circulated and commented upon minutes, discussion papers and presentation materials arising from each of the company network meetings. These materials tracked in detail the background to and the development of the initiatives and associated relationships
- Minutes and notes of researcher meetings
 - The notes of the company network meetings were presented and discussed at the researcher meetings. The academic researchers and the managers participated in these meetings. The meetings were run as research seminars, in which ideas and emerging theoretical and methodological insights were challenged and further development towards publication encouraged. The data gathered, documented and

reflected on in the researcher settings were fed to the various teams who kept an overall watching brief of the progress of their area of responsibility.

- Researcher journaling
 - Researchers developed personal notes as a record of their own observations and reflections, thoughts and feelings and personal learning through the process.

Consistent with the three levels in the researcher learning network, there were three different structures for communication.

The local researcher network in each country. Each company network meeting was preceded and followed by a local researcher meeting which engaged in the action research cycle, of diagnosing, planning action, taking action and evaluating action with respect to the implementation of and research on the three themes - the business model, the technical system and the company action learning process. The purpose of these meetings was to

- gather, document and make sense of data with respect to each research area and their respective company learning network for the duration of the action learning process. The data related to operational processes in terms such as time, quality and cost; and to the development of collaboration in terms such as communication difficulties encountered and overcome,
- review the feedback generated from assessments of practice and performance in each company learning network. The discussions challenged the analysis presented with a view to developing a shared understanding of the status of issues and the potential for improvement,
- develop and outline the process being used to set and to communicate objectives for the change initiative to management in the network partners and to consider the degree of conditionality in their buy-in. This conditionality was of particular importance in the context of the buyer-supplier relationships in the company networks. Commercial concerns, on both sides of the relationship, were never far from the surface: cost was monitored and impact expected,

- develop and outline the plan for transitional steps from stage to stage so as to minimize possible deterioration of company performance, company motivation and quality of research data. In all cases, the improvement initiatives involved issues associated with current order streams which could be repeated into the future. As such, any disturbance to the flows of materials, information or promises to customers was to be avoided,
- resolve issues that might arise. Some of these issues were anticipated such as trust and information flow. However, others emerged such as a recognised need to deal with trust issues in real time, with bureaucracy in a large organization and with power relations,
- develop a position paper on the substantive issues and on the action learning approach in each company learning network.

As outlined earlier, the work of these local teams was facilitated through, development, customisation and application of assignments at company network meetings, minutes and notes of company network meetings, minutes and notes by individual researchers of on-site meetings with members of the company learning network between company network meetings and researcher journaling. A combination of structuring and directing was adopted whereby a medium structure with well-defined tasks and schedules was implemented in a nondirective manner (Coghlan/Coughlan/Brennan 2003). This was to maintain consistency across the three company networks – that each followed a recognisable action learning process and engaged in self-assessment and cycles of action and reflection, while at the same time accommodating the uniqueness of each network and the differences between them.

The work package researcher network. The researcher network for each workpackage met at each partner meeting and engaged in the action research cycle, of diagnosing, planning action, taking action and evaluating action with respect to the implementation of and research on the 3 themes in the three company learning networks. The purposes of these meetings were to

- gather, document and make sense of data with respect to each research area with respect to the three company learning networks for the duration of the action learning process,
- develop a position paper on the development, application process, usefulness and usability of the business and technical models and the action learning approach, as appropriate,
- develop and outline the plan for transitional steps from stage to stage so as to minimize possible deterioration of company performance, company motivation and quality of research data,
- resolve issues that might arise.

The work of these project teams was also facilitated through development of assignments for application at company network meetings, minutes and notes of company network meetings, minutes and notes by individual researchers of on-site meetings with members of the company learning network between company network meetings and researcher journaling

The project researcher network. The project researcher network met at quarterly partner meetings where all local and workpackage researcher networks presented reports on the progress of their action research across the three company networks, and the development of the business and technical models and the action learning process. The preparation for these meetings was directed by assignments. These assignments were circulated in advance as a “call for papers” outlining both the guidelines for preparation of the papers and also the outline programme for the meeting. Here, each company learning network was invited to write a “research working paper” presenting a brief summary of the structure, achievements, issues and ambitions of their network to date. The papers were to be drawn from their minutes of network meetings and field notes compiled since the previous meeting and illustrating particularly how developments had emerged from engagement in action learning cycles.

Exploring the Richness: Reflection

This section is in three parts, each reflecting on richness for the managers, the researchers and the implications for actionable knowledge. Throughout there is evidence of Evans and Wurster's (1997) concept of richness defined by three aspects of the information generated and shared:

- Bandwidth – there were large amounts of technical, commercial and research process information exchanged between a variety of senders and receivers over the time of the project.
- Customised – the information was generated from and so customised to the particular situation in each network.
- Interactivity – the dialogue was extensive and at no stage became a monologue.

For example, one initiative in Denmark focused on quality. Defects were at an unacceptable level, measured in terms of defective parts per million. A clear improvement target was established. The agreed approach was to apply a failure mode and effect analysis (FMEA) to one product. The designer estimated the importance of each measurement, dialogued with the supplier about the measurements and measuring equipment before agreeing to apply FMEA to all other products.

Similarly the process of exploration was evidenced by terms such as those proposed by March (1991):

- Search was not only for data but also for meaning.
- Risk taking was not only financial and commercial for the companies involved but also reputational for the researchers,
- Experimentation involved not just technical or commercial matters but also new organizational arrangements.
- Flexibility was evidenced in the willingness to accommodate the collaborative process to the data emerging.

- Discovery included a confidence that this mode of working had possibilities both for the companies and for the researchers.

For example, each network reflected on how they progressed with their initiatives. They recognised the differing needs for application of strong deadlines. One network valued an occasional full day of reflection on projects. In these days of reflection, they explored the likely impact on their competitiveness from a long term perspective, and the implications for co-operation between the particular companies in the network.

Exploring the richness for the managers

For the managers, CO-IMPPROVE provided the opportunity to experiment, to implement and to learn through an action learning approach in an inter-organizational learning network. Self-assessment served as a catalyst for reflection in each inter-company learning network. In turn, monthly network meetings served as a platform for the exchange of ideas and opinions with a view to building trust and reaching common ground for collaboration. The discussions that emerged and the feedback given by researchers helped to encourage participation and to build commitment to the project, particularly where collaborative improvement and action learning were not familiar to participants. Also, through the monthly meetings researchers gave participants time to plan and problem-solve as well as to present their progress to date. In these respects, CO-IMPROVE achieved what was expected of it at the outset.

Commitment to the vision of a long-term, mutually beneficial relationship inherent in the concept of collaboration was often difficult for companies to align with the realities of the marketplace in which they were operating. In addition the inability of system integrator companies to provide long-term assurance regarding the future of supplier relations meant that trust and openness between parties was not easy to establish. In turn, participants were often slow to act and hesitant to reflect on initiatives that required them to share information and increase the visibility of each other's processes.

Exploring the richness for the researchers

The project progressed on the basis of an action research approach. In Holmqvist's (2003) terms this involved experimentation through cycles of action and reflection. Here, the action taking place in the networks was central. The researchers valued, as critical input to an emerging theory, the unexpected difficulties which emerged as the organizations attempted to deal with the complex issues they faced. They valued also the learning potential in these difficulties as a means of bringing the managers face-to-face with the realities of collaborative improvement. The resulting outcome was actionable knowledge. The action learning phase was used as an opportunity to develop the research objectives further, based on the initiatives taken by the participating companies, and on the reflective discussions undertaken at the meetings held by the partners. These reflections were enabled by a directive approach taken to the structuring of the agendas for the meetings: a call for papers was issued requiring descriptive and reflective reports on the activities and achievements (or otherwise) over the preceding two month intervals. This journaling brought a level of formalisation and rigour to the research, while preserving the space within which the experiences could surface and a theoretical framework could evolve.

Exploring the richness: Theoretical implications for actionable knowledge

Actionable knowledge is knowledge that can serve simultaneously the needs of a living system and the scientific community (Argyris 1993; Beer/Nohria 2000; Adler/Shani 2001). There are two main living systems evident in the CO-IMPROVE project: the company learning networks and the researcher learning network (Coughlan/Coughlan 2005).

For the company learning networks, taking into account the pre-existing commercial relationships and the previous collaborative histories, there was both optimism that collaborative improvement was possible and a naivety regarding the difficulties and barriers to be overcome in practice. In a sense, the prior conceptual framework was incomplete. For example, there was evidence that the power differential between the system integrator and sup-

pliers created suspicion in relation to motives leading to mistrust. In particular, the availability of new information technology with the potential to increase the sharing of information was viewed with suspicion. Would it lead to closer collaboration among existing partners or result in dissemination of core capabilities among competitors with terminal consequences for existing relationships? There was no comfort perceived in contractual or confidentiality agreements. Yet, there was reluctance to “walk away” from the interactions and to give the impression of dismissal of collaboration as viable option for the working of an extended manufacturing enterprise. A theoretical implication for actionable knowledge is, therefore, that the efforts of facilitators, acting as action learning coaches are critical to the formation and development of collaborative improvement in EMEs. This criticality is based upon the need for facilitators to surface, to recognise, and to confront constructively the real suspicions and the origins of those suspicions latent in a commitment to action towards collaboration as they are expressed in the behaviour of the company representatives in the face-to-face interactions. In addition, the criticality is based upon the active connection of the commitment to action with the commitment to learning, which takes time, openness and psychological safety to achieve.

For the researcher learning networks, comprised of researchers drawn from different disciplines, the role of a shared understanding of the epistemological underpinnings of a proposed methodology and methods is paramount. In the event of a difference in understanding, the application of differing degrees of structure and directiveness to the establishment of a shared understanding is possible (Coughlan et al. 2003). However, the preservation of a commitment to continued working, but in a different mode than might have been anticipated, depends upon the development of educational and training initiatives which respect the expertise of participants, while guiding them towards alternate modes of question formulation, research design, data gathering and journaling.

The action research methodology in CO-IMPROVE was enacted around cycles of action and reflection. Each company learning network submitted progress reports, based on the action learning framework, in advance of partner meetings which were discussed and reflected on at the meetings and

next steps were planned and then implemented in the next cycle of action. For instance, in one learning network one particular progress report reported little progress in engaging in the CO-IMPROVE process. At a meeting of all the partners this was picked up and discussed with the effect that the particular network redesigned its processes in order to move at a faster pace.

Researchers wrote reflection papers which aired assumptions and inferences and which were tested in meetings of both academics and system integrator managers so that there was continuous exposure of the events across the project and their interpretation to public reflection and analysis which then led to further action. An example of this was a constant reflection on the slow progress on the introduction and use of the technical system across the three networks. The content of the researchers' reflection notes were fed back to the group overseeing the development and application of the technology and acted as a driving force for the work of that group and the initiatives it took across the project.

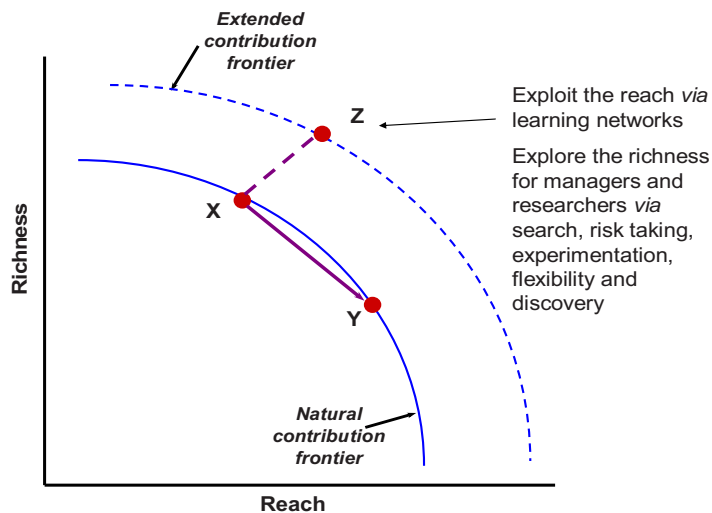
For the scientific community, CO-IMPROVE was a collaborative research project, employing action research, committed to scientific rigour in the study of the collaboration in action (Susman/Evered, 1978; Shani et al. 2008). Rigour in action research refers to how data is reflected on and in particular how assumptions and theories-in-use are exposed to public testing (Coughlan/Brannick 2005). The way the researcher learning network was managed and coordinated across borders and boundaries, by means of a range of structuring and directive/nondirective procedures ensured consistency across the frequency, form and process of reports, reflection papers and researcher meetings (Coughlan et al. 2003; Coughlan/Coughlan 2005). In sum, the recording of events, the articulation and discussion of interpretations and assumptions, the enactment of cycles of action and reflection and the testing of reflections in subsequent action ensured methodological rigour. The collaborative nature of the cycles of action and reflection was evident at the partner meetings, where the company managers and the researchers reflected together and consequent actions were jointly planned and implemented.

Conclusions

This article has explored collaborative research in and by an inter-organizational network. It has described and reflected on the process by which and the setting within which managers and academics collaborated as researchers across boundaries - including discipline and institutional boundaries, as well as those between academia and industry - to develop learning in collaborative improvement in the supply chain. CO-IMPROVE has been the source of many findings and insights on collaborative research (Coughlan/Coughlan 2005 2008).

This article has combined two pairs of existing concepts in a reflection on a large scale inter-organizational action research initiative. The combination was unusual but rewarding. Two distinct but related stages in the collaborative management research process emerged, associated with each of which was a different set of challenges. Key was the absence of a tradeoff – that between richness and reach. Exploiting the reach through learning networks of managers and researchers, an opportunity emerged to explore an added

Figure 3: Exploiting the reach to explore the richness
(adapted from Slack/Lewis 2002: 95)



richness of insights. The result was an extended level of contribution to understanding and practice beyond that which might otherwise be achieved. Figure 3 illustrates the way in which this tradeoff might be seen.

As noted earlier, tradeoffs were seen originally as relationships which were largely fixed. The only option was to re-balance the emphasis on competing objectives. Drawing from and adapting Slack and Lewis (2002), Figure 3 shows this re-balance as tradeoff moving from X to Y on a “natural frontier of contribution”. Here, points X or Y may represent a limited exploitation of reach. For example, the action research may be undertaken by co-researchers interested in contributing only a limited set of voices to knowledge and practice.

More recently, tradeoffs have been seen as relationships between performance objectives which hold true for a given set of factors and, so, can be changed. Drawing from and adapting Slack and Lewis (2002) again, Figure 3 shows the move from X to Z as overcoming the tradeoff at a new “extended contribution frontier”. Here, point Z may represent a more ambitious exploitation of reach to achieve a greater richness. For example, the action research may be undertaken by co-researchers acting in a learning network and consciously contributing a broader set of voices to knowledge and practice.

In a complex collaborative research setting, the two pairs of concepts (richness and reach, and exploration and exploitation) are applicable. They delineate two separate but related process/objective combinations - the exploitation of the reach of network relationships and the exploration of the richness in co-generated data. We suggest that the exploitation of the reach of action research collaborative relationships and, the exploration of the richness in co-generated data are pertinent and relevant objectives and processes in all action research projects.

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