COMPUTER-MEDIATED COMMUNICATION IN ALICE RAP:
A METHODOLOGY TO ENHANCE THE QUALITY OF LARGE-SCALE
TRANSDISCIPLINARY RESEARCH

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A methodology to enhance the quality of large-scale transdisciplinary research

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ABSTRACT

The solving of complex social problems often calls on the public sector to stimulate, support and coordinate multidisciplinary, multi-sector action programmes, including public research programmes. When actors from disparate backgrounds and viewpoints gather to formulate and implement solutions, achieving effective communication is a special challenge. Computer-mediated communication (CMC) is often helpful in this regard, but it is still under development. A CMC innovation addressed by this research project is how scientific methods can be used to analyse, interpret and feedback CMC data and results to management, to facilitate large-scale publically financed transnational and transdisciplinary research (TDR). In a qualitative study design, data were collected at the first research meeting of EU's Addictions and Lifestyles in Contemporary Europe – Reframing Addictions Project (ALICE RAP), in Barcelona, May 2011. The participants were 104 scientists with backgrounds in more than 40 disciplines/specialties from 73 research institutions in 31 countries. Three CMC discussions were conducted with the scientists working simultaneously in groups of approximately 10, used computers to post comments to TV monitors visible to all participants, on three subjects: how ALICE RAP should be managed, what its mission should be, and the scientists' diverse values and ideas regarding addiction research and policy. The CMC produced 510 posts, 212 on management, 146 on mission and 152 on values, analysed using content analysis. Participants discussed their disciplinary, language and cultural diversity, and the need to manage diversity to avoid problems. They raised the issue that ALICE RAP is not just TDR, it is also transcultural, and this adds another challenge to TDR. The discussion about values revealed a preference for reframing addictions so as to reduce stigmatization and marginalization. It is concluded that CMC is a viable way to facilitate dialogue about complex issues in the conduct of TDR on addictions, when large numbers of scientists from highly divergent backgrounds are involved. The findings from analyzing CMC data can be used by managers to fine tune functioning and collaboration in a very complex research network like ALICE RAP, as well as other types of public sector networks.

Key words: transdisciplinary research, networks, addictions, computer-mediated communication, public sector management

Introduction

The administration of public sector research has taken on new levels of complexity in recent decades, for several reasons. First, public research programmes have become ever more targeted on developing policy solutions to major social problems and the processes by which science influences policy formation are multifaceted (Pohl, 2007). Following from this, collaboration is becoming more the rule than the exception, as realisation grows that many of the most significant social challenges know no provincial, national or regional boundaries; this is starkly evident with regard to the interaction of human activities and climate change, and the interaction between globalisation and public health, to name two prominent examples. International teams are assembled to address such problems and the multi-cultural nature of such teams adds yet another dimension of complexity to research management (Brett, Behfar and Kern, 2006).

Major examples of publically-administered research programmes of high complexity are the seven research Framework Programmes of the European Union, which have promoted trans-national research since 1952, with the first projects in operation in 1955 under the European Coal and Steel Community Treaty and continuing to this day under Framework Programme 7 (see Larédo, 1998 for the historical developments). In the United States, the National Institutes of Health has long had a collaborative approach in the establishment of research teams that link researchers across disciplines, institutions and States, and include international collaboration (Mabry, et al., 2008).

Another factor behind the growing complexity of large-scale research is that research funders, public and well as private, are today demanding something beyond 'mere' multi-disciplinary research – transdisciplinary research (TDR) is now called for (Klein, 2004), with three essential characteristics: (1) TDR addresses major social problems as identified by society – scientists advise but are not in the driver's seat; (2) TDR involves 'real world' actors as not only consumers of the research, but as participants in the research process; (3) TDR is intended to produce synergy, new ways of seeing and of solving problems that could not emerge without a melding of the contributing disciplines.

As a research, basic scientists and as well as applied researchers are today quite likely to work in research networks, encountering the challenges of managing networks generally (Agranoff and McQuire, 2001) and research networks in particular (Stokols, et al., 2010). The need for research on the management of networks has been articulated by scholars concerned about public administrators' preparedness to manage networks (O'Toole, 1997), the problem of managing the fluidity of networks (McQuire, 2002), the special difficulties of controlling networks (Kenis and Provan, 2006), and the challenges of assessing network performance (Kenis and Provan, 2009).

All these issues are as relevant for the management of publically-funded TDR as they are for the management of most types of public networks, but here we focus on just one issue: in a research world characterised by disciplinary silos, how can research coordinators foster the high levels of cross-disciplinary understanding, respect and cooperation that are essential to achieve TDR in international research networks?

It is the premise of this paper that a good part of the answer lies with *enhanced communication*. The understanding and respect that are essential if cooperation is to manifest cannot be left to happenstance. Where disciplines gather to plan and conduct TDR, arenas for dialogue are required which provide adequate time and structure for high quality cross-disciplinary communication. To shape and manage such arenas is especially challenging when collaboration is international, and not only 'multiple' with regard to disciplines, but also multiple with regard to cultures, scientific traditions and language.

We have developed, implemented and demonstrated, and describe in this paper, a methodology that provides the communication arena that is called for above. It uses computer-mediated communication (CMC), which is widely in use today in public administration, and is certainly not an innovation.

What is innovative about our approach is: (1) the use of CMC to help manage the conduct of very large-scale, transnational and transdisciplinary research, and (2) the analysis, interpretation and dissemination of CMC analysis results using scientific methods. To help illuminate how important this latter innovation is, the reader is asked to consider how cross-sector communication is often managed, regardless of which particular public sector one thinks about. Conferences, seminars, retreats and working meetings are used to gather actors for discussion and action on a public sector issue. Time is often set aside for brainstorming or other types of discussion and dialogues, with groups sitting in

roundtables with convenors and note-takers. Then in a plenary session, someone from the roundtable makes a brief presentation of the group's deliberations, and the other tables do the same.

This ad hoc method of handling the conversation data that is generated during roundtable discussions leaves much of the raw data – the words/ideas delivered by the participants –unused in the aftermath. The methodology presented in this paper captures all the data, analyses it systematically, and feeds it back to project coordinators, providing a highly participatory aspect to project management. While this innovative methodology was developed in the context of conducting TDR, we contend that it is equally applicable in all public administration settings where diverse actors gather to engage in joint planning, implementation and evaluation of programmes, projects and policies aimed at solving important social problems.

Turning to the details of the research reported here, this paper describes a CMC methodology to stimulate TDR at the start-up of a large scale addiction research project involving research partners from several countries, several research institutions and several disciplines. The need for such research in Europe is manifest, to provide an integrated knowledge-base that can support the reframing of public policy regarding the place of addictive substances and activities in social life (Sussman et al., 2004; Fuqua et al., 2004).

In response to this need, the TDR project *Addictions and Lifestyles in Contemporary Europe – Reframing Addictions Project* (ALICE RAP) was established in 2011. ALICE RAP is a five-year research collaboration, co-financed by the European Union's Seventh Framework Programme (FP7), and having input from over 126 researchers and 73 research institutions from 31 countries (ALICE RAP, 2012). Its aim is to analyse the place and challenges of addictive substances and practices, and addictions and lifestyles, to the cohesion, organization and functioning of contemporary European society. ALICE RAP is a 'goal-directed network'. Goal-directed networks are formal mechanisms to achieve multi-organizational outcomes especially in the public and nonprofit sectors where collective action is often required for problem solving (Agranoff & McGuire, 2003; Provan & Kenis, 2008). They are set up with a specific purpose, either by those who participate in the network or through mandate, and evolve largely through conscious efforts to enhance coordination.

The ALICE RAP scientists have backgrounds in more than 40 disciplines and specialties ranging from anthropology to toxicology. It takes little imagination to appreciate the challenges of achieving transdisciplinarity in such a scholarly menagerie. Because of the power of disciplinary thinking and habits, special efforts need to be made from the first day of a project like ALICE RAP, to stimulate transdisciplinary thinking and interaction. This requires that research collaborators take time to become familiar with one another's terms and language, ways of thinking about a problem and various research approaches to the problem. This, in turn, requires structured time for communication, for listening, and for making genuine efforts to understand other's points of view. However, mutual learning of the type just described does not happen spontaneously. There is a strong tendency to just want to 'get on with the science' and not 'waste time' on seemingly peripheral issues.

Literature Review

Computer-mediated communication (CMC)

A computer-mediated methodology for facilitating group interaction has been in use almost since the beginning of the computer era, in organizational contexts as varied as business management, accounting, the military, education, government administration and security services (Fjermestad & Hiltz, 2000; Olaniran & Rodriguez, 2010). The range of settings is similarly wide, from the facilitation of small groups working at the same table, to the facilitation of very large groups dispersed around the

globe (Fjermestad & Hiltz, 2000; Romano, Lowry & Roberts, 2007; Chen et al., 2007). However, it seems that CMC to help facilitate research groups' work has yet to take hold; at least our search of the literature yielded no CMC studies in which a research group of any type was the user, let alone an addictions research group.

Perhaps as a 'first' in the addiction research arena, ALICE RAP has used CMC to facilitate communication involving a large group of collaborating addiction scientists (the third author being the source of inspiration to implement CMC in ALICE RAP). The aims of this study are to document the CMC methodology, to report the results of analyses of the data obtained from CMC, and to suggest ways to improve the utility of CMC in support of addiction research.

Methodology

Three CMC sessions were conducted during the first ALICE RAP scientific project meeting (23-27 May, 2011) with 104 of ALICE RAP's 153 scientists participating (51 percent are men, and 60 percent have a doctoral degree). The CMC sessions aimed to initiate a wide-ranging discussion on how the ALICE RAP partnership should function, ways to make it work smoothly and efficiently, the project's mission, and the degree to which there is a diversity of core values among the ALICE RAP scientists. Nine simultaneous, randomly composed roundtables discussed the topics. There was one computer per table and all the computers were connected to a single chat room, visible to all participants through TV monitors placed around the room. A chair/coordinator at each table facilitated the discussion, assisted by a reporter who posted the group's comments on the chat room (chairs and reporters were selected based on convenience). Via the monitors, all participants could see the posted information simultaneously and in real time. The tables' discussions were processed, interpreted, and then posted in a consensus building process which involved the participants, the chair and the reporter, in interaction with other roundtables. The tables were numbered and each post was identified by table number, not by individual post contributors.

Each CMC session was of about 30 minutes duration and participants received the following statements as stimuli for discussion: (Session 1) Think back to your best and worst experience in research collaborations. What excellent management practice do you recommend that ALICE RAP adopt? What terrible approach to management must ALICE RAP avoid at all costs? (Session 2) What is the ALICE RAP mission? (Session 3) Quick overview about how scientific and societal core value differences can be a strength to a collaboration like ALICE RAP followed by a discussion about the degree to which this is a matter of importance to ALICE RAP, and if it is judged to be important, how should it be addressed during the course of the project. The CMC sessions were combinations of brainstorming, logging and networking, and complemented with an integrated content analysis as described next.

A preliminary form of content analysis and data reduction was performed during the CMC sessions themselves, as the groups at the tables decided which of their comments would be posted to the chat room, and how pronouncements (sometimes long-winded) would be condensed into one line to be posted to the chat room. Some censoring occurred, as when a group would not agree that someone's pronouncement should be posted. The raw data (the actual pronouncements) were not recorded and therefore not analysed. The secondary data (the chat room posts) were analysed separately by the first two authors, then a combined analysis was performed by the second author, which was checked and fine-tuned by the first author. Three rounds of analysis were done, one round for each of the three CMC sessions. Coding followed a grounded strategy (Strauss & Corbin, 1994). In each round of analysis approximately the same steps were performed. The data were first read through to gain an overall impression of the range of content. Then open coding was conducted to examine, compare and categorise the data. The process of organizing the posts in themes and sub-themes then

commenced, with the starting point being the main themes around which the sessions were organized. Within themes and sub-themes, clusters were identified. Thus, the analysis process yielded a three level analysis: clusters within sub-themes and sub-themes within three main themes. All the steps in analysis were undertaken as an iterative, and sometimes a near-simultaneous process.

Results and Analysis

Five-hundred ten (510) posts were produced during the CMC sessions (212 on management, 146 concerning the project's mission and 152 on values).

Session 1 – Main theme: management practices

This theme was divided in two sub-themes. In the first, the scientists were asked to brainstorm about good research management practices, drawing on their experience in other research projects. The second sub-theme focused on their experiences with poor research management practices. Two hundred and twelve posts were generated from this session. Twenty-seven of them were excluded from the analysis as they did not refer to the overall session themes.

With regard to participants' posts about *good management practices*, six clusters were discerned. *Cluster one* focused on the importance of a firm, clear, direct management style, with clear definition of leaders and coordinators, and with the establishment of clear goals. One example of this group of posts: *Top-down mgt leads to successful collaboration*. *Cluster two* expressed appreciation for a participative, integrative and consultative style, based on consensus about the project's aims. *Cluster three* focussed on the idea of cross-fertilisation, with the wording of the posts in this pointing to the importance of proactively getting partners and disciplines to work together in a way that will produce synergy, as in this post: *Keep pushing us to work together & communicate for the whole project*. *Cluster four* had to do with the need for transparency in decision-making, and the value of a clear, open and constructive communication style. *Cluster five* focussed on the 'tone' of collaboration, emphasising the desirability of a polite, respectful, trusting and enthusiastic style. Finally, *cluster six* contained ideas for management strategies or initiatives, which could help turning differences into strengths, both with regard to the pan-European dimension of the project, and to the cultural/language diversity of it, as illustrated by this post: *Be aware of the trans-cultural nature of the project*.

Six clusters were also discerned in the sub-theme management practices to avoid. *Cluster one* focussed on the need to avoid a weak and wobbly management style; conversely *cluster two* concentrated on the need to avoid a rigid, authoritarian and hierarchical approach to management, as these posts exemplify: *Individuals taking charge and dominating with their own agenda* and *Arrogant management can reduce good working*. *Cluster three* had to do with the handling of ethical issues in a research project, analysis and reporting data. *Cluster four* was focused on the need for clear, fair policies regarding authorship. *Cluster five* dwelt on barriers to a project's timely progress that may result from fragmentation, unfeasible timelines, etc. Finally, *cluster six* concentrated, on problems due to dominance attempts by one or several disciplines over others, and on dominance of the English language, as this post illustrates: *Competitiveness and doggedness of one discipline against others*.

Session 2 – Main theme: mission

One hundred and forty six posts were generated in this CMC session. Eleven were excluded from the analysis as they were not related to the theme under discussion. The aim of the session was to provoke the scientists to reflect aloud about their ideas, up to that point, on what the mission of ALICE RAP is (if any).

Drawing on the posts' content, two main clusters were identified, distilling the concept of mission into two concepts, 'mission, and also 'vision'. Starting with the later, the cluster focussed on vision stressed the importance of fostering public debate and influencing European policy and practice to better address the problems associated with addictions, as illustrated by the following posts: *Reframe addictions in Europe to redesign addictions governance* and *ALICE RAP should foster an informed and responsible debate to bring about change*. The goal of reframing, that is actually part of the project's official title and one of its central goals, appeared in the posts indirectly, related to ideas of change, new thoughts.

Regarding cluster on *mission*, the posts suggested the need for broadening the ways of researching and understand addictions, especially through increasing the synergy among sciences and through trans-disciplinary research. The advance of science was seen as a consequence of *Identifying gaps in current knowledge* and *Breaking barriers across disciplines, boundaries, substances* in order to be able *(...) to capture the whole elephant*.

Session 3 – Blogging on values

A total of 152 posts were made during the session. Twelve posts were excluded from the analysis using the same criterion stated before. Participants were asked to discuss the degree to which scientific and societal core value differences among scientists could be viewed as strengths, and ways that value differences could be addressed during the unfolding of a TDR. It was emphasised that the session was intended to get participants thinking about core values, rather than to come to any conclusions or closure.

Content analysis of the posts distilled the concept 'values' into two sub-themes, *societal* values and the role of *values in science*. In the sub-theme on societal values, two clusters were discerned. The tone of *cluster one* posts was that 'reframing addictions' could/should include actions to reduce stigmatization and marginalization, and better understand/respect addiction from users' perspectives. There was a call to rethink/broaden the concept of addiction, the negativity associated with it, and to consider possible positive aspects of drug use, such as the value of pleasure. In a similar vein, there were posts about the way in which addiction problems are defined, and by whom, as exemplified by this post: *Need to question the value basis of defining use as a problem*. There was also concern about the *drug user's perspective* not being sufficiently considered in research nor in policy.

Cluster two posts referred to society as whole, pointing out how policies in consumer society are driven by political ideologies based on market rules and profit, as exemplified by these posts: *Weapons to fight profit making governments, Prioritizing public health over markets*. Participants also commented on the medicalization of society, the need to address inequalities, and the importance of individual's rights with regard to stigma, as reflected in these two posts: *Issues are medicalized and this disrupts our social understanding,* and *Help should be available without stigmatizing people.* The posts in this cluster also remarked on the way the present models of addiction governance promote marginalization, and serve as mechanisms of control, possibly with science's connivance: *Is addiction becoming an industry? Are we propagating that?*

The second sub-theme, the role of *values in science*, is composed of two clusters, one having to do with ethics, and other having to do with the need for scientists to illuminate and debate their values. *Cluster one* on ethics had to do with the need to do ethical science, and the difficulties of doing ethical science, illustrated by these posts: *Values can be reflected on and challenged in such a multidisciplinary group* and *Scientists can come under many pressures to adjust their message*. *Cluster two* posts addressed directly the theme of session three, with these posts being illustrative: *Recognise the importance of the influence of values in what we do* and *Collaboration with others helps*

us to develop shared values. There was also some attention to science's possible vest interest in addiction, as illustrated by this post: *researchers are in danger of expanding the concept* [presumably of addiction] *out of self interest (funding)*.

Finally, a major aim of all three CMC sessions was to generate interaction amongst the tables, by posting to a common chat room that all could see on the screens around the room. There is evidence that this happened to some extent. For example, this exchange about science and values involved four tables:

Anything other than abstinence isn't being addressed in the UK

Agreed/science is not value free

Science is not value free

But science tries to be relatively objective

Science not value free but disciplined

The main result with regard to management practices, rather expectedly, was that the participants wish for a leadership style that balances firmness and clear direction on the one hand, with openness and a consultative style on the other hand. Perhaps less expected was the degree to which participants focussed on challenges related to diversity in the ALICE RAP research team. A warning was sounded about possible diversity-related dominance problems of two types; dominance by one or several disciplines over the others, and dominance of native English language speakers over the others. The later point ties in with another note of caution illuminated by the CMC: ALICE RAP is not just transdisciplinary, it is also *transcultural*. As far as we are aware, the literature on TDR has not until now considered how language and culture heterogeneity affects the quality of TDR, and the study of this issue would make a unique contribution to the TDR literature. It will be of interest to see if the project can take advantage of the disciplinary, language and cultural diversity of the research partners, by proactively managing diversity for best advantage, as recommended in the business management literature (Brett, Behfar & Kern, 2006; Thomas & Ely, 1996; Dass & Parker, 1999). Anticipating the challenges posed by diversity, the management structure of ALICE RAP was set up to ensure effective collaboration and communication in the context of managing a very large multicultural, multidisciplinary and complex scientific team. While one might choose to assemble a team with low diversity to increase manageability, the business management literature suggests that project teams made up of members with differing cultural and disciplinary backgrounds can bring comparative advantage to a project, and business teams with diversity have been found to perform better, compared to homogeneous teams, when diversity is managed proactively (Brett, Behfar & Kern, 2006; Thomas & Ely, 1996; Dass & Parker, 1999). However, business teams characterized by diversity may differ in important ways from science teams with great diversity, for example, with regard to motivation for collaboration and anticipated rewards. The management lessons gleaned from business management may not be fully applicable to a project like ALICE RAP.

Moving on, a finding of particular significance that emerged from the CMC has to do with values. It might have been the case that as scientists, the participants would have focussed on the eternal debate about value-laded versus value-free science. However, the widely held position was that science is value-laden, that values should therefore be illuminated, and that ALICE RAP should make an effort to develop shared values. Considerable attention was also paid to societal values regarding the nature of addiction, and the need to reframe the problem of addiction so as to reduce stigmatisation and marginalisation of people with addictions.

It is open to question, however, which values actually predominate in ALICE RAP, since the CMC is not the right methodology to study values, attitudes and predispositions. Further study of values, attitudes and predispositions held by ALICE RAP scientists could be useful in understanding the unfolding of the project's science.

The CMC methodology

One of the greatest challenges to the management of complex teams such as ALICE RAP is to establish effective communication, including methods to foster sufficient interaction among team members. As noted in the Introduction, CMC in various forms has been used for this purpose for decades, in many settings – but not in the research arena generally and not in addiction science in particular, as far as we are aware.

The ALICE RAP experience reported here demonstrates that the use of CMC can facilitate strong bridging in a dense networked structure, over a very short time period. Our particular implementation of CMC methodology enabled over 100 addiction scientists, grouped in nine roundtables, to simultaneously undertake intra- and intergroup discussions on complex themes, while not loosing face-to-face interaction. Thus, CMC is a dialogue approach to TDR that generates rapid, direct and open communication.

It is too early in the ALICE RAP project to know what practical collaboration outcomes may be traceable to the use of CMC. Continued use of CMC is planned, with CMC modified over time based on accumulating experience with the methodology. Evaluation throughout the course of the project will hopefully generate insight into if and how CMC contributes to better collaborative functioning. However, the ALICE RAP coordinators have used the results of this study to inform management strategy, maintaining a transparent, firm, but participative management style. In addition, they are stimulating synergy by facilitating transdisciplinary publications that cross ALICE RAP Areas and Work Packages. They have also developed a framework for the project built on analyses of the states of wellbeing developed by the OECD (OECD, 2011).

One aspect of CMC as implemented at the ALICE RAP May 2011 research meeting deserves special consideration: the roles of the table chairs and table reporters, who were instructed to 'facilitate discussion' and 'keep posts short and snappy'. It was evident to the CMC facilitators (authors MBM, TG and SM) that there was a great deal of variation in the chairing styles and chairs' levels of influence over the discussions. Some chairs simply kick-started discussions and then participating as equals with the other participants, while others implemented a strategy to maximise inputs from everyone and/or assisted with the summarising of comments.

Similarly, the techniques the reporters varied, from reporting comments verbatim to rephrasing or even reinventing comments. Also, as mentioned above, as with any reported discussion, selective attention on the part of the reporters (determined by their own interests, personalities and conceptions of their roles as reporters) is likely to have influenced which pronouncements made it onto the screens and which didn't. For instance, it was observed that some topics that were debated at some length resulted in only one post, presumably because the reporter wished to avoid multiple postings of the same basic idea.

Thus, the 'raw' data – the actual pronouncements – underwent one to two levels of processing (by the chair and/or by the reporter at each table), potentially modifying actual pronouncements. However, it seems likely that the posts more closely reflected the multiple positions of participants, compared to the notes of a traditional breakout procedure, because the CMC procedure allowed reporters to rapidly type many posts.

A few other aspects of table dynamics are important to note. There was clear evidence for interaction amongst the tables in all three sessions, as noted at the end of the Results, but it is also clear that certain tables devoted much of their attention to intra-table discussion of selected themes. This could have been due to particularly active table participants who wished to focus on subjects of special interest to them, or to the guidance of table chairs, or to the selective attention of the table reporters, or due to all three sources of influence. The clearest example of such concentration was nine posts on user participation in addiction policy and science, most of them from the same table.

Aside from table dynamics, some technical and administrative aspects of the CMC sessions could be improved. For example, the rolling text on the monitors allowed only the most recent posts to be viewed at any one time. Heights of posting frenzy (and at times it was very frenzied) probably resulted in important ideas going unnoticed before disappearing from the monitors. Some method is needed to keep posts visible longer; perhaps by using arrays of monitors such as airports use to post rolling information on many flights.

Limitations of the current study include the potential for endogeneity in our research design. The profiles of participants (experience, talent, abilities, expertise) could explain their degree of active participation in the CMC sessions. Another possible problem of endogeneity is that the discussing and observing of posts most likely influenced participants' choices in making pronouncements, similar to an effect observed in focus group discussions (and controlled for in individual interviews). This can result in a loop of 'causality' that bounds a discussion in unpredictable ways. However, all breakout techniques have this potential, not just CMC as it was implemented in this study.

Another important limitation is that we collected data in a single TDR project at a given time in its development (very early). It would be interesting to evaluate how the use of CMC and its results generalize to different types of research groups, and how results evolve in time as a project matures; this latter issue will be addressed by continued use of CMC in ALICE RAP.

Conclusion

In conclusion, our study is of significance because it provides unique documentation showing how CMC can be implemented to assist communication and management in large scale addictions TDR, and how CMC can generate a high degree of interaction on complex themes, among scientists from many backgrounds and traditions. We doubt that such rich data could have been generated in ALICE RAP by more conventional meeting communications methods.

As Stokols et al (2010) remark in their seminal chapter 32 in the Oxford Handbook of Transdisciplinary Research, Many projects fail in their efforts at collaborative problem framing, and consequently, in developing integrated results. This is often due to a deficit concerning theory and methodology with regard to *interdisciplinary processes* (Pages 483-4, italics ours). They are not alone in warning coordinators and managers of transdisciplinary projects that special effort must to made to facilitate collaborative problem framing, but specific ideas about what to do to address this problem, and the testing of those ideas, is a rarity.

This research project offers evidence for one practical solution: the use of CMC to create arenas for inter-disciplinary dialogue, by which research coordinators can help foster the high levels of cross-disciplinary understanding, respect and cooperation that are essential to achieve TDR. More specifically, this report shows how CMC can be systematised so that all the information delivered and exchanged in CMC can be analysed using scientific methods, interpreted and reported to managers, and thereby create the conditions for participatory management of TDR.

We hypothesise that simply participating in this innovative type of CMC, and seeing how the results are used by managers, creates motivation to move from multi- to transdisciplinary forms of research cooperation. We also suggest that CMC undertaken in this way has utility in many types of complex collaborative action projects where research is not in focus. The public sector is often called upon to create partnerships across public and private sectors of society, to address critical issues of the day. Health, climate, education, environmental protection, and public safety are just a few of the arenas where this type of action takes place.

The testing of these suppositions should be the subject of continuing research, in TDR settings and in the non-research public arenas exemplified above. Such research must be longitudinal, with follow-up data collection and analysis to assess if and how CMC has impact over time. There is also the interesting question of whether participating in the kind of CMC described in this paper stimulates participants to use the methodology on later occasions; if this approach disseminates, that will be prima facie evidence of its value. Finally, the technical aspects of conducting CMC should be investigated systematically, to illuminate the technical approaches to CMC that give best results with greatest efficiency. For example, the CMC as used in ALICE RAP combined video and computer and internet technology; are more parsimonious solutions feasible?

While the nature and extent of further research on these topics cannot be known, at least some of these issues will be investigated in the ALICE RAP project, as it continues to unfold its five year programme of research.

Declaration of interest

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