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What is Community Operational Research?

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Abstract

Community Operational Research (Community OR) has been an explicit sub-domain of OR for more than 30 years. In this paper, we tackle the controversial issue of how it can be differentiated from other forms of OR. While it has been persuasively argued that Community OR cannot be defined by its clients, practitioners or methods, we argue that the common concern of all Community OR practice is the *meaningful engagement of communities*, whatever form that may take – and the legitimacy of different forms of engagement may be open to debate. We then move on to discuss four other controversies that have implications for the future development of Community OR and its relationship with its parent discipline: the desire for Community OR to be more explicitly political; claims that it should be grounded in the theory, methodology and practice of systems thinking; the similarities and differences between the UK and US traditions; and the extent to which Community OR offers an enhanced understanding of practice that could be useful to OR more generally. Our positions on these controversies all follow from our identification of 'meaningful engagement' as a central feature of Community OR.

1.   Introduction

Community operational research is a child of the wider operational research (OR) movement, and the history of its emergence and institutionalization has been extensively documented (e.g., Carter et al, 1987; Parry and Mingers, 1991; Mar Molinero, 1992; Ritchie, 1994; Ritchie et al, 1994a; Midgley and Ochoa-Arias, 2004a; Johnson, 2012a). While it can be defined very broadly as "OR… for community development" (Midgley and Ochoa-Arias, 2004a, p.3), more detailed definitions can attract controversy due to the diversity of practitioners, clients and methods involved (Bryant et al, 1994; Ritchie and Taket, 1994; Ritchie et al, 1994b,c). Most Community OR practitioners value participating in an inclusive research network, embracing a variety of traditions, and overly restrictive definitions can create unwelcome exclusions (Midgley and Ochoa-Arias, 2004a). We will, however, revisit the possibility of a consensual definition of Community OR in this paper.

The term 'Community OR' was first coined in the United Kingdom (UK) in the mid-1980s at a time when public and private sector OR was in decline (Fildes and Ranyard, 1997), and the Operational Research Society was looking for new application domains for the expertise of its members (Rosenhead, 1986; Ritchie and Taket, 1994). However, it is important to acknowledge that a good deal of work applying OR to community development had already been done prior to that. In the United States (US), OR practitioners had been working with community groups since the late 1960s (e.g., Ackoff, 1970) and in the UK since the mid-1970s (e.g., Noad and King, 1977; Trist and Burgess, 1978; Jones and Eden, 1981). Nevertheless, creating the label 'Community OR' in the 1980s facilitated the emergence of a new, relatively coherent research community in the UK. As a result, the number of community-based interventions significantly expanded (Ritchie and Taket, 1994). It would be some years later that the same burgeoning interest would manifest in the USA under the label of 'Community-Based Operations Research' (Johnson, 2012b). The similarities and differences between the UK and US traditions will be commented upon later in this paper. While Community OR is much more widely international (for examples of practice elsewhere in the world, see Ochoa-Arias, 2004; Waltner-Toews et al, 2004; White et al, 2011; Foote et al, 2007, 2016; Velez-Castiblanco et al, 2016; Beall and Brocklesby, 2018; Laouris and Michaelides, 2018; Morgan and Fa'aui, 2018; Romm, 2018; Ufua et al, 2018), it is nevertheless the UK and US traditions that have been most influential to date.

In writing this paper, we have two interlinked objectives. First, we will revisit a question that is frequently avoided due to the controversies it can raise (Ritchie et al, 1994b; Midgley and Ochoa-Arias, 2004a): is there something that differentiates Community OR from other forms of OR, beyond the broad idea that it involves applications to community development? We will argue that the answer is 'yes': it is the *meaningful engagement of communities* that matters, although there is no consensus on what counts as 'meaningful' (Ufua et al, 2018) or even what constitutes a 'community' (Midgley and Ochoa-Arias, 1999). However, disagreements on these things are not a problem for Community OR because they provide useful stimuli for deliberation and learning. Indeed, there are

other disagreements in our research community, and the second objective of the paper is to discuss four more controversies that have implications for the future development of Community OR and its relationship with its parent discipline. Our positions on these controversies all follow from our identification of 'meaningful engagement' as a central feature of Community OR.

2. Defining Community OR

So far, there have been four edited books on Community OR (Ritchie et al, 1994a; Bowen, 1995; Midgley and Ochoa-Arias, 2004b; Johnson, 2012b), and all of them use general phrases like "OR… for community development" (Midgley and Ochoa-Arias, 2004a, p.3). However, they stop short of offering a formal definition of our field. Ritchie et al (1994b, p.1) say:

> "Let's admit it, we're going to cop out here and not offer a precise, neat and tidy definition of either Operational Research (OR) or community Operational Research (Community OR). The OR profession has struggled for many years to reach a succinct statement of OR which achieves broad agreement across OR practitioners and has any meaning to a wider audience. It hasn't got there yet (some would argue it never will)…. The view we take here is that precise definitions don't really matter, or more positively: 'the proof of the pudding is in the eating'".

Midgley and Ochoa-Arias (2004a, p.1) argue that over-defining the field can result in marginalizing the concerns of some members of our research community. As a result, they portray Community OR "as a label used by a variety of people engaged in a debate and on-going learning about their own and other people's community development practices". However, Midgley and Ochoa-Arias (2004a) go on to say that all Community OR practitioners have two things in common: "a desire to make a contribution to change in communities" (p.2) and "a concern with the design of methodologies, processes of engagement, methods and techniques" (p.2). Of course, the latter is common across all branches of OR.

As hinted at in the previous sentence, a useful starting point for a definition of Community OR is to look at how OR more generally has been understood, given that the former is a sub-domain of the latter. A variety of definitions of OR have been offered over the years, although (as acknowledged by Ritchie et al, 1994b) none have been universally accepted. We do not expect our own offering to generate a consensus across our diverse research community, but we can nevertheless highlight two widely-recognized characteristics of OR that are relevant to *Community* OR too: *intervention for desired change* and the use of *modeling*. Our rationale for focusing on these two characteristics can be found in the online supplementary material to this paper.

So, we argue that Community OR has inherited the focus on modeling for intervention from its parent discipline, but what defines it as different from other forms of OR? Bryant et al (1994) offer a really useful clarification of what

can't be used to define Community OR. First, it can't be defined by the characteristics of its practitioners. While some have formal training in OR, others come to it from a wide range of different disciplines and practices, such as mathematics, systems science, the social sciences and even the humanities. Our anecdotal observation here, however, is that many 'immigrants' to our research community already have an interest in application, transdisciplinarity and/or action research, which makes the development and use of generic modeling methods for intervention appealing to them.

Also, Community OR practitioners have a wide range of motivations (Wong and Mingers, 1994), including "social, religious, personal, career development, research and other reasons" (Bryant et al, 1994, p. 232). So there is no one motivation that can be singled out as definitive of Community OR.

It can't be defined by a set of methods either: an extraordinary variety of methodologies, methods and techniques have been deployed (Bryant et al, 1994). There is certainly more of an emphasis on the use of problem structuring methods than is found in the rest of the OR literature, and some writers claim this is because community contexts entail greater complexity and pluralism of perspectives than most industrial and public sector contexts (e.g., Jackson, 1987a, 1988), but for these methods to be a *defining* characteristic of Community OR, they would have to be used by everyone in all projects, and they are clearly not: there have been a number of uses of quantitative methods reported in the UK literature (e.g., Thunhurst and Ritchie, 1992; Thunhurst et al, 1992; Cohen and Midgley, 1994; Mason, 1994; Pepper, 1994; Ritchie and Townley, 1994; Ritchie, 2004). Indeed, these constitute the *majority* of applications in the USA (Johnson, 2012b).

Bryant et al (1994) hint that there may be something that is common across all Community OR projects concerning the *process of application* of OR techniques. We will return to this insight later in the paper, not to suggest that it is a defining feature of Community OR, but to point to what OR more generally can learn from the *critical attitude* that is commonly found in Community OR theory, methodology and practice.

Finally, Bryant et al (1994) argue that Community OR cannot be defined by its clients. This is arguably their most important observation, as it is very tempting, when we are asked what Community OR is, to simply say that it is OR with grass-roots community groups and voluntary organizations. This is arguably how the field started out (e.g., Thunhurst et al, 1992; Gregory and Jackson, 1992a,b; Thunhurst and Ritchie, 1992), but it rapidly went beyond serving these more 'obvious' clients: the literature reveals applications with business organizations (e.g., Mason, 1994; Ufua et al, 2018), the public sector (e.g., Pindar, 1994; Midgley et al, 1998; Grubesic and Murray 2010; Foote et al 2016), voluntary organizations providing services with statutory funding (e.g., Cohen and Midgley, 1994), multi-agency teams (e.g., Gregory and Midgley, 2000) and networks spanning the public and voluntary sectors (e.g., Vahl, 1994; Midgley and Milne, 1995; Gregory and Midgley, 2000; Johnson et al, 2005; Boyd et al, 2007; Hare et al, 2009; Johnson et al, 2015), as well as many projects with the more 'obvious' clients mentioned above. See also Johnson

and Smilowitz (2007) and Johnson (2012b) for many other examples of applications stretching beyond community groups and voluntary organizations. Of course it could be argued that these applications are not actually Community OR and have been mislabeled, but in our view this would be a retrograde step because it would impose an artificial boundary on practice that is both counter-intuitive and anti-systemic: in most countries, to address the complex needs and desires of grass-roots communities, there is often a need for collaboration across the 'traditional' boundaries of business, public and third sector organizations in order to achieve change (Midgley et al, 1997; Gregory and Midgley, 2000; Taket and White, 2000; White, 2018). Some forms of OR assume the existence of a single problem owner, whereas many complex issues have multiple 'owners' (Taket and White, 2000). White (2018) says that Community OR serves 'social purpose organizations', which may be in any sector or could be a multi-agency collective, so there is no assumption of a single problem owner. However, we suggest that serving a social purpose organization is still not the *defining feature* of Community OR, as there are examples of projects addressing complex issues with no obvious owners at all, as they fall through the cracks between existing agencies (e.g., Boyd et al, 2004).

Bryant et al (1994) speculate that maybe it is the type of issue being dealt with rather than the category of client that defines Community OR, but we believe this is also incorrect: a very wide range of issues have been addressed in Community OR projects, and arguably the only thing they have in common is that the authors writing about them have claimed that addressing them is a 'good thing to do'. We suggest that belief in the value of 'doing good' (whatever that might mean in local contexts) *is* a common characteristic of all Community OR practitioners, but it is not restricted to Community OR – for instance, some people still go into Public Sector OR to do good, and they discuss values (e.g., Johnson et al, 2015), even though that field has become increasingly technocratic over the years (Rosenhead, 1986; Midgley and Ochoa-Arias, 2004a). Indeed, 'doing good with good OR' has been adopted by INFORMS in the US as the name of a student paper competition intended to highlight innovative public-sector applications (INFORMS 2016a), and INFORMS has recently started a non-profit voluntary consulting initiative called 'Pro Bono Analytics' modeled after a similar UK project called 'Pro-Bono OR' (INFORMS 2016b).

So, should we give up on finding a definitive characteristic of Community OR that differentiates it from other branches of the profession? We say 'no'. Below, we offer what we believe distinguishes Community OR from other forms of OR, including those forms that are motivated by the desire to 'do good' in society but nobody would claim are Community OR.

The critical characteristic we identify as being necessary for a project to be described as Community OR is the *meaningful engagement of a community* (or communities). Now, let us first of all make clear that this does not presuppose a particular theory of community or methodology of engagement; there are numerous theories that can help us make sense of what a community is (Midgley and Ochoa-Arias, 1999) and there are even more

methodologies that offer principles and methods for structuring engagement (Jackson, 1988, 1991; Midgley, 2000). However, it *does* presuppose that, for every project that someone claims is an example of Community OR, it should be possible to explain what constitutes 'the community'. This might be residents in a geographical locale, the members of a self-help group, a sub-category of the population with particular needs or desires, an under-served or marginalized section of the population, an interest group, or even a geographically dispersed set of people interacting online. It should also be possible to say what makes the engagement meaningful rather than tokenistic or absent.

Importantly, we claim that this way of distinguishing our field does not impose radically new boundaries, thus excluding projects that have previously been accepted as Community OR. This is therefore not a move to marginalize participants in our research community. Rather, we believe we are making explicit a value or 'principle of practice' that has always tacitly been there, informing people's intuitive judgments on what is and isn't Community OR. By drawing out this principle, and showing that it enables us to differentiate Community OR from non-Community OR, we seek to counter the view (not in the literature, but sometimes expressed at meetings and conferences) that Community OR lost some coherence when it expanded from its early, sole focus on grass-roots community groups and voluntary organizations. While there might be some who wish the practice of Community OR had never broadened out, we believe it is a mistake to claim that this has brought incoherence. It just involves a *different* coherence around the meaningful engagement of communities instead of service only to grass-roots community groups and voluntary organizations. So, let us explore the terms 'engagement' and 'community' a little more, to add clarity.

We have chosen the word 'engagement' because it is broader than other possible terms like 'participation'. For example, there is a question mark over whether 'consultation' is a form of participation, given that the former excludes the consulted from being part of the final decision that people are being consulted on: some people define consultation as a type of participation, and others treat participation and consultation as completely different, or even opposite concepts (Arnstein, 1969; Richardson, 1983). However, consultation is clearly a form of *engagement*, as is full participation in decision making.

The more interesting question is whether any particular form of engagement can be justified as *meaningful*, and answering this usually requires a judgment in context. Whether a particular form of engagement is meaningful or not might depend on the expectations of citizens in the community, whether their representatives have the respect of the wider community and the authority to speak on their behalf, whether the agenda is set by an organization but can be influenced by community representatives, whether there is actually a need for the community to set the agenda that organizations then respond to, etc. Ufua et al (2018) explore this notion, emphasizing the need to prevent the co-option of community-based organizations (also see Ochoa-Arias, 2004), and conclude that

"*meaningful* community engagement involves enabling people from local communities

to have a substantial input into framing both the issues to be discussed and potential

actions to address them, whether the issues are first raised as a concern by the

community itself or by a private or public sector organization wanting that community's

involvement".

We see the latter as a reasonable heuristic to employ when considering whether an engagement is meaningful or not: are communities, and/or their legitimate representatives, able "to have a substantial input into framing both the issues to be discussed and potential actions to address them"? If the answer is 'yes', then the project qualifies as Community OR.

If the answer is debatable, some justification might be needed. For example, Midgley et al (1998) discuss a project on housing for older people where older people themselves were engaged in a wide-ranging exercise of systemic service design, but were then excluded by the statutory authorities from a workshop that was going to determine the latter's organizational response to the OR report that had been produced. The Community OR practitioners made the judgment that they could design the workshop to ensure that the older people's concerns were strongly represented – indeed, they turned the vision of the housing service that the older people wanted into evaluation criteria to test the adequacy of the statutory agencies' plans (and also used other techniques to ensure the ideas of the older people were respected in the development of those plans). In this case, Midgley et al (1998) argued that the meaningfulness of the engagement was preserved.

The other term of interest here is 'community'. What constitutes a 'community' that ought to be meaningfully engaged? Midgley and Ochoa-Arias (1999) have addressed this question, arguing that different political traditions define 'community' in different ways, so the explicit or tacit political assumptions of Community OR practitioners (and those made by influential stakeholders) end up framing both who comes to be engaged in projects and indeed what Community OR as a practice should be. Examples of political theories of community include welfare and radical liberalism; classical Marxism and neo-Marxism; and participative-democratic, historical, religious and green communitarianism. Indeed, we do not have to be limited to the political theories already in the literature, as it is perfectly possible for reflections on Community OR theory, methodology and practice to give rise to new perspectives on how communities should be viewed.

There is the possibility of a tension in Community OR regarding the role of privilege in defining 'community'. Surely not all communities are equal in terms of needs/deprivation, or orientation towards social improvement? The question of whether one might place extra emphasis on some types of community rather than others on the basis of relative deprivation or marginalization, and the issue of whether some definitions of community make these things less visible, are things that Community OR practitioners could usefully reflect on. Critically, Midgley and Ochoa-Arias

(1999) argue that, if Community OR practitioners fail to reflect on their own assumptions about what communities are, they are likely to default to the understanding of community that is dominant in their wider society. Many may be content with this, but if they are not, they need to ensure that their practice supports the vision of community that they want to see being developed.

It would be possible for us to identify our own preferred theory (or theories) of community, but in the context of the current paper, this is not the point: as a spur to learning, research communities need a degree of heterogeneity, so we simply ask practitioners to think about and explain their assumptions about community and how these have informed their practice, if and when this arises in debate. Also, our research network needs to reflect more generally on the 'who, what, why and how' of community engagement, and what kinds of pragmatic compromises on meaningful engagement can be accepted as legitimate in what contexts – and conversely, what might constitute 'one compromise too far'.

We said earlier that we could point to the difference between Community OR and other domains of OR practice (e.g., public sector OR). The criterion of 'meaningful engagement of communities' helps in this regard. Examples of perfectly legitimate interventions that do not include any aspect of community engagement include some of the application-orientated chapters in Pollock et al's (1994) important survey of public sector OR: for instance, Odoni et al (1994), on modeling urban and air transportation; and Weyant (1994), on energy policy applications. Note that there are also examples of public sector OR where there was actually community engagement that could be described as meaningful (e.g., Gregory et al, 1994; Walsh, 1995; Gregory and Romm, 2001; Foote et al, 2016; Lee et al., 2009, Jehu-Appiah et al., 2008; Ewing and Baker, 2009), and *we would argue that these are also Community OR*. There can be overlaps between Community OR and other branches of the discipline too: Mason's (1994) and Ufua et al's (2018) projects working with businesses in a community-engaged manner are also examples. Bryant et al (1994) are absolutely right to say that Community OR is not defined by the nature of its clients: it is the meaningful engagement of communities, with the latter having a substantial input into framing the issues to be tackled and how they are to be addressed, that matters.

3. Addressing Controversies

This definition of Community OR can now be taken forward to help us address some abiding controversies in our field. We should acknowledge that some of these controversies have been discussed in the literature, but others represent tensions that bubble beneath the surface; they may be the subject of informal conversations at meetings and conferences, but do not always get an airing in papers and formal conference presentations. However, they are no less important because of this. We have selected four particular controversies as foci, partly because they have been significant in relation to the positioning our own practice, and partly because revealing the defining feature of

Community OR as the meaningful engagement of communities helps us throw new light on them. The four controversies are whether Community OR should be more explicitly political; whether it should be grounded in systems thinking; what the consequences are of the similarities and differences between the US and UK traditions; and whether Community OR offers an enhanced understanding of practice that could be useful to OR more generally. There are no doubt other controversies that could have been tackled, but these will have to wait for another day.

3.1 Should Community OR be more explicitly political?

The above question has been a subject of considerable debate, with strong points being made by those answering both 'yes' and 'no', although only those saying 'yes' have written up their views in academic papers (Rosenhead and Thunhurst, 1982; Rosenhead, 1986; Midgley and Ochoa-Arias, 1999). The essence of our argument is that 'meaningful engagement' has been understood by a variety of authors with reference to political philosophies, especially concerning the value of citizen participation in civil society dialogues. However, even authors who prefer not to view 'meaningful engagement' politically have the opportunity to learn from *methodological* debates on what the meaningful engagement of communities means, and this is of great value to Community OR.

There have been two different reasons advanced for taking an explicitly political stance. One concerns the history of OR. After the 2nd World War, many people went into OR with the explicit motivation of helping with social improvement, and indeed Rosenhead (1986) says that some had explicitly socialist ideals. However, over the years, our parent discipline has largely become a problem solving service, supporting the interests of industrial owners and managers, often without regard for the often very different interests of shop floor workers and their broader communities (Rosenhead and Thunhurst, 1982; Rosenhead, 1986). By being more explicitly political, we might usefully recover the sense of serving our wider community and not just narrowly-defined organizational clients.

The second argument comes from Midgley and Ochoa-Arias (1999) who, as we saw in the previous section, point out that the term 'community' means something quite distinct in the various different political traditions, so if we want to avoid supporting the political status quo through our Community OR practice, we should reflect on the kind of community we want to build.

In contrast, those against thinking of Community OR as politically engaged point to the fact that 'doing good', for them, means doing something of value in a particular local context, usually for community groups or voluntary organizations whose mission is dear to their hearts. The survey of practitioners undertaken by Wong and Mingers (1994) makes it clear that the majority think like this. Thus, they have strong and explicitly declared value-based commitments to their practice, but not necessarily any desire to change wider society. From this perspective, the origins of Community OR in the Marxist position of Rosenhead and Thunhurst (1982) are either an irrelevance or

something they would prefer to distance themselves from, as they wouldn't want the groups and organizations they support to think that their OR practice has ulterior political motives.

In our view, both sides in this debate have valid concerns, and Community OR needs to be broad enough to include both those who do and those who do not have political motivations. That said, we believe that viewing 'meaningful engagement of the community' as the defining characteristic of Community OR has significant implications: while the majority of people in our research network may not be interested in having their politics explicitly influence their practice, we argue that assumptions about what constitutes both a 'community' and 'meaningful engagement' *are always present*. This means that learning focused on explicating the assumptions made in Community OR practice should be very useful for advancing our field, whether or not these assumptions are labeled as 'political'.

It is also possible to develop new methodologies and methods based on learning about what constitutes good practice in the meaningful engagement of communities. There are already some examples of this happening, including several where their authors are explicit about their political commitments. For instance, Christakis and Bausch (2006) define meaningful engagement in terms of *participatory democracy*, and they offer a methodology that is consciously designed to facilitate the fair participation of everybody involved. This has been used in Community OR by Laouris and Michaelides (2018).

Likewise, Walsh (1995) and Gregory and Romm (2001) have developed a Community OR methodology to enable more of a 'level playing field' in dialogue between organizational stakeholders and community participants, and this is explicitly based on Habermas's (1984a,b) political philosophy. Habermas argues that the systemic exercise of power can be countered through the engagement of communities in normative public discourse. They provide an example of a project that enabled blind and partially sighted users of a hospital, as well as professionals from various hospital-based disciplines, to challenge taken for granted understandings of 'service quality'. Their methodology also makes the practitioner accountable for their decision making during an intervention (also see Romm, 2001), and we suggest that this sort of issue is vital to building our understanding of 'meaningful engagement'.

A final example is use of Critical Systems Heuristics (Ulrich, 1983) in several Community OR projects (e.g., Cohen and Midgley, 1994; Midgley, 1997a, 2000; Midgley et al, 1997, 1998; Boyd et al, 2004), as this provides a list of 12 questions that stakeholders of any service system can use to formulate their views on what it currently is and what it ought to be. Ulrich (1983) is explicit that his political aim (building on the work of Habermas, 1976) is to provide a tool that empowers ordinary citizens to communicate their preferences for service development and to challenge professionals who refuse to listen. A distinguishing characteristic of his 12 questions is that they can be answered equally well by professionals, service users and community members with no previous experience of planning and management (Midgley, 1997b, 2000). Indeed, service users often produce more detailed and far-reaching plans than

professionals, as the former are less constrained in their thinking by what current organizations will allow. A finding that has been repeated several times is that the professionals welcome the user visions of what their services ought to be doing (Midgley, 2000). This again addresses the question of what constitutes meaningful engagement, and how it can be practiced in Community OR.

In looking at the above three examples, we see that political and methodological concerns are tightly intertwined, so even if a Community OR practitioner is only interested in good *methodological* practice for meaningful engagement, this can hardly avoid having political implications.

3.2 Does Community OR need systems thinking?

Here we argue that there is a systems approach called 'boundary critique' that is particularly useful for Community OR, but it is important not to get trapped into the paradigm war that has erupted every so often over the years, where operational researchers and systems thinkers have tried to make the methodology and practice of the other a sub-set of their own. It is far better to regard OR and systems thinking as two overlapping communities of practice that can learn from exploring their common concerns.

The place of systems thinking has been contentious, and the debate has a history that goes back long before the advent of Community OR (Keys, 1991). Therefore, a brief exploration of the more general issue around the relationship between systems and OR is worthwhile to place the debate in Community OR in some historical context.

As mentioned previously, the proponents of OR and systems thinking are both concerned with modeling for intervention, and every so often disagreements erupt between them as to which is the sub-domain of the other (Keys, 1991). Stainton (1983) declares, with some conviction, that systems thinking is a part of OR, and this makes intuitive sense because there are methodologies for intervention that are explicitly systemic and others that are not. Conversely, Checkland (1981, 1985) says that the large majority of problematic situations are complex and characterized by a plurality of perspectives, so a systems approach is needed to address them, but there is a sub-set of problems that are clearly defined and merely complicated (rather than complex), where quantitative, optimizing OR techniques come into their own.

One approach to resolving this recurring disagreement is to try to distinguish OR and systems thinking more clearly, so they can be separated. To this end, Hirschheim (1983) says that systems approaches are concerned with the synthesis of hitherto fragmentary knowledge to facilitate the emergence of new, synergistic, widely-shared understandings and actions, and they are therefore useful in the context of high levels of complexity and multiple perspectives. In contrast, he says that OR is reductionist (breaking things down into parts) and analytical (as opposed to emergent), and therefore is useful for more manageable problems where mathematical analysis can optimize policies and performance without controversy.

However, we need to say straight away that this division between systems and OR is no longer accurate or credible (if indeed it ever was), because we have had problem structuring methods in OR since the 1970s (e.g., Rosenhead, 1989; Rosenhead and Mingers, 2001), including some that are not based on systems thinking (e.g., Keeney 1992; Eden and Ackermann, 2001; Friend, 2001; Rosenhead, 2001), yet are equally capable of addressing situations characterized by complexity and a plurality of viewpoints. There are also some systems approaches that enable quantification and/or optimization (e.g., Forrester, 1961; Hall, 1962; Quade and Boucher, 1968; Jenkins, 1969; Optner, 1973; Quade et al, 1978; Miser and Quade, 1985, 1988). The fields of OR and systems thinking are much more entangled than Hirscheim's (1983) analysis would suggest.

In spite of this entanglement, we believe that there *is* a way to understand the difference between OR and systems thinking, and this can allow us to demonstrate that moves to subsume one field within the other are potentially damaging. We will make three observations. First, the 'transdisciplines' of systems thinking and systems science include a wide range of theories and practices that are applied to phenomena well beyond the purview of operational researchers, such as biological organisms, families and galaxies, to name but three (Midgley, 2003). Second, OR practitioners have developed a range of optimization and other mathematical modeling techniques that are not generally researched or applied by systems thinkers, even though the latter accept their utility for complicated but clearly defined problems (Checkland, 1981; Jackson and Keys, 1984). Third, the previous two observations give us a clue as to what is really going on: OR and systems thinking are best thought of, not as fields of practice, but as *overlapping but differentiated research communities* (Midgley and Ochoa-Arias, 2004a). The overlap concerns intervention in purposeful human systems of various kinds. Subsumption of one research community within the other, whichever ends up dominant, is potentially damaging because it could result in the marginalization or elimination of significant areas of theory, methodology and/or practice. Instead of aiming for subsumption, it is far better to reframe the overlap between systems and OR as *an opportunity for learning across research community boundaries where there are common interests*. Also see Midgley and Richardson (2007) for a similar argument for learning across the boundaries of systems thinking, cybernetics and complexity science.

We have discussed the historical tensions between OR and systems thinking because they explain why, when the place of systems thinking within Community OR was discussed in an edited book (Midgley and Ochoa-Arias, 2004b), it was quite a sensitive issue for some participants. Nevertheless, we believe that the dialogue between the authors of the various chapters quickly transcended early fears of disciplinary imperialism, and it unfolded in the spirit of mutual learning that we advocated in the previous paragraph. Hence, new arguments for and against a systems approach emerged that are potentially of wider value to the OR community, as shared below.

It is very clear, just by looking at the sheer number of Community OR papers discussing the benefits of systems thinking, that the latter has been highly influential: we found 46 in our literature search, and some examples with

different emphases are Jackson (1987a, 1991), Keys (1987), Midgley (1989, 1990, 1996a, 2000), Gregory and Jackson (1992a,b), Ochoa-Arias (1994, 1996, 1998, 2000), Midgley and Reynolds (2001, 2004a), White (2003), Walsh and Hostick (2005), Walsh et al (2008), Thunhurst (2013) and Sommer and Mabin (2016). It may be that systems thinking has been so influential because most of the problems surfacing in community contexts are characterized by complexity, multiple perspectives and power relationships, and many systems approaches come into their own in these contexts (Jackson, 1988). However, it could simply be that systems thinkers and problem structuring researchers wanting to make a beneficial social impact gravitated to Community OR in the 1980s because it was then a relatively undefined field that offered them opportunities to practice that were less available in more 'mainstream' OR contexts where uses of quantitative optimization methods were the norm (Bryant et al, 1994).

In the face of this influence of systems thinking, John Friend (one of the leading early practitioners of both problem structuring methods and Community OR) raises two concerns. First, he suggests that the advocates of systems approaches are overly interested in comprehensive modeling. He argues that comprehensiveness is never actually achievable, so it is more productive to learn to work with selectivity (Friend and Hickling, 1997). We agree that, if building a comprehensive model of the problematic situation is a primary goal of practice, then this can lead to 'paralysis by analysis' because any amount of detail could potentially be included. Indeed, there is strong evidence from the 1960s and early 1970s that systems thinkers fell into the trap of building 'super models' that could answer very few policy questions because they were not designed with more *selective* foci in mind (Lee, 1973).

Second, Friend (2004) criticizes systems thinkers for viewing organizations as relatively stable systems evolving over time. He says this introduces a limiting assumption into Community OR practice: that we should be working with formal organizations in relatively long term projects instead of building transitory alliances to address social issues that might cut across organizational and community boundaries. Working with stable organizations often makes sense in public or private sector OR, where the effectiveness and efficiency of organizations are the focus, but we agree with Friend that many Community OR projects address an issue of concern to a community rather than managers of an organization; may involve representatives of multiple organizations and informal groups; may only be in existence for a limited period of time; and only sometimes set out to improve just one organization.

Midgley and Ochoa-Arias (2004a) address the first of these issues, and they identify a particular systems approach (boundary critique) that does not make the above assumption about comprehensiveness. They do not tackle the second issue, but we will argue that boundary critique also avoids a focus on organizations-as-systems. This is therefore of particular relevance to Community OR. Below, we summarize the essence of boundary critique (necessarily leaving out a lot of detail about understanding conflict and marginalization processes) before showing how it addresses Friend's concerns.

At its most basic, boundary critique is about *reflecting on the boundaries of inclusion and exclusion* in systems/OR projects (e.g., Ulrich, 1983, 1987; Midgley et al, 1998; Midgley, 2000; Midgley and Pinzón, 2011). While in the early days of systems thinking, organizations were seen as real-world systems (e.g., Kast and Rosenzweig, 1972) and the focus was on supporting their management (e.g., Emery, 1993), in the work of Churchman (1970) and particularly Ulrich (1983), the focus shifted away from organizations as such to the boundary judgments made in OR projects that determine who will participate and what will be the focus, mostly beyond single organizational agendas (Córdoba and Midgley, 2008). A boundary is a conceptual marker of the inclusion and exclusion of both participants and the issues that concern them, and there are usually multiple possibilities for setting boundaries (Midgley, 2000).

If boundary critique had inherited some of the early assumptions of systems science from the 1950s, Friend would be right to be concerned that there is a preoccupation with comprehensiveness. In the work of von Bertalanffy (1956) and Boulding (1956), the priority was to transcend the arbitrary limitations of disciplinary boundaries by developing a general system theory (GST) that can describe the generic properties of all systems (e.g., cells, organs, organisms, families, organizations, communities, ecosystems, planets, solar systems and galaxies). In GST, a systems view (understanding the properties of systems *in general* and analyzing *particular* systems with reference to these) is said to be the most comprehensive view that it is possible to attain. However, the advocates of boundary critique have explicitly distanced themselves from this understanding of comprehensiveness. Following Churchman (1970), it is Ulrich (1983, 1987) in particular who argues that the systems idea highlights the bounded nature of all understandings, and hence the inevitable *lack* of comprehensiveness in any OR project. Midgley and Ochoa-Arias say it is the latter view of comprehensiveness that is useful in Community OR, and it is the *same thing* as Friend's idea of working with selectivity:

> "So, let us return to the work of Friend and Hickling (1997) who argue that striving to be comprehensive in analyses is problematic because, in "difficult and complex planning problems the norms of linearity, objectivity, certainty and comprehensiveness keep on breaking down" (p.22). If one defines comprehensiveness as conformity to the saying "don't do things by halves" (Friend and Hickling, 1997, p.21), then we couldn't agree more. However, if we follow Churchman and subsequent writers in the systems domain, we need to recognise a crucial paradox. By viewing the pursuit of comprehensiveness as *dealing with its inevitable absence*, and by making this explicit in the form of boundary judgements that can be explored and critiqued, we are likely to be *more* comprehensive than if we simply take our boundary judgements for granted. It is our contention that this is actually quite similar to Friend and Hickling's (1997) prescription, "learn to work with selectivity" (p.22). Being selective essentially

means, to use systems terminology, making boundary judgments" (Midgley and Ochoa-Arias, 2004a, p.11).

We also argue that boundary critique takes us beyond the assumption of stable organizations-as-systems, which Friend (2004) argues leads to longer-term OR projects that serve single organizations instead of transitory alliances to address issues cutting across organizational and community boundaries. Clearly, if boundaries are conceptual markers and not the real-world edges of organizations, it is easy to define projects that are inclusive of community (and indeed multi-stakeholder) concerns. Indeed, boundary critique encourages this by asking the practitioner to consider the consequences of using different boundaries (Midgley, 2000). Also, more recent work using this systems approach has highlighted the importance of considering *time boundaries* as well as boundaries that establish the extent of participation in framing the issues to be addressed (Midgley and Shen, 2007; Hodgson, 2013, 2016; Shen and Midgley, 2014). Hence, the idea of transitory strategic alliances that Friend (2004) advocates can be understood using boundary critique, as can the idea of longer-term projects taking community-led change management through to implementation. Which should be the focus is a matter for the practitioner and stakeholders to choose, based on the needs of the project and any pragmatic constraints (including the time of the participants) that need to be respected.

Our own view is that Friend's understanding of transitory "negotiated project engagement" (Friend, 2004, p.177) is very useful, and so is the systems theory of boundaries as it has been applied in Community OR (see especially Midgley et al, 1998, 2007; Midgley, 2000, 2016; Boyd et al, 2004; Córdoba and Midgley, 2006; Foote et al, 2007; Midgley and Pinzón, 2013; Barros-Castro et al, 2015; and Ufua et al, 2018). Indeed, these two ways of understanding practice are *pointing in the same direction*: Friend (2004) explains the nature and importance of temporary community-engaged alliances, and Midgley (2000) and his collaborators provide the theory and methodology of boundary critique to deepen our understanding of how these alliances can take account of multiple perspectives, value conflicts and marginalization. The latter can all be understood in terms of how stakeholders make and defend boundary judgments (Midgley and Pinzón, 2011).

We are now in a position to tie this discussion back to the definition of Community OR offered earlier. If the meaningful engagement of communities is a characteristic of all Community OR projects, then we have to recognize that what counts as a legitimate 'community' to engage with actually depends on a boundary judgment. This boundary judgment may already be decided in the mind of the practitioner if he or she is following a given political theory of community, or what counts as a community may be explored as part of the project without any pre-judged boundaries. In this situation, it is possible that a vision of community will be emergent, but it will still be dependent on an implicit or explicit boundary judgment made sometime during the project.

Understanding 'meaningful engagement' also relies on boundary judgments, in the sense that the practitioner may believe it is necessary to involve everyone in the community concerned with the issue in focus, or they may make the case that it is acceptable to involve a smaller number of representatives. These are both boundary judgments. Given that there may be marginalization in the community, and this can be understood in terms of boundaries of inclusion and exclusion (Midgley, 1992, 1994; Midgley and Pinzón, 2011), what counts as 'meaningful' engagement can become quite important: projects that fail to identify and address marginalization risk entrenching it (Midgley, 2000), and to be called 'meaningful', an engagement process has to give space for marginalized groups to express themselves in a safe environment (Midgley and Milne, 1995; Midgley, 1997b; Midgley and Pinzón, 2013).

So our perspective is that systems thinking can indeed be useful to Community OR, both in terms of offering theory, methodology and methods of value to practice (as in the 46 papers taking a systems approach that were mentioned earlier), *and also to understand how practitioners may take different perspectives on what is and is not legitimate Community OR*. Indeed, the systems theory of boundary critique potentially offers a way to understand explorations of these issues of legitimacy *in the context of practice*, as practitioners come into dialogue with participants and stakeholders who may have different views on their project than themselves.

However, having argued for the value of systems thinking, we wish to end this section by re-affirming the point that we made earlier: this does not imply any 'take-over' by the systems community. We strongly believe that Community OR needs to be a broad church, and where there are common interests across the OR and systems communities (and indeed other communities), the strengths and weaknesses of all perspectives can be discussed in a spirit of mutual learning.

3.3 What are the similarities and differences between the US and UK traditions of Community OR?

The title of this subsection should not be interpreted as implying that there are only two nationalities of interest; as mentioned earlier, Community OR is much more widely international, but the US and UK traditions have been particularly influential. We argue in this sub-section that US OR as a whole has adopted a narrower boundary of legitimate practice than UK OR, and the contrasting boundaries of legitimacy in the two nations have informed how Community OR has been differently framed and developed. Nevertheless, it is very clear that, regardless of which framing is used, Community OR can only deal with questions of meaningful engagement if it can offer an enhanced methodology of 'engaged OR' that stands in comparison with expert- and client-driven forms of OR that are less concerned with either community- or wider-stakeholder engagement.

The US tradition is one that focuses almost exclusively on quantitative modeling. Certainly, it has long embraced applications in the public sector. Examples include public service OR initiatives such as the Operations Research in Public Affairs program held at MIT in 1966; and the Science and Technology Task Force of 1967, which initiated the

quantitative analysis of criminal justice problems and influenced the set of methods used in the prosecution of the Vietnam war (Johnson, 2012a). A seminal compendium of public-sector OR applications from 1994 includes chapters on health care, energy, natural resources, criminal justice and others (Pollock et al, 1994). In addition, INFORMS has been strongly promoting public sector OR (Kaplan 2016).

However, in 2009, 49 prominent UK-based scholars wrote a letter (Ackermann et al. 2009) to the editor of the INFORMS professional magazine, *OR/MS Today*, advocating for problem structuring methods (sometimes called 'soft OR') and other non-traditional (from the US perspective) analytic approaches. This generated a response from the editor of the INFORMS flagship journal, *Operations Research*, asserting that "Our objective is to serve the community by publishing high quality papers that are based on rigorous mathematical models and demonstrate potential impact on practice", and when OR applications "are not based on rigorous mathematical models, *Operations Research* is not the appropriate outlet for such papers" (Simchi-Levi, 2009, p.21). Although Mingers (2011a) presented an introduction to problem structuring methods for a US audience, this kind of practice is still barely visible within the US branch of the profession (and in other areas of the world that follow the lead of the US in defining our discipline). The perspective of Simchi-Levi still represents the contemporary understanding of OR in the US, despite the fact that INFORMS has inaugurated journals addressing diverse application areas (e.g., strategy, organizational development, service science and marketing) and OR is extending its embrace to 'analytics', which is not solely focused on prescriptive decision modeling (e.g., Liberatore and Luo, 2010; Mortenson et al, 2014).

In contrast, since the late 1970s, the UK OR community has broadened its understanding of the discipline to include problem structuring methods (Rosenhead, 1989), Soft OR (Ackermann, 2012) and Community OR. A typical motivation for this broadening is given by Ackoff (1979a,b), a high-profile US-based researcher who argued that "the future of operational research is past" (Ackoff, 1979a, p.93) if it would not embrace change. He made the case that we increasingly need to deal with issues characterized by complexity and stakeholder disagreement, and participative, design-orientated systems approaches are better able to deal with these than mathematical modeling techniques. However, his call for change fell on deaf ears in the USA, and he therefore abandoned the OR community.

It was in the context of the much more constrained US definition of OR that one of us (Michael Johnson) sought, in 2007, to put a name to some then-recent public sector OR applications that seemed to have a focus on research with and in the community, inspired by Ackoff's (1970) seminal paper on community-engaged OR in an inner city neighborhood of Philadelphia. Johnson wanted a new emphasis on OR applications for neighborhood revitalization and social change. The paper that resulted used a phrase, "Community-Based Operations Research" (Johnson and Smilowitz, 2007, p.102), that Johnson thought would communicate that this work lay within the US OR tradition,

while nevertheless broadening its scope in terms of both methodology and application. This paper did not reflect any substantive awareness of the then already mature UK tradition of Community OR.

Johnson's attempt at branding continued with his 2012b edited volume, *Community-Based Operations Research*, and by that time he had become aware of UK Community OR. Indeed, scholarship within the latter tradition was amply cited in the introductory chapter (Johnson 2012a). However, he kept the 'Community-Based Operations Research' brand, rather than adopting 'Community OR', because of his determination to avoid marginalization by US OR practitioners who might object to the explicitly Marxist and other 'progressive' and 'critical' perspectives that were highly visible in the UK Community OR literature (as well as many other academic domains within the European humanities and social sciences). One of us (Gerald Midgley) has had personal experience with US-based OR researchers who have acknowledged a disdain within the profession for conceptions of OR that do not reflect Simchi-Levi's (2009) insistence on the centrality of mathematical modeling, the implicit valuing of 'expert' insights over community perspectives, and the privileging of theoretical developments divorced from practice over real-world applications.

Acknowledging that histories of scholarship may not always convey the messiness of new thought, it is useful to note that the conception of Community-Based Operations Research may be better understood through the lens of Jackson's conception of 'enhanced OR' (Jackson, 1987a, 1988), which enlarges the notion of OR as a rigorous, analytically-focused problem-solving discipline to address notions of critical thinking and stakeholder/community engagement via action research and a deeper understanding of the diversity of problem contexts within which OR may be deployed.

While Community-Based Operations Research allows for diverse understandings of problem identification, formulation, solution and implementation to enable a more inductive, critical, iterative and community-engaged notion of OR (in a sense, a superset of traditional US-style OR), Community OR as we explore it in this paper proposes something even more fundamental: an awareness that engagement drives the choice of problem-solving approach and methods, and cannot be seen as an 'optional extra'. In this sense, we cannot accept that a Community OR practitioner has the right to unilaterally diagnose a problem context that clearly arises from a community need without at least some degree of engagement with relevant community members or representatives. The researcher may conclude that people's understandings of the context are inadequate, and be able to justify this, but refusing to engage at all is not legitimate if an application is to be labeled 'Community OR'.

Having discussed 'enhanced OR', we should acknowledge that this term can be seen to imply that other forms of OR are simplistic. Clearly this is not the case. We may call this *engaged OR* rather than enhanced OR – and, when there is direct engagement with local communities, this is, in addition, *Community OR*.

We suggest that a new conception of engaged OR can add real value to addressing many difficult problems of public interest when at least one of three conditions are manifest (and of course whether they are manifest is open to debate):

1. Stakeholder and/or community engagement is essential to understanding and/or addressing the problem in focus;

2. A modeling perspective that embraces methodological pluralism (multi-methodology or mixed methods) can productively deal with the complexities at hand better than a single method design; and

3. Marginalization and obstructive power relations make the need for a critical approach (including boundary critique) necessary, either to sweep in and value diverse voices, and/or to focus the attention of decision makers on the need for change.

For further discussions of the reasons why a more engaged approach is needed in light of the three conditions above, see Flood and Romm (1996) and Midgley (1996b).

In the section to follow we examine what Community OR can offer to the broader OR community and discipline.

3.4 What can Community OR offer to OR more generally?

Our short answer to the question 'what can Community OR offer to OR more generally?' is a deeper understanding of what could constitute the theory and practice of 'engaged OR'. Here we go beyond the defining feature of Community OR, the meaningful engagement of communities, and recognize that, for OR more generally, it is *stakeholders* (in many cases including communities, but not necessarily so) who need to be meaningfully engaged. While practitioners developing problem structuring methods have made a significant contribution that we can draw upon (e.g., Rosenhead, 1989; Rosenhead and Mingers, 2001), and so has the systems thinking research community (e.g., Jackson, 1991, 2000, 2003; Flood and Romm, 1996; Midgley, 2000, 2003; Reynolds and Holwell, 2010), Community OR has arguably been a major focus of practical application for both these communities. It therefore represents a fascinating 'melting pot' of theories, methodologies, methods and practices to inform a more general understanding of what 'engaged OR' might mean.

However, we recognize that this is a controversial assertion. You don't have to walk very far to meet a large number of OR practitioners who are perfectly happy to stick with the sole use of quantitative methods and provide a problem-solving service to clients without any significant stakeholder and/or community engagement. These practitioners would no doubt say that their practice *is* engaged, because they take seriously the idea that the purpose of their work is to serve clients who want to make more informed decisions, and this requires *very strong* engagement with these clients. From our own perspective, however, this is only partial engagement: as discussed in

Section 2 of this paper, we argue that complex issues may have multiple problem owners, or even none at all if no agencies have yet picked them up.

The idea of 'serving a client' also assumes that the client's framing of the issue is adequate, which may well not be the case if there are stakeholders with different perspectives and no learning across those perspectives has yet been attempted. Indeed, the client's perspective may be part of the problem! This is why Midgley (2000) always explains to those who are paying for a project on a complex issue that they will not be treated as 'clients' in the traditional manner: the framing of the issue has to emerge from engagement with relevant stakeholders (the client's view should not be taken as given), and these stakeholders also need to participate in developing plans for action, which will enhance legitimacy, buy-in and the likelihood of implementation across organizational boundaries.

At this point in the argument it is worth stepping back to ask why it is that so many OR practitioners are satisfied with a practice that is only client-engaged, and not engaged in any wider sense. There are arguably three reasons. The first two assume that it is necessary for OR to be more engaged in this wider sense, but there are cultural and psychological barriers to overcome. The third reason raises the possibility that the majority of OR practitioners are actually *right* to resist stakeholder and community engagement.

First, as we saw in the previous section, OR in the USA is still defined very narrowly in terms of the use of mathematical techniques (Simchi-Levi, 2006, 2009; Ackermann et al, 2009; Mingers, 2011a,b); and in most of the rest of the world OR is broader, but the majority of practitioners are still only interested in quantification (Ackermann, 2012). If all the focus is on mathematical techniques, concerns with stakeholder and community engagement will inevitably be neglected or marginalized. Mingers (2011b) demonstrates, through a causal loop diagram, how 'traditional' understandings of OR are continually being reinforced.

Second, there is clearly an element of personal comfort involved: for those who have spent decades in OR and have been wedded to the dominant paradigm, it is a daunting prospect to accept that there is now a need to learn a whole new set of theories, methodologies and practices (Brocklesby, 1995, 1997; Mingers and Brocklesby, 1996, 1997; Midgley, 2000; Midgley et al, 2016). It means the possibility of senior OR practitioners being seen as novices in some respects, and this can make them feel vulnerable.

However, what if the majority of practitioners are actually *right* to resist learning about the theory and practice of engagement coming from Community OR? The third possible reason why many practitioners are satisfied with client-only engagement and the sole use of quantitative methods is that *this works for them*. We have to consider the possibility that the contexts of much 'mainstream' OR and Community OR are so dissimilar that they require different skill sets.

The historical place of much OR has been within public and private sector organizations, with practitioners offering a problem-solving service to managers. Could it be that, in such a role, if OR practitioners were to insist on

stakeholder engagement, they would risk being perceived by their clients as further problematizing already problematic issues? Or could it be that, in larger organizations with substantial human capital, other departments are already engaging with stakeholders, so the OR practitioners can assume that their clients are already well informed about other perspectives? If the answer to either of these questions is 'yes', then it would be entirely reasonable for OR practitioners to want to maintain client-only engagement, even if it's just for their own self-preservation!

Perhaps Community OR practitioners have more influence over problem framing and methodology choice than their colleagues in industry and government. This might be because they are mostly external to their commissioning organizations and act in the role of consultant-researcher; or because, when they are actually employed by third sector organizations, the latter are more likely to give them leeway to choose their preferred approach. Alternatively, the situation may be as Jackson (1987a, 1988) claims: the issues that Community OR practitioners address are inherently more likely to require multi-stakeholder and community engagement to resolve them. If it is indeed the case that Community and other OR practices are substantially different, then perhaps it is too much to ask for OR practitioners more generally to learn from Community OR.

While there may be some truth in the observation that there are differences between Community OR and other OR foci, we nevertheless want to stress that business and government are by no means immune to facing highly complex issues characterized by multiple perspectives and the need for action beyond the boundaries of a single client organization. Indeed, scholarship in public sector management emphasizes that citizen engagement is crucial to the better delivery of services (Ahn and Bretschneider 2011). Thus, it is certainly possible for many government employees to do Community OR in a credible way. It is also quite interesting to note that, in research to see how OR would have to be transformed to meet the emerging challenge of environmental management, business leaders actually expressed *more* interest in managing stakeholder relationships than people in the public and third sectors (Midgley and Reynolds, 2001, 2004b).

In the context of complexity and multiple perspectives, engaged OR is clearly more effective than its less-engaged predecessor: this has been argued extensively in the literature (e.g., Jackson and Keys, 1984; Jackson, 1987b; Rosenhead, 1989; Mingers and Rosenhead, 2001; Ackermann, 2012) and the value of engaged OR (especially using problem structuring methods) has been demonstrated in multiple case studies over four decades (Mingers and Rosenhead, 2004). It is also the case that even large organizations with substantial human capital can have 'blind spots' and suffer 'groupthink' (Janis, 1982), so taking the client's perspective for granted and failing to engage more widely can be problematic (Munday, 2015).

In some ways, this whole issue of whether 'mainstream' OR can learn from Community OR boils down to our normative vision of OR: do we just see ourselves as offering a research service to management, primarily tackling 'tame' (complicated but uncontroversial) problems, or should we be able to address the full range of issues facing

organizations, communities and societies, including the 'wicked' (complex, multi-stakeholder, difficult to resolve) problems identified by Rittel and Webber (1973)? If we want a more multi-talented OR, and we suggest this is essential if our discipline is to have a future in an increasingly complex and interconnected world, then we need the theories, methodologies, methods and practices of engaged OR. Community OR practitioners can help the wider discipline understand what this might involve.

Perhaps the clinching argument, for us, is that understanding whether a particular focal issue for an OR project requires stakeholder engagement is not a simple matter. To find out whether an issue requires engaged OR *actually requires engagement*! Let us explain. Early arguments for the complementarity of different kinds of OR techniques focused on the alignment of different types of method with different contexts of application: optimization and other mathematical techniques were said to be appropriate for relatively simple problems where there is agreement on what the problem is, while problem structuring methods are more appropriate for complex problems characterized by disagreement between stakeholders (Jackson and Keys, 1984; Jackson, 1987b, 1990, 1991; Keys, 1988). We suggest that there is an element of truth to this way of thinking, but on its own it is inadequate: how do we know if the problem is a relatively simple one that is agreed between stakeholders *if we don't ask them*? Thus, any framework that is designed to support practitioners in choosing OR methods, regardless of all the caveats built around it to encourage critical thinking (e.g., Jackson, 1990), *is only as good as the exploratory approach adopted to diagnose the context* (Ulrich, 1993; Midgley, 2000). Simply asking the client is not enough, as he or she may have blind spots. Thus, an initial period of stakeholder-engaged investigation is needed prior to choosing the main problem solving or problem structuring methods to be used. This is precisely what the theory and practice of boundary critique is all about, as discussed in Section 3.2 (and also see the following references, which include those before 1998 when the term 'boundary critique' was first used as a label for this body of work: Ulrich, 1983, 1987; Midgley, 1992, 2000; Midgley et al., 1998; Foote et al., 2007; Midgley and Pinzón, 2011). It involves "probing" the features of the issue in focus (Ufua et al, 2018) and revisiting exploration periodically throughout an intervention if/when new dimensions of the issue are uncovered (Córdoba and Midgley, 2006). The extent of boundary critique needed prior to the choice of methods partly depends on the time and resources available, but at least a modicum of stakeholder and/or community engagement is always required if the blind spots of those initially constructing the remit of a project are to be exposed.

Hence our conclusion is that the kind of engaged OR that has been developed as part of Community OR theory, methodology and practice is really necessary for *all forms of OR*, although once an initial probing of the context has been completed, and this shows that there really isn't a need for further stakeholder engagement, the researcher can legitimately revert to a more 'traditional' mode of inquiry with a primary focus on the perspective of the client. Arguably, the only exceptions to this are when other projects with stakeholder engagement are already

being done on the problem in question, and/or there are other parts of the organization that are working with stakeholders, and the knowledge being generated can be drawn upon to frame the new work without having to repeat a previous engagement process.

4. Conclusion

In this paper, we have sought to address the often-avoided question of how to define Community OR by arguing that it involves *meaningful engagement with the community* (or communities). This definition leaves open what 'meaningful' and 'community' might mean, both generally (different theories and methodologies take a view on these things) and in specific projects. Thus, there is space for debate and therefore learning in the Community OR research community.

The above definition allows us to differentiate between Community OR and other forms of OR that do not involve community engagement, but without tying the former to a narrowly defined sector (e.g., grass-roots community groups and/or voluntary organizations). Community OR can be cross-sector when necessary, and indeed community-engaged practice can take place *within* public, private and third sector OR.

Importantly, this new definition does not marginalize any papers or projects that have previously been described as Community OR, thus alienating sections of our research community: we argue that the meaningful engagement of communities is a principle of practice that has been tacitly present all along, and making it explicit provides a new coherence for Community OR. Nevertheless, it has implications for addressing some of the controversies in our research community, and we have shown how it helps us take a position on four of these.

One of these positions concerns what Community OR can offer to OR more generally. We suggest that it can offer a deeper understanding of what constitutes 'engaged OR'. Community OR is uniquely placed for this because it has been a focus of application for problem structuring researchers, systems thinkers and action researchers as well as more traditional quantitative OR practitioners, and thus it represents a 'melting pot' of theories, methodologies, methods and practices from which new understandings of engaged OR can emerge.

Supplementary Material

The online supplementary material contains our reflections on how to define OR, and our rationale for focusing on intervention and modeling as the two characteristics that Community OR has inherited from its parent discipline.

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Towards a Definition of Operational Research

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In the paper to which this supplementary material is linked (Midgley et al, 2018), we have sought to define Community Operational Research (Community OR). Given that this is a sub-category of Operational Research (OR) more generally, it is worth reflecting on what Community OR has inherited from its parent discipline. This requires a definition of OR.

To keep matters simple, given the number of definitions in the literature, we will discuss the official one presented by the International Federation of Operational Research Societies (IFORS). As IFORS is the umbrella body for national OR societies, it seems reasonable to assume that their definition has some legitimacy. We will nevertheless raise some concerns with their definition before highlighting two important features of OR that Community OR has inherited. Having identified these two key similarities across all forms of OR practice, we will then have a basis for looking more closely at the *differences* between Community and other forms of OR.

IFORS (2017) defines OR as "the discipline of applying advanced analytical methods to help make better decisions". Clearly, to satisfy a diverse range of practitioners within the global OR community, the IFORS definition has been developed to be general and inclusive. Nevertheless, even this definition implies boundaries to the field that some would not accept. For instance, the focus on 'decisions' hides the fact that many policies and strategies are developed through on-going learning and refinement processes, which cannot reasonably be reduced to a single decision point (Nutley et al, 2007). We do not believe that many OR practitioners would put approaches focused on learning outside the boundaries of OR, as a broad range of analytical methods, including both the quantitative (e.g., de Geus, 1994; Sterman, 1994) and qualitative (e.g., Rosenhead and Mingers, 2001), may be useful in this context.

More controversially, perhaps, a minority of OR practitioners would also question the focus in the IFORS definition on purely 'analytical' methods. We are not aware of anyone in OR who actually argues *against* the use of such methods, but there are practitioners both within and outside OR (e.g., Heron and Reason, 1997; Rajagopalan and Midgley, 2015) who suggest that they can be usefully *complemented* by non-analytical approaches. The latter are often arts-based (e.g., Norman and Norman, 2000; Liamputtong and Rumbold, 2008), or practitioners may import methods from group and family therapy into practice with organizations (e.g., Campbell et al, 1994; Bilson, 1997). Rajagopalan (2015), reflecting on decades of practice in India, where he has been working with communities facing forms of marginalization that have been entrenched over centuries, argues that the deployment of rational-analytic methods alone is insufficient to create significant change in such circumstances because the marginalization has become so deeply rooted in people's identities.

The idea of using non-analytical methods may make some practitioners feel uncomfortable, as they are certainly not in the OR mainstream – at least not yet. However, we ask those whose instant reaction is to reject them to think about the kind of knowledge of human relationships that is needed for the successful use of even the 'hardest' analytical method in the context of organizational problem solving. A great deal of the knowledge of the OR practitioner is practice-based and learned experientially, making it tacit or intuitive (Midgley, 2000; Rajagopalan and Midgley, 2015). Without such knowledge, the practitioner would be lost as he or she navigates complex client, stakeholder and OR-team relationships. Really, the kind of knowledge derived through the use of analytical methods is just the tip of the iceberg of the forms of knowledge that are relevant to our work (Heron and Reason, 1997; Rajagopalan and Midgley, 2015), as demonstrated by detailed analyses of communications in OR projects (e.g., Tavella and Franco, 2014) and OR teams (Velez-Castiblanco et al, 2016), where much of the shaping of people's understandings is clearly happening very fast through processes deploying tacit knowledge that the participants are barely conscious of. If knowledge beyond the rational-analytic is important to the OR practitioner, is it too far-fetched to say that methods supporting the development of such knowledge might be useful to our clients and stakeholders too?

If we stretch the IFORS definition a little and accept that IFORS has used 'decisions' as a catch-all term, which includes learning processes, and we acknowledge that the overwhelming majority of OR is focused on the use of analytical methods, but other types of method and forms of knowledge are also relevant, then we can begin to make progress in understanding what constitutes OR. Indeed, we suggest that it is in the IFORS text expanding on their definition that we can find some critically important features of OR: "By using techniques such as problem structuring methods and mathematical modelling to analyze complex situations, Operational Research gives executives the power to make more effective decisions and build more productive systems" (IFORS, 2017). Leaving aside the reference to 'executives', which is too narrow a definition of our clients (even for OR more broadly, let alone Community OR), it is quite clear that OR practitioners are always engaged in some kind of *intervention* to enable better decisions (or learning processes) and thereby to support the improvement or

creation of systems designed for some purpose (but going beyond just the productivity mentioned in the quotation). *Intervention for desired change* is the first characteristic of OR that appears to be generally applicable across all approaches.

Also, the explicit discussion of "problem structuring methods and mathematical modelling" in the above quotation is interesting because it signals the diversity of methods that can be used in OR. However, *it is what these different methods have in common* that is really significant: whether they are quantitative or qualitative, OR methods generally involve *modeling.*

> "…Models are convenient worlds. They are artificial worlds that have been
> deliberately created to help with understanding the possible consequences of
> particular actions… The models may be quantitative or qualitative, but in any case
> they will be simplified abstractions of the system of interest" (Pidd, 1996, p.3).

Even arts-based methods and therapeutic techniques use modeling, broadly defined: Heron and Reason (1997) talk about the knowledge generated through arts-based methods as "presentational" as opposed to "analytical", but what is presented is nevertheless a model of the 'artist's' perspective. A good example is Checkland's (1981) technique of rich picturing, where the picture is very clearly a model. So, *modeling* is the second generally applicable characteristic of OR.

Bringing these two characteristics together, we suggest that OR involves *modeling in the service of intervention for a desired change*, and what that change could be often emerges through the intervention process itself and is not known (or is only partially known, or known very sketchily) in advance. Other knowledge, beyond that derived from modeling methods, is certainly relevant (as argued earlier, practice would actually be impossible without tacit knowledge of human relationships), but this is complementary to the use of modeling.

Nevertheless, we should also be clear that OR is not the only form of practice that involves modeling in the context of intervention – so, for example, do many forms of systems thinking (e.g., Midgley, 2003) and action research (e.g., Bradbury, 2015). To be counted as OR, however, it has to be self-identified as OR by the practitioner. While this might seem so obvious that it is hardly worth mentioning, it is necessary to make it explicit because it points to the fact that OR is *practiced by a research community*, and community custom and practice really matters (Rosenhead, 1986). There is, of course, a lot of potential for learning across the various research communities with different customs and practices concerned with modeling for intervention.

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