

Critical theory and contemporary paradigm differentiation

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■ Introduction

Critical theory, drawing from the enlightenment tradition, considers social science to be tasked with liberation from ‘unnecessary restrictive traditions, ideologies, assumptions, power relations, identity formations, and so forth, that inhibit or distort opportunities for autonomy, clarification of genuine needs and wants’ and therefore greater and lasting satisfaction (Alvesson & Willmott 1992:435). Steffy and Grimes (1986:334) stress that, besides ‘expanding the research agenda by subjugating methodology to epistemic critique,

How to cite: Callaghan, C.W., 2016, ‘Critical theory and contemporary paradigm differentiation’, in ‘Critical Management Studies in the South African context’, *Acta Commerci*, suppl. 1, 16(2), a421. <http://dx.doi.org/10.4102/ac.v16i2.421>

critical theory would also affect the structure and activities of the scientific community' and more fundamentally 'potentially affect the structure of the scientific community itself' due to the intimate relationship 'between methodology, as well as the criteria for what constitutes a valid scientific product, and the social structure of the scientific community' within which research outputs are produced. Critical management studies (CMS) is taken to encompass the application of critical theory to the field of management, building on an agenda that is subjecting methodology and its ontological and epistemological assumptions to critique as well as interrogating ideologies or management practices which inhibit or distort opportunities for autonomy and emancipation. Such a project is considered particularly important in the South African context as management theory and practice within the context of this developing country stands at the nexus of theory developed in resource-rich contexts and the need for new theory which incorporates an emancipatory agenda applicable to one of the most unequal societies in the world. In such contexts of radical inequality, it is possible that people in working contexts are more vulnerable to managerial practice which fails to incorporate a normative agenda as a bedrock of values to ensure that human emancipatory principles act as a counterbalance to exploitation. What makes the South African context unique is arguably its dramatic inequality, a microcosm perhaps of the digital divide between Global North and Global South, where technology and knowledge creation may, through global management practice, be deepening inequality.

Given certain seminal perspectives from critical theory and the need to develop novel theory which can be relevant to

developing contexts, Chapter 3 seeks to build on the critical-theory vision, offering an argument that a discussion concerning the influence of technology on theory generation and knowledge engagement needs to find a place within Burrell and Morgan's (1979) paradigmatic differentiations. This is deemed to be particularly important in order to take into account what is described here as paradigmatic change in the structure of the scientific community itself as well as in its constituent methodologies. Special consideration is given to the rise of Internet and social-media technology and their wholesale disruptive effects. These have, arguably, up-ended power relationships (Callaghan 2016a) in certain organisational and societal contexts, potentially contributing to an emergent and disruptive paradigm of democratisation of science. This paradigm is related to the rise of movements prioritising transparency and population engagement (Bonney *et al.* 2009) as well as scrutiny of scientific research (Funtowicz & Ravetz 1994) on the part of technologically empowered stakeholders.

■ New developments on epistemological and ontological frontiers

Arguably, radical new epistemologies and ontological perspectives have emerged on the back of new technology such as crowdsourcing, crowdsourced research and development (R&D) as well as social media, offering new opportunities for innovation platforms (Allio 2004; Aye *et al.* 2016) and boundary spanning (Carlile 2004) to transcend the knowledge-aggregation problem (Hayek 1945; Von Hippel 1994) and enable problem-solving capabilities in real-time research (Callaghan 2014, 2015, 2016b). Arguably, the emerging

paradigm in scientific (both social and natural) sciences ‘closes the circle’ as citizen science and participant-led research paradigms together with post-normal science movements herald perhaps not only a radical new ontological paradigm in science but also a radically new epistemological paradigm premised on radically increased innovative potential related to harnessing the ‘crowd’ or democratically inclusive populations in problem-solving itself. Long-standing views in critical theory are however considered central to this emergent change, lest it lose its focus and its *raison d’être* [purpose] as an emancipatory project premised at freeing innovative science from its yoke to markets and the underprovision of innovation to poor populations and lest it finds another path back to dystopian value-less science.

■ The importance of developing CMS research

Chapter 3 therefore seeks to develop a conceptual framework that incorporates theory related to these new developments into a synthesised model which updates Burrell and Morgan’s (1979) framework and which offers useful heuristic properties for developing management theory. This research is considered important for the following reasons.

Firstly, theorists using Burrell and Morgan’s (1979) framework to derive principles and to locate their work in relation to other theory arguably do so in the absence of literature related to what are seemingly powerful new social forces enabled by Internet and social-media technology as well as an underlying social connectivity enabling a host of emergent methodologies unplaced in the Burrell

and Morgan schema. Arguably, Burrell and Morgan's (1979) paradigmatic differentiation also predates important developments in organisational theory. These include developments in corporate culturism (Willmott 1993a), control through identity regulation (Alvesson & Willmott 2002), critical-theory critique in the literature and other work on the power of values which link the role of values to emergent technology that can amplify their effect (Feenberg 1991, 2005, 2009). Therefore, Burrell and Morgan's views are predating the role of increasing connectivity and democratisation in supplanting totalitarian ideologies with critical humanist realities. The costs for managers and management researchers seeking heuristic benefit from Burrell and Morgan's (1979) schema without integrating contemporary theoretical developments may manifest in impoverished theorising which does not adequately provoke contemporary ontological and epistemological considerations. In particular, I refer to those related to what is arguably a new paradigm in science, both social and natural, and which in turn has perhaps upended many historical assumptions about the social world in which managers are nested. Populations in the Global South may face a growing digital divide in comparison to the Global North, from and across which multinational firms bridge and draw resources and profits. However, without an infusion of CMS values, populations in developing countries may be vulnerable to power dynamics associated with the growing power of digitally enabled managerial elites.

Secondly, the new paradigm of societal connectivity perhaps heralds a new era of accountability for managers. This accountability

has two characteristics. The first is that the monopoly power of capital may increasingly be disrupted by increasingly powerful relationships between expert tacit knowledge and firms' performance in the individual and knowledge economy (Callaghan 2016a). This means that managers will no longer as easily be able to take recourse to power vested in capital and they might need to understand more nuanced and complex management practices in global contexts of rapidly increasing interconnectivity. The second characteristic is that increasing societal interconnectivity has perhaps amplified the strength of accountability mechanisms faced by managers. Given these changes in power structures, which are not independent of the rise of the 'crowd' or increased voice of stakeholders, it is considered important to offer a management-relevant model of paradigm differentiation which makes explicit the emergent ontological and epistemological issues in contemporary science as management contexts are embedded in societies that are experiencing these changes. The need for South African populations and the 'crowd' enabled by social media to be able to hold accountable the monopoly power in management and other contexts is particularly important given increased vulnerabilities associated with populations that are disenfranchised and disempowered through historical events, the legacies of which persist in their influence.

Thirdly, given the rise of what are termed the 'democratisation of science' movements in the form of citizen science (Bonney *et al.* 2009), participant-led research (Vayena & Tasioulas 2013) and post-normal science (Funtowicz & Ravetz 1994), epistemological imperatives may exist to reshape research processes to take advantage of very large real-time data collection, synthesis and analysis

capabilities provided by crowdsourcing, crowdsourced research and development and social media as connectivity mechanisms. Probabilistic innovation theory (Callaghan 2015) can be understood to predict the eventual emergence of yet another paradigm of extreme radical change, termed ‘transcendence’ for the purposes of Chapter 3. Extrapolation of trends towards the democratisation of natural and social science also seem to converge with emancipatory visions of critical theory such as those espoused by Alvesson and Willmott (1992:435) as scientific endeavour, in contrast to the predictions of many, may ultimately come to achieve emancipatory outcomes (Feenberg 2009) if stewarded by critical theorists. Importantly, the transcendence paradigm developed here is taken to be a natural outcome of technological emergence and exponentially increasing potentialities driven by increased interconnectivity. The third contribution of Chapter 3 is therefore its attempt to make explicit not only contemporary paradigm differentiation but also to provide a theoretical rationale for a future paradigm premised on current trajectories of ontological and epistemological change in science. These changes towards a more inclusive global paradigm are expected to contribute to a more equitable distribution of knowledge resources over time but only if CMS values can be embedded in scientific endeavour, including the field of management.

Chapter 3 proceeds as follows. Firstly, a theory of paradigms is introduced, and the radical verificationist and radical emergence paradigms are considered as extensions of the Burrell and Morgan (1979) schema, based on ontological and epistemological characteristics grounded in relatively more recent societal and scientific changes and the emergent properties of these changes.

Theories of emergent change are discussed, including predictions of probabilistic innovation theory, and discussions are grounded in critical-theory notions concerning technology (Feenberg 1991). These theories can, with critical-theory leadership and technological change result in the convergence of emancipatory values. A model of contemporary and future paradigm differentiation premised on ontological and epistemological assumptions is offered, and its value to managers as a heuristic device for theory development is discussed. Finally, a model is considered which simulates first-order change in the form of socio-technological change as a driver of second-order change as related to the disruption of power relationships in society and organisations. This model is taken to represent the causal structure underlying the emergence of the paradigms described in the paradigm-differentiation model. Having outlined the rationale behind the research and a justification for its importance, a theory of paradigms is now considered.

■ Theory of paradigms

At the heart of any discussion of how to frame change and differentiation in scientific epistemologies and ontologies is the need to relate change in the natural sciences to that in the social sciences and to make explicit the tensions amongst and between these bodies of literature. An example of these tensions is offered by Latour. He (Latour 2000) explains that the social sciences have typically over time ‘wrong-headedly’ tried to imitate the natural sciences:

Most of the social sciences were invented, a century ago, to short-cut political process after many years of insufferable wars and

revolutionary strife. If we have a Society which is already composed as a single whole and which can be sued to account for the behaviour of actors who do not know what they are doing, but whose unknown structure is visible to the keen eyes of the trained social scientist, it then becomes possible to embark on the huge task of social engineering in order to produce the common good, without having to go through political means. We find here the genealogy of this famous Society whose demise is not everywhere visible, not so much because of the advent of networks and global markets, but because it has become politically and scientifically scandalous. From Comte to Bourdieu through Durkheim and Parsons, this dream of legislating in order to by-pass an impossibly fractious political arena by using the knowledge of what Society is – what manipulates the people in spite of themselves – has formed the core vocation of most social sciences (apart from the tiny schools of interpretative sociology, ethnomethodology and symbolic interactionism, that Bauman places in a different family). In this strange political dream of short-cutting politics, we find not only the notion of the social we had to dispute above, but also this extravagant scientism we have also been criticizing throughout. (pp. 117-118)

According to Latour (2000), the social sciences' quest (to reveal the hidden structure which manipulates agents) has sought to apply similar thinking to that of natural scientists' differentiation between primary and secondary qualities of phenomena (the former relating to real substance making up nature, such as particles, atoms, genes, and the latter relating to subjective representations of this same universe). Latour's example is but one of a host of theoretical tensions running between and through scientific literature. Science (both natural and social) exists within society, and it is in within this complex milieu that Burrell and Morgan (1979) sought to differentiate paradigms of scientific thought according to what they took to be fundamental ontological and epistemological assumptions of scholarly research.

Arguably, the schema offered by Burrell and Morgan (1979) can be considered to reflect longstanding debates in social-science literature germane to normative versus non-normative science and as to what science, social or natural, represents. A rationale is now offered for the inclusion of two other paradigms, namely the radical verificationist paradigm and the radical emergence paradigm, which may reflect contemporary changes in science. In addition, I consider a further paradigm which extrapolates these changes and represents them as a convergence of values.

The functionalist paradigm in Burrell and Morgan's (1979:26) schema seeks to provide explanations 'of the status quo, social order, consensus, social integration, solidarity, need satisfaction and actuality' from a 'standpoint which tends to be realist, positivist, determinist and nomothetic', offering 'essentially rational explanations of social affairs' rooted in the sociological positivism paradigm or the attempt 'par excellence, to apply the models and methods of the natural sciences to the study of human affairs.' Problem-oriented as it is, functionalism therefore seeks to provide practical solutions to practical problems and is 'usually firmly committed to a philosophy of social engineering as a basis for social change', emphasising the maintenance of order, equilibrium and stability in society, or regulation and control of social affairs (Burrell & Morgan 1979:26).

In terms of Burrell and Morgan's (1979) ontological differentiation between the assumptions of social-science research which takes objective versus subjective assumptions as one of two axes of difference (Figure 2), the functionalist paradigm is

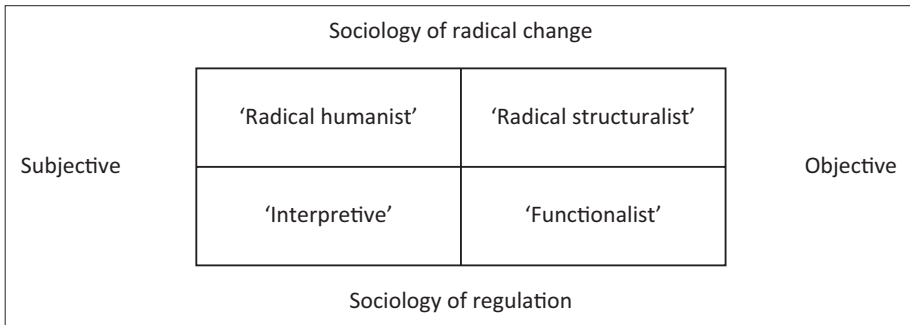


FIGURE 2: Burrell and Morgan's (1979:22) paradigmatic differentiation schema.

differentiated from the interpretivist paradigm. However, both of these axes are considered to relate to the 'sociology of regulation' or status quo in contrast to the radical humanist subjective and radical structuralist objective paradigms which relate to the 'sociology of radical change'. As shown in Figure 2, the verificationist paradigm is considered to be on the objective axis but to be more radically oriented toward change than the radical structuralist paradigm.

■ The epistemological tenet of positivism

One difference between the subjective and objective paradigms is their relationship toward the objective paradigm's epistemological tenet of positivism. According to Burrell and Morgan's (1979) analysis, the subjective paradigm's anti-positivist tenets contrast epistemologically with positivism, rejecting positivism's claims that 'hypothesised regularities can be verified by an adequate experimental research programme' (verificationists) or that hypotheses can only be falsified (falsificationists). The radical

verificationist paradigm is taken to derive epistemologically from the positivist verificationist tradition in the sciences described by Burrell and Morgan (1979). However, due to radical change in methods over time, including those associated with probabilistic innovation, less emphasis is now placed on falsificationist logic and notions of dichotomisation imposed on evidence evaluation whilst the focus is rather on probabilistic evaluation and multiple perspectives of evidence (Campbell & Fiske 1959), based on large volumes of data, synthesis and analysis in real time. Management research can draw useful heuristics for the development of theory in Burrell and Morgan's (1979) schematic differentiations, but these need to be updated to incorporate ideas from contemporary management contexts. Management applied to public-health emergencies provides important contemporary insights which highlight the importance of epistemological and ontological assumptions and the need to include emergent paradigms that are reflecting technological change.

Recent deliberations concerning ethics in the wake of public-health emergencies such as the Ebola outbreak have affirmed the deliberative democratic approach with maximised real-time stakeholder engagement in research and policy making as well as the need for proactive democratic deliberation in advance of such events (Fenton, Chillag & Michael 2015). The rights of populations to have scientific findings fully disclosed and to have maximised transparency concerning developments that influence them in an era of rapid technological developments, including for example areas such as genetic engineering (Kimmelman 2008), have important implications

for scientific assumptions and notions of the incommensurability of paradigms. Kuhn's (1962) paradigm theory suggests that normal science processes can cause paradigm change through changes in scientists' value systems, and it is in relation to this notion that anti-positivism and other tenets of differentiation of scientific thought need to be placed.

Anti-positivism contests the positivist tenet that knowledge creation is fundamentally cumulative in nature. Anti-positivism can take different forms but is 'firmly set against the utility of a search for laws or underlying regularities in the world of social affairs' (Burrell & Morgan 1979:4). The social world, for anti-positivists, is therefore relative and can only be understood from the point of view of individuals who are directly involved in it. From this perspective, social science is taken to be a subjective, not objective, enterprise as anti-positivists 'tend to reject the notion that science can generate objective knowledge of any kind' (Burrell & Morgan 1979:4). In a world increasingly affected by socio-technological change, it is perhaps necessary to interrogate the usefulness of the four paradigmatic differentiations offered by Burrell and Morgan, and to update these to take into account contemporary ontological and epistemological dynamics.

Anti-positivist assumptions may be associated with the interpretivist and radical humanist paradigms mooted by Burrell and Morgan (1979), but the (more) radical emergence paradigm is taken to reflect a more complex relationship with anti-positivism. Anti-positivism has less to do with the rejection of positivistic relationships

which emerge from the subjective engagement of human consciousness with empirical phenomena and more with the prioritisation of the subjective forces of the human intellect. These forces are the subject of a fast-growing body of literature related to collective intelligence and its emergent properties, which are increasingly recognised as key to driving innovative scientific discoveries (Rosenberg 2015).

■ Emancipatory science contingent on critical-theory contributions

Innovative scientific discoveries can be emancipatory if stewarded by an engagement with critical theory. Critical theory of technology with its links to the Frankfurt School of critical theory (Feenberg 1991) argues that technological change does not necessarily force a deterministic choice between human values and technological advancement (substantivism) but can instead contribute to broader democratic participation in social choices. Technology is adapted to social and political systems, and technological systems are not neutral (the tenet of instrumentalism) but contribute to socio-political agendas. Hence, critical theory of technology is a ‘political theory of modernity with a normative dimension’, extending from Foucault and Habermas a tradition which (Feenberg 2009):

[A]dvances in the formal claims of human rights take centre stage while in the background centralization of ever more powerful public institutions and private organizations imposes an authoritarian social order. (p. 147)

Further, with the ‘rise of the environmental movement, the struggle of AIDS patients for access to experimental drugs, and the re-

inventions of the Internet by its users as a communication medium', a critical approach to technology has gained much ground as political dimensions of technology become increasingly clear, according to Feenberg (2009:147). Global South populations are disproportionately exposed to catastrophic events such as the AIDS epidemic and other health challenges with inequalities in the contribution of science. Burrell and Morgan's (1979) schema can be extended to capture ontological and epistemological aspects related to technological emergence and its contributions to social and natural sciences, particularly in terms of its potential to radically change research processes and contribute to the democratisation of science.

The operationalisation of collective intelligence based on the involvement of populations, not only in high-volume big data, information and knowledge collection but also in analysis and problem-solving may offer radical potential for real-time problem-solving, (Callaghan 2015) on the back of rapidly developing technology that is driving radically enhanced connectivity such as crowdsourcing, crowdsourced research and development (R&D) and the use of social media. The front line in theory development in the radical emergence paradigm has arguably been found in disaster-management literature, which has highlighted the potential of social media (Alexander 2014) and crowdsourcing (Callaghan 2016b) as well as the importance of complex adaptive systems (Coetzee, Van Niekerk & Raju 2016) and its emergent properties in solving research problems under intense time constraints.

Crowdsourcing, or crowdsourced R&D, has demonstrated proof of its effectiveness in medical research (Allio 2004; Adams 2011; Armstrong *et al.* 2012; Callaghan 2015) as a powerful

enabler of research productivity. Internet-based platforms using geographical information systems (GIS) and other forms of emergent technological applications are proliferating globally (Aye *et al.* 2016). These platforms offer opportunities for integrating human-swarm problems (Rosenberg 2015) with artificial intelligence applied to crowdsourced data (Davies 2015), resulting in a radically changed research landscape. The potential for the radical emergence paradigm to solve societal problems and to provide emergent alignment with the values of radical humanism and critical theory derives from its epistemological nature as an emergent paradigm and from the notion that its emergent properties are inherently 'subjective' and not based on an ordered logic.

The subjectivity associated with the emergent properties of the crowd is well documented as crowds can be irrational and behave like mobs (Le Bon 1896; Surowiecki 2004), and it is only under certain conditions that crowds manifest collective intelligence. This subjectivity differentiates the radical emergence paradigm from the radical verificationist paradigm, which, although enabled by radical technological progress and the use of the crowd or inclusive populations to engage in scientific research as well as research verification and ethical scrutiny, is focused primarily on the objective accumulation of knowledge and its verification. The verificationist paradigm is therefore a counterpoint to the radical emergence paradigm and is uniquely more suited to managing the chaotic conditions under which emergent problem-solving can arise as checks and balances are applied through the transparent scrutiny of research by populations.

However, in contrast to Burrell and Morgan's (1979) rigid conceptualisation of paradigm incommensurability, Campbell and Fiske's (1959) notion of increasing validity through the complementarity of perspectives is taken to be more realistic, given the nature of the literature synthesised here as literature on the verificationist and radical emergence paradigm ultimately predicts a convergence in epistemological and ontological objectives. This convergence is taken to be the coming together of scientific objectives to support humanist emancipation or a process of 'closing the circle' whereby the convergence of science and the needs of the crowd, or populations, is ultimately attained, following the principles of critical theory of technology, namely broader democratic participation in technological choices (Feenberg 1991). This is essentially the attainment of what critical theorists have long advanced as the emancipatory potential of critical engagement (Alvesson & Willmott 2002). However, it is epistemologically enabled through the democratisation of the processes of science and the power inversion resulting from the engagement of the crowd to exponentially increase data, information and knowledge aggregation and problem-solving in science.

■ The convergence of normative humanist epistemologies and ontologies

The notion of the convergence of radical emergence and radical verificationist paradigms around what is essentially a normative humanist epistemology and ontology is derived here from theory. This prediction has its roots in analysis of trajectories of

theory development, which lends this prediction both inductive and deductive processes, the former associated with extrapolation of the radical emergence paradigm and the latter with forms of logic associated with the radical verificationist paradigm. The transcendence paradigm is therefore considered to be premised on humanist assumptions associated with the relatively complete democratisation of science whereby the needs of populations and their concerns (the affected) are essentially wedded to the production of knowledge or knowledge creation. This position holds important implications for power relationships as well as for the convergence of natural and social science in terms of shared values.

Technologically enabled methodologies also enable metaheuristic processes (Bianchi *et al.* 2009; Blum & Roli 2003), which can radically accelerate research productivity. What characterises the radical emergence and verificationist paradigms are their exposure to forces of the democratisation of science with powerful epistemological roots in emergent systems. Some have described this emergent process as the manifestation of collective intelligence.

The emergent literature on collective intelligence is increasingly incorporating burgeoning research on swarm intelligence (Bonabeau & Theraulaz 2000; Callaghan 2016c). Furthermore, theory development around the use of probabilistic algorithms such as artificial immune systems (Farmer, Packard & Perelson 1986) as well as theory related to how the emergent collective intelligence of crowds can solve knowledge-aggregation problems

related to market-price derivation (Fama 1970, 1995). Probabilistic innovation theory, for example, seeks to identify underlying mechanisms and causal channels common across these literatures and focuses these on research acceleration based on maximising connectivity and collaboration between stakeholders. Theoretical developments across these fields suggest that the radical emergence and verificationist paradigms offer a useful differentiation of contemporary paradigms on the basis of ontological and epistemological differences.

With its roots in the functionalist paradigm but with a more radical, change-oriented ontological and epistemological agenda, the radical verificationist paradigm is premised on the emergence of scientific methodologies associated with high-volume data collection, synthesis and analysis as well as the influence that these new processes, which are enabled by rapid technological developments, are having on science. Post-normal science (Funtowicz & Ravetz 1994) theory is based on scepticism of scientific research outputs such as those related to climate change, which have been inconsistent and contradictory. These findings hold serious consequences for stakeholders and suggest the verification and scrutiny of scientific research and its processes by stakeholder populations, or the ‘crowd’. As such, the verificationist paradigm is grounded in ontological assumptions related to objective reality and epistemological assumptions related to knowledge creation enabled by large volumes of data made possible by the engagement of crowds in the research process itself.

■ The usefulness of the new paradigm

The importance of this paradigm is evident in the context of disasters where data required for solving problems are only available after the disaster has unfolded. In such contexts, disaster-management processes have to create ‘maps’ and a newfound ‘memory’ of the unfolding problem, and high volumes of data from crowdsourcing and social media have the potential to contribute not only to knowledge of the situation but used to problem-solving. Such disaster situations offer appropriate examples of verificationist paradigm contexts as large volumes of data are taken to offer real and objective inputs into problem-solving, but given this large volume of inputs, the verification and quality management of knowledge is the dominant challenge faced in these processes. Radical change is enabled in this paradigm as, without the benefit of time, problems need to be solved instantaneously. There are a host of theoretical frameworks which offer insights into how problem-solving can be enabled within this paradigm.

To illustrate explanations, the case of an Ebola outbreak might be useful. Given that Ebola is a highly infectious virus, rush-hour conditions and the global transport system could endanger the lives of millions if it were to spread to a modern subway system. The verificationist paradigm, premised on the technological enablement of large data input, synthesis and analysis, provides an ontological and epistemological space for theory development that is uniquely matched to these kinds of knowledge-creation problems and contexts. Solving the problem of Ebola would then require problem-solving in real time, to provide solutions in hours and days (Callaghan 2016a), not months or years, as perhaps typical of the functionalist

paradigm. The project process would need to be ‘crashed’ as the human costs would be too high to wait for resources to be mobilised and to arrive. Only very high volumes of information and knowledge together with a system of verification, which sifts and identifies useful information and creates knowledge around the problem in real time, could arguably provide for this kind of problem-solving.

Theory focused on this kind of problem-solving is growing. For example, swarm intelligence theory, which relates to the collective behaviour of decentralised, self-organised systems (Kennedy, Eberhart & Shi 2001) offers a host of metaheuristic principles (Blum & Roli 2003) useful for real time problem-solving. These include ant-colony algorithms (Bonabeau & Théraulaz 2000; Garnier, Gautrais & Theraulaz 2007) which can be applied to managing inputs and mapping knowledge to the shortest paths toward a solution. They also include other algorithms such as artificial immune-systems theory (Farmer *et al.* 1986), bat algorithms (Yang 2010), particle swarm optimisation (Kennedy 1999), differential evolution (Storn & Price 1997), genetic algorithms (Dorigo 1993) or glow-worm swarm optimisation (Krishnanand & Ghose 2005).

Derived from principles common to the behaviour of swarms and populations, this body of theory offers the potential for managing large volumes of data in support of real-time problem-solving, particularly in terms of identifying and verifying relatively more or less useful inputs under real-time conditions of problem-solving. Given that solving problems in real time relies on theory related to these mechanisms, which operate probabilistically to manage high volumes of knowledge input, this body of theory is also known as probabilistic innovation theory (Callaghan 2014). The term

probabilistic innovation derives from the notion that, as the volumes of problem-solving input are increased exponentially, the probability of solving a targeted problem also increases. In the Ebola example, researchers (problem solvers) have little choice but to engage the expert crowd immediately and also to engage human problem-solving inputs beyond the expert crowd. The principles of swarm intelligence are already in use across areas like data mining, electronic engineering, robotics and molecular biology (Yesodha & Amudha 2012). These, together with other methods related to high-volume knowledge creation, are considered to fall within the verificationist paradigm as their epistemological characteristics are congruent with this paradigm.

The verificationist paradigm is however not limited to conditions of real-time research but to any context in which high-volume knowledge creation is enabled, where probabilities of radical innovations or change are heightened and where the primary challenge is the verification and selection of useful knowledge in high-volume data and information contexts. Nevertheless, scrutiny and accountability in contexts high in knowledge creation on the basis of the crowd's engagement and transparency are key to these processes. Also, cultural values are considered key to optimistic perspectives on technological change. Values associated with democratic participation, as stressed by critical theory of technology (Feenberg 1991), further provide a normative bedrock on which theory can synthesise natural-science objectivism with the social and ensure science in the service of humanist values.

■ The disruption of power relationships

Whereas the verificationist paradigm exists currently, it is perhaps also necessary to map its trajectory into the future. This paradigm is explained in terms of literature and methodologies which already exist, and the schema offered here is a descriptive one, seeking to offer a useful differentiation between paradigms. However, changes having given rise to the radical verificationist as well as radical emergence paradigms can arguably be extrapolated, and in time, another paradigm will develop, which for the purposes of Chapter 3 is termed the transcendence paradigm.

Arguably, increasing connectivity between individuals and their in-groups and populations will ultimately result in convergence between the verificationist and radical emergence paradigms, the latter related to the development of emergence theory and the former to objective realist applications of high-volume crowd engagement and accountability as well as ethical and stakeholder checks on both the validity of processes as well as the extent to which the needs of populations are met by research. The ultimate convergence of the radical emergence and verificationist paradigms will perhaps take the form of boundary collapse as further radical change is enabled which no longer separates emergent properties from objective verification. The differentiation of paradigms in this way also reflects the dynamics of power. Whereas the functionalist paradigm exists perhaps as the paradigm with the least normative assumptions, the radical emergence and radical verificationist paradigms represent an inversion of power relationships in societies as the monopoly power of capital is crowded out by the power of knowledge. The monopoly power of

industry premised on the secrecy of R&D and innovation is likewise crowded out by the power of populations as they engage with both the research process itself and its ethical scrutiny.

According to Foucault (1982:791–792), however, a society without power relations ‘can only be an abstraction’, and the analysis of power relationships in a given society, their historical formation, their source of strength (or fragility) and conditions necessary to ‘transform some or to abolish others’ is therefore necessary. The transcendence paradigm is taken ultimately to reflect to its fullest extent the democratisation of science as considered by critical theory of technology (Feenberg 1991) and therefore an alignment between power and the needs of populations, which needs can be supported by science. Arguably the power of markets can ultimately be balanced by ethical scrutiny and the power of the ‘crowd’ to demand that its most important needs be met. Given climate change and other ecological threats, the current model of scientific research (Funtowicz & Ravetz 1994) requires maximised transparency, and the transcendence paradigm is premised on an epistemological paradigm of transparency and accountability in knowledge creation where the objectives of probabilistic innovation theory have ultimately been attained or where research processes have essentially provided real-time problem-solving, and many resource problems are essentially a thing of the past. However, critical theory is considered an important guide to the normative convergence of the radical emergence and radical verificationist paradigms as attainment of the transcendence paradigm is considered to be the triumph of humanist values over deterministic ideologies.

The transcendence paradigm stands in contrast to the emergence of the paradigm that Malthus predicted. Malthus (1798) predicted the emergence of a paradigm of population growth constrained by inexorable physical laws where prescribed bounds of nature constrain human advances:

Through the animal and vegetable kingdoms, nature has scattered the seeds of life abroad with the most profuse and liberal hand. She has been comparatively sparing in the room and the nourishment necessary to rear them. The germs of existence contained in this spot of earth, with ample food, and ample room to expand in, would fill millions of worlds in the course of a few thousand years. Necessity, that imperious all pervading law of nature, restrains them within the prescribed bounds. The race of plants, and the race of animals shrink under this great restrictive law. And the race of man cannot, by any efforts of reason, escape from it. Among plants and animals its effects are waste of seed, sickness, and premature death. Among mankind, misery and vice. The former, misery, is an absolutely necessary consequence of it. Vice is a highly probable consequence, and we therefore see it abundantly prevail; but it ought not, perhaps, to be called an absolutely necessary consequence. The ordeal of virtue is to resist all temptation to evil. (p. 1)

Whereas Malthus (1798) claims an impervious all-pervading law of growth in nature constrains regarding human (and perhaps all) organisms, neither human agency nor trajectories of human scientific endeavour are considered. Commensurate with the advent of industrialisation, changes in work drove changes in societal structure and also academic endeavour (Callaghan 2016c). Arguably, a new paradigm in values emerged subsequent to industrialisation, including an awareness of power relationships associated with the dominance of capital in industrial production and its power over more homogenous and relatively powerless labour. Burrell and Morgan's (1979) radical structuralist paradigm

reflects these changes, but it does not capture the second order change, or power-relationship disruption, in societies and organisations, which are a result of first-order, emergent socio-technological change.

The radical structuralist paradigm seeks to advocate a sociology of radical change from a objectivist perspective, sharing similarities with functionalists but with a commitment to 'radical change, emancipation, and potentiality, in an analysis which emphasises structural conflict, modes of domination, contradiction and deprivation' (Burrell & Morgan 1979:34). Arguably, this perspective, via the verificationist paradigm, can be extended to consider a social and research world in which radically increased knowledge and connectivity have increased the productivity of knowledge work and in which the knowledge worker and his or her knowledge rivals the power of capital, or the firm.

The radical structuralist paradigm approaches issues from a standpoint that tends to be 'realist, positivist, determinist and nomothetic', and in contrast to the focus on consciousness by the radical humanists, the focus of radical structuralists is 'structural relationships within a realist social world' (Burrell & Morgan 1979:34). The radical verificationist paradigm is taken to extend these assumptions whilst taking into account the radically enhanced capabilities of knowledge associated with emergent technology and its social and research effects. What differentiates the radical emergence and radical verificationist paradigms from Burrell and Morgan's (1979) other four paradigms are certain causal mechanisms, which are represented in Figure 4. In order to argue

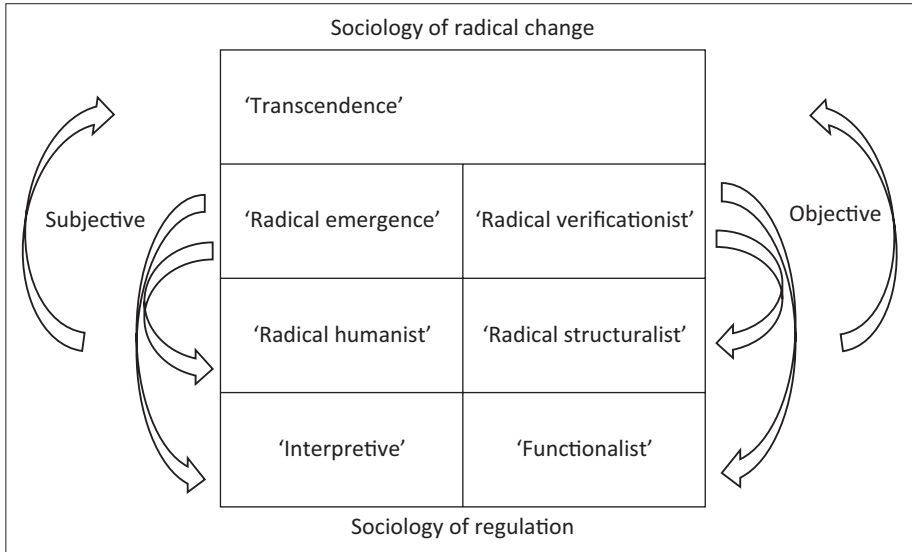


FIGURE 3: Contemporary and future paradigm differentiation.

for the extended schema (Figure 3), it is considered necessary to identify certain causal relationships which arguably give rise to the additional paradigms.

The radical structuralist paradigm, in particular, as well as the other three paradigms offered by Burrell and Morgan (1979) are also taken to not be independent of temporal legacy effects. For example, legacy effects can be associated with the formation of this schema on the back of the need for a normative paradigm to address the inhumanity associated with industrialisation and the powerlessness of the working classes in the face of monopoly capital in a period when capital is dominant. Burrell and Morgan’s (1979) schema is therefore largely premised on ontological and epistemological differentiations prior to the disruption of social life and academic

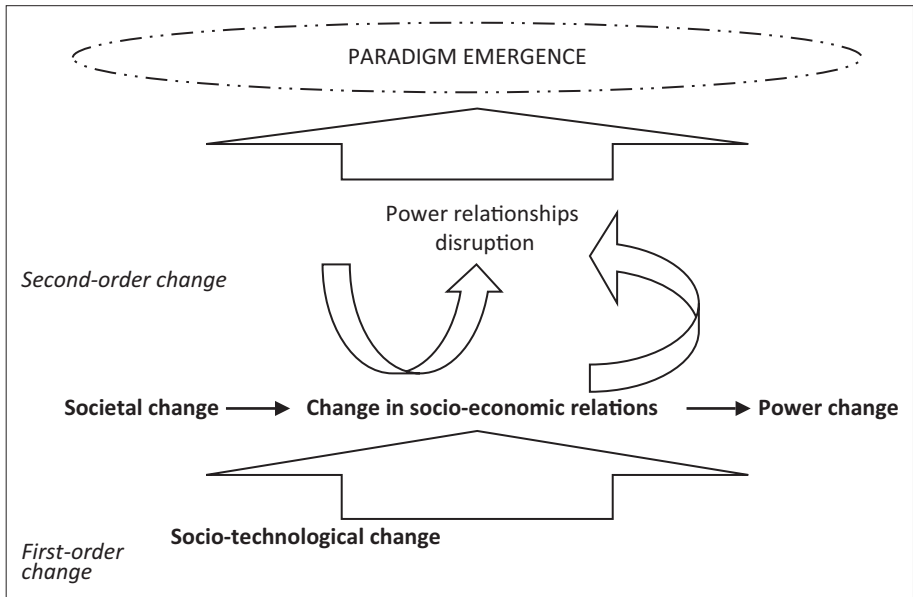


FIGURE 4: The causal structure of post-industrial paradigmatic change.

research by emergent technologies and a new era in technologically enabled connectivity even if these effects have yet to fully work their way through academic systems.

Contemporary forces shaping the emergence of a paradigm are illustrated in Figure 3, which offers first-order socio-technological change as a causal driver of second-order change in the form of the disruption to power relationships, which is due primarily to the power of technology to leverage knowledge as a factor of production. These causal mechanisms, or channels, are considered to underpin both radical emergence and radical verificationist paradigms, and these are termed post-industrialist paradigms, given that their effects relate to radical change enabled by new technology. As stressed previously, although many have considered technological change to

be threatening to emancipatory human values, following Feenberg's (1991) critical theory of technology tenets, this pessimism is taken to be unwarranted on condition that broader participation in technological choices is enabled. Ironically, it may be the technological developments themselves which can increase the connectivity through which these new paradigms of democratisation, enhanced transparency and ethical accountability are made possible. Arguably, much has happened since Burrell and Morgan's (1979) work, and subsequent changes have provided more insight into their schema and the aspects that need to be incorporated in order to bring it up to date with contemporary ontological and epistemological implications as well as future projected change.

■ Structuralist dynamics

Work in the radical structuralist paradigm has typically shared a focus on the 'deep-seated internal contradictions' in societies and work contexts as well as the structure and analysis of power relationships. Its focus was also on a shared 'view that contemporary society is characterised by fundamental conflicts which generate radical change through political and economic crises', which requires humankind's emancipation from the social structures within which they live (Burrell & Morgan 1979:34). The development of the radical structuralist paradigm owes its development primarily to Marx and also to a lesser extent to Weber, in particular the synthesis of their work described as 'conflict theory'. It also owes its development to those inspired by Marx, including Lenin, Plekhanov, Buhharin and other Marxist sociologists of the New Left (Burrell & Morgan 1979). This body of theory, however, which may comprise much of the

bedrock of social-science thinking, has not adequately or sufficiently integrated the effects of the knowledge revolution as it has done with those of the industrial revolution. The verificationist paradigm seeks to offer this additional perspective. The transcendence paradigm can further be derived through the logical extrapolation of conditions associated with the radical emergence and radical verificationist paradigms with a particular reference to socio-technological changes and a trajectory of increasing connectivity. However, utopian visions of a fuller humanist democratisation of workspaces and societies require circumspection, and critical theory is considered an important lens through which to envision these changes as these changes extend a normative humanist perspective and locate changes in values in relation to temporal change and the industrial and knowledge-production revolutions.

At the intersection of sociology of regulation and subjectivist perspectives in Burrell and Morgan's schema (1979:28) is the interpretivist paradigm, concerned with understanding the world as it is, or at the level of subjective experience, from the frame of reference of the participant, tending to be 'nominalist, anti-positivist, voluntarist and ideographic' (Burrell & Morgan 1979:28). The radical emergence paradigm is taken to build on this, but it integrates effects related to increased connectivity as well as subjective characteristics of crowds, or groups of people. According to the interpretivist paradigm, social reality, if recognised as existing outside of individual consciousness, is regarded 'as being little more than a network of assumptions and intersubjectively shared meanings.' Key to the academic project is a quest for the

‘fundamental meanings which underlie social life’, drawing from the German idealist tradition of social thought and the work of Kant which ‘emphasises the essentially spiritual nature of the social world’ (Burrell & Morgan 1979:28, 31).

Neo-idealist thought sought to re-invigorate the idealist tradition, and Weber and Husserl are examples of those who develop this thinking as a basis for social analysis (Burrell & Morgan 1979). Steffy and Grimes (1986) make the following observation in this regard:

[It] should be noted, however, that the interpretive position may be as suspect as the empirical-analytic position, both in terms of its criticisms of the natural science approach and in the adequacy of its own methods. (p. 323)

The radical emergence paradigm is premised on the value of subjectivity and meaning in human life, and despite the fact that capturing the technological effects of connectivity is also associated with the radical verificationist paradigm, it is quintessentially humanist. Its emergent epistemologies, which are based on the increasing engagement and harnessing of population inputs, are expected also (as in the case of the radical verificationist paradigm) to be associated with increasing accountability to society. The racial emergence paradigm therefore extends the normative perspectives of radical humanism.

■ Humanist effects

The radical humanist paradigm seeks to develop a sociology of radical change from a subjectivist perspective. As such, it is aimed

at ‘overthrowing or transcending the limitations of existing social arrangements’, taking consciousness to be ‘dominated by the ideological superstructures’ with which people interact and which ‘drive a cognitive wedge’ between individuals and their true consciousness, a wedge of ‘alienation’ or ‘false consciousness’ which prevents ‘true human fulfilment’ (Burrell & Morgan 1979:32). The radical emergence paradigm re-envisioning human work and the research process itself on the basis of emergent re-evaluations of its very assumptions but with the further assumption that the collective intelligence of populations which arises from increased connectivity will ultimately drive out the cognitive wedge between individuals and true consciousness and ultimately enable the integration of humanist values with working life and societal functioning. However, due to increasing connectivity and broader participation in technological change (Feenberg 1991) on the basis of humanist values, the radical verificationist and radical emergence paradigms are taken to ultimately converge and produce transcendence conditions. Transcendence then produces conditions under which the epistemological circle is closed, and human life is lived to maximise human potential. Connectivity ultimately enables shared consensus around humanist values and science itself. This ultimately predicts convergence between normative values and radically accelerated research productivity in service of human needs.

The concern of theorising in the radical humanist paradigm is typically a release from the constraints that existing social arrangements place on human development. It therefore entails a

concern with critique of the status quo, a view of society as ‘anti-human’ and arguments concerning the need for humans to transcend existing social patterns to realise their full potential (Burrell & Morgan 1979:32). Radical humanists therefore typically concern themselves with radical change, modes of domination, emancipation, deprivation and potentiality. They are less concerned with notions of structural conflict and contradiction (which are associated with the radical structuralist paradigm), instead focusing on ideas drawing from notions of human consciousness and German idealist thought typically associated with Kant, Hegel, the phenomenological perspectives of Husserl as well as the work of Frankfurt School theorists like Habermas and Marcuse, amongst others (Burrell & Morgan 1979). The radical emergence paradigm is premised on changes in societal and organisational power relationships and an increasing exposure of all practices and conditions to the crowd, which is due to an increasing emergent connectivity that is coupled to maximised transparency that is enabled by rapidly developing technology. Ultimately, the transcendence paradigm suggests that this trajectory of increasing connectivity may result in the transcendence of values, or a social and scientific world in which humanist ideas are widely shared and provide the rationale for human existence and individual autonomy, or a world in which open and transparent contestation of ideas has enabled widely shared consensus.

What those working within the radical humanist paradigm seem to share is a ‘common concern for the release of

consciousness and experience from domination by various aspects of the ideological superstructure of the social world within which men live out their lives', therefore with the goal of changing the social world through a 'change in modes of cognition and consciousness' (Burrell & Morgan 1979:33). The radical humanist perspective of organisations has however also developed into anti-organisation theory. Burrell and Morgan (1979) explain this further as follows:

The radical humanist paradigm in essence is based upon an inversion of the assumptions which define the functionalist paradigm. It should be no surprise, therefore, that anti-organisation theory inverts the problematic which defines organisation theory on almost every count. (p. 33)

In contrast to perspectives which define themselves as in opposition to other perspectives, the radical emergence paradigm seeks to break with this notion and instead stresses the emergent nature of subjective engagement with the superstructure of the social world and how it is shaped by economic relationships and imperatives. Given humanist re-engagement, or the reversal of industrialised alienation associated with industrial work, and the emergence of knowledge work and the power of the specialist knowledge worker in a context of rapid technological change (Callaghan 2016b), emergent forms of living are considered by the radical emergence paradigm, but its normative assumptions draw on critical theory and extend the radical humanist perspectives. Novel forms of emergent oppression can result from the power of knowledge, and the emergence of new elites in organisational and societal contexts may require critical-theory leadership in order to balance these

new power relationships, using increased transparency and scrutiny of the crowd.

■ Paradigm incommensurability

Central to the ontological and epistemological assumptions of both the radical emergence and radical verificationist paradigms is therefore the acknowledgement of social and research changes enabled by emergent technology (Feenberg 1991) and social changes related to these effects. These include acknowledging the increasing global social connectivity, predicted to ultimately converge and lead to the emergence of the transcendence paradigm. These ideas, however, contest Burrell and Morgan's (1979) notions of paradigm incommensurability and place their analysis in the era of post-industrialised social-science theory which has not sufficiently incorporated the knowledge-revolution effects of power disruption and social connectivity. Probabilistic innovation theory posits a world of research breakthroughs where radical improvements in the collection, synthesis and analysis of data result from exponentially increased engagement with socially important research problems, and critical theory is key to steward these processes so as to avoid threatening the side effects of technological advancements.

With respect to technological advances Freenberg (2005) asks the following, from the perspective of critical theory of technology:

What can be done to reverse the tide [*threatening side effects of technological advances*]? Only the democratisation of technology can help ... The spread of knowledge by itself is not enough to accomplish this.

For knowledge to be taken seriously, the range of interests represented by the actor must be enlarged so as to make it more difficult to offload feedback from the object onto disempowered groups. But only a democratically constituted alliance of actors, embracing those very groups, is sufficiently exposed to the consequences of its own actions to resist harmful projects and designs at the outset. Such a broadly constituted democratic technical alliance would take into account destructive effects of technology on the natural environment as well as on human beings. (p. 55)

Arguably, paradigm incommensurability can therefore be dangerous in a world of rapidly developing technological capabilities with science at the centre of these developments. Other attempts have been made to reconcile the notion of paradigm incommensurability with a world that cannot be 'fixed' into firewalled differentiations. These attempts have perhaps reduced to agreements the different paradigmatic perspectives that can be useful heuristic devices that are helpful in theory development. In contrast to Burrell and Morgan's (1979) rigid arguments for the incommensurability of paradigms, Lewis and Grimes (1999) have, for example, suggested a multi-paradigm approach to complex and paradoxical phenomena in order to harness disparate theoretical perspectives in support of meta-triangulation in theory building, an approach followed by a host of theorists (Bradshaw-Camball & Murray 1991; Grimes & Rood 1995; Hassard 1991; Schultz & Hatch 1996; Willmott 1993b; Weaver & Gioia 1994; Ybema 1996). Multi-paradigm theorists have since utilised paradigms as heuristics to interrogate phenomena, which is helpful as it offers different perspectives of what is under study. Multiple ontological and epistemological

perspectives are helpful as they disrupt the hegemony of ideologies, or totalitarian agendas, whether of the corporate culturism (Willmott 1993a) type or of societal versions.

The new paradigms described here relate directly to the inversion of power relationships as forces of democratic engagement disrupt the monopolies of firms over problem-solving, and new forms of technological connectivity empower citizen science and previously powerless stakeholders to wield greater power and to hold decision makers accountable across contexts.

■ Conclusion

As a CMS project which drew its inspiration from the field of management, from the challenges facing South Africa and from the need for theory to address these challenges, Chapter 3 sought a synthesis of seminal and contemporary literature in order to supplement Burrell and Morgan's (1979) schema of ontological and epistemological assumptions underlying knowledge creation in the social sciences. By so doing, Chapter 3 sought to contribute to the CMS literature. Although the discussions in Chapter 3 have global relevance, fundamental inequalities associated with the accelerating digital divide between the physical and metaphorical Global North and South were taken to have the potential to imperil the emancipatory project. Conditions of organisational life in South Africa reflect these challenges acutely. Multinational firms, driven and embodied by management theory, span this digital and geographic divide,

drawing both profits and resources across it, which can contribute to increasing inequality along what seem to be geopolitical fault lines. In contexts such as that of South Africa, populations are particularly vulnerable to increasing power inequalities associated with the digital divide. Chapter 3 therefore aspired to provide a useful analysis of how technological change and the management realities acutely experienced in South African organisations, society and its academe could be accommodated by building on Burrell and Morgan's (1979) theoretical schema. Further, acknowledging dystopian predictions, principles from critical theory of technology were also incorporated in order to argue that only with a grounding in CMS values could management theory ultimately transcend digital divisiveness and steward technological progress towards an ultimate state of transcendence.

The core ideas offered in Chapter 3 bear repeating, and a final summation is now provided. In contrast to pessimistic notions of incommensurability between humanistic values and technological advancement, this research took as its stance the critical theory of technology (Feenberg 1991), which argues that broader democratic participation in technological choices anchored by humanist values and longstanding emancipatory agendas (Alvesson & Willmott 2002) is a core feature of the rapidly developing technological milieu within which contemporary organisations are nested. Drawing from a host of different streams in the literature, the objective of Chapter 3 was ultimately to build upon Burrell and Morgan's (1979) schema of paradigmatic differentiation in order to offer a heuristic argument of paradigm

differentiation premised on technological advances and their overarching societal effects as well as their epistemological and ontological implications. However, at the heart of arguments made in Chapter 3 was the notion that theory development around technological progress in human societies may need to incorporate a critical theory lens in order to steward progress in support of human values and human needs. Critical theory of technology was considered an important perspective in that it incorporates the potential for the democratisation of science to hold research to account. It is hoped that the argument offered here, which sought to incorporate certain contemporary epistemological and ontological realities, may be useful as a heuristic to provoke ideas and theory relevant to management as a field. Certain limitations, however, are acknowledged, not least of which is the fact that attempting any differentiation of the assumptions of different academic fields is difficult as one has to offer an overarching logic which is compelling enough to make sense of the tremendous heterogeneity in academic ontological and epistemological perspectives. The rationale applied here was premised on qualitatively differentiating on the basis of the ontological and epistemological forces predicted by a wide body of theory since the Burrell and Morgan era – and not only contemporary change but extrapolated changes in times to come. This differentiation is therefore theory driven, but it remains to be seen to which the extent the predictions of these bodies of theory are borne out. Further research is recommended in the spirit of provocative theory development to extend theoretical horizons related to paradigm differentiation as theory

development needs to cover the ground before theory testing can follow.

■ Chapter 3: Summary

Burrell and Morgan's paradigm differentiation offered what has arguably been a useful heuristic for certain management-theory development, notwithstanding controversy associated with issues of paradigm commensurability. With reference to challenges faced in the development of South African management theory and practice, Chapter 3 seeks to contribute to the critical management studies literature by locating Burrell and Morgan's schema in relation to contemporary changes in societies and organisations as well as in relation to ontological and epistemological changes associated with emergent technology. Emergent technology is considered here to represent first-order change, which in turn are taken to drive changes in societal and organisational power relationships, or second-order change. Drawing from the critical theory of technology's notion that technological progress is not antithetical to emancipatory values, the role of the democratisation of science movements as mechanisms of transparency and accountability is considered. Further paradigms are offered to complement the Burrell and Morgan schema and update it to encompass contemporary ontological and epistemological realities. It is hoped that, under conditions of the digital divide between Global North and South, firms which currently draw profits and resources across this unequal divide might ultimately draw insight from management theory which explicitly incorporates ontological and epistemological principles as well as values premised on critical

theory. Chapter 3 seeks to provide this synthesis and argues for a schema building on Burrell and Morgan's which predicts a positive role for technological advancement and ultimately an emancipatory convergence of values under a more equitable and inclusive paradigm of knowledge creation.

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