

CRITICAL REALISM IN INFORMATION SYSTEMS RESEARCH

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Introduction

There has been growing interest in a range of disciplines (Ackroyd and Fleetwood 2000; Danermark et al. 2002; Fleetwood 1999; Fleetwood and Ackroyd 2004), not least information systems (Dobson 2001; Longshore Smith 2006; Mingers 2004b; Mutch 2010b; Volkoff et al. 2007; Wynn and Williams 2012) in ideas derived from the philosophical tradition of critical realism. Critical realism offers exciting prospects in shifting attention toward the real problems that we face and their underlying causes, and away from a focus on data and methods of analysis. As such, it offers a robust framework for the use of a variety of methods in order to gain a better understanding of meaning and significance of information systems in the contemporary world.

Although the term *critical realism* has been used in a number of different traditions, we are primarily concerned with that developed from the foundational work of Roy Bhaskar in the philosophy of science, later extended in the social arena by authors such as Archer and Sayer (Archer et al. 1998; Bhaskar 1978, 1979; Mingers 2004b; Sayer 2000). In this tradition, the benefits of CR are seen as:

- CR defends a strongly realist ontology that there is an existing, causally efficacious, world independent of our knowledge. It defends this against both classical posi-

ivism that would reduce the world to that which can be empirically observed and measured, and the various forms of constructivism that would reduce the world to our human knowledge of it. Hence it is *realist*.

- CR recognizes that our access to this world is in fact limited and always mediated by our perceptual and theoretical lenses. It accepts *epistemic* relativity (that knowledge is always local and historical), but not *judgemental* relativity (that all viewpoints must be equally valid). Hence it is *critical* in a Kantian sense.
- CR accepts the existence of different types of objects of knowledge—physical, social, and conceptual—which have different ontological and epistemological characteristics. They therefore require a range of different research methods and methodologies to access them. Since a particular object of research may well have different characteristics, it is likely that a mixed-method research strategy (i.e., a variety of methods in the same research study) will be necessary and CR supports this.

In this introduction, we will first introduce the basic concepts of critical realism as a philosophy of science, and then discuss its extensions into the social realm, before finally introducing the excellent papers that are included in this issue.

1 Critical Realism: Basic Concepts

2
3 Critical realism (CR) developed initially by way of arguments
4 against both the empiricist view of science as embodied in
5 positivism (Bhaskar 1978), and the idealist view of (social)
6 science as embodied in constructivism or interpretivism
7 (Bhaskar 1979). Later, it also engaged with postmodernism
8 and other irrealist viewpoints (Bhaskar 1986, 1989). Through
9 this immanent critique of alternative positions it developed its
10 own approach, which was most fully articulated within a
11 dialectical perspective (Bhaskar 1993).

12
13 The starting point was to argue, specifically against empiri-
14 cism and positivism, that science is not just about recording
15 constant conjunctions of observable events, as the Humean
16 view of causation embedded in positivism would have it, but
17 is about objects, entities and structures that exist (even though
18 perhaps unobservable) and generate the events the we
19 observe. The form of the argument is a *transcendental* one.
20 That is, it begins with some accepted phenomenon and asks
21 what the world must be like for this to occur. In this case,
22 what is accepted by both empiricism and many forms of
23 idealism is that we do have perceptual experience of the
24 world, and that science is carried out through experimental
25 activity in which scientists bring about particular outcomes.
26 The argument is that neither empiricism nor idealism can
27 successfully explain these occurrences and that they necessi-
28 tate some form of realist ontology. Essentially, there must be
29 some *intransitive* domain of object and events, independent of
30 our perceptions of them, which can indeed become objects of
31 our knowledge.

32
33 The argument can be expressed in terms of the mistake that
34 both empiricism and strong forms of idealism or construc-
35 tivism make—that is, the *epistemic fallacy*. The essential
36 mistake is in reducing the ontological domain of existence to
37 the epistemological domain of knowledge: statements about
38 *being* are translated into ones about *our (human) knowledge*
39 or *experience* of being. For the empiricist, that which cannot
40 be perceived cannot be. For the conventionalist, limitations
41 of our *knowledge* of being are taken to be limitations on being
42 itself. In contrast, the realist asserts the primacy of ontology:
43 the world would exist whether or not humans did. The empi-
44 ricist identification of causal laws with empirical regularities
45 thus involves a double reduction—that of laws to events and
46 events to experiences of those events.

47
48 But what is it that causes or generates events given both the
49 regularities that can be established in experiments, and the
50 common absence of regularity outside? Equally, how can we
51 assure ourselves that event regularities are based on necessary
52 connections rather than simply coincidence? The answer is

that there must be enduring entities, physical (e.g., atoms or organisms), social (e.g., the market or the family) or conceptual (e.g., categories or ideas), observable or not, that have *powers* or *tendencies* to act in particular ways. It is the continual operation and interaction of these *mechanisms* that generates the flux of events. Entities or mechanisms may have powers without exercising them at a particular time (it may need an experiment or particular context to trigger them), and powers may be exercised but not become manifest in events because of the countervailing operation of some other generative mechanism. The heart of this argument is that of a *causal* criterion for existence rather than a perceptual one. In other words, for an empiricist, only that which can be perceived can exist, whereas for a realist, having a causal effect on the world implies existence, regardless of perceptibility. This view of causal mechanisms is at the heart of critical realism and, independently, is also becoming dominant within mainstream philosophy of science (Illari and Williamson 2011).

For Bhaskar, reality is both *intransitive* (existing independently of humans) and *stratified* (Archer 1998, p. 41). The first form of stratification is between mechanisms, the events that they generate, and the subset of events that are actually experienced. These are known as the domains of the *real*, the *actual*, and the *empirical*. The real contains mechanisms, events, and experiences (i.e., the whole of reality); the actual consists of events that do (or perhaps do not) occur and includes the empirical, those events that are observed or experienced. These distinctions arise from the transcendental arguments above, namely, that we should not reduce all events to only those that are observed, and we should not reduce enduring causal mechanisms to events.

A second form of stratification is within the realm of objects themselves (Archer 1998, p. 66), where causal powers at one level (e.g., chemical reactions) can be seen as generated by those of a lower level (atomic valency). One strata is emergent from another (what Bhaskar terms “emergent powers materialism”). The picture of the real is thus one of a complex interaction between dynamic, open, stratified systems, both material and non-material, where particular structures give rise to certain causal powers, tendencies, or ways of acting, often called by Bhaskar (1979, p. 170) “generative mechanisms.” The interaction of these generative mechanisms, where one often counterbalances another, generates the presence or absence of actual events.

Having established the *intransitive* objects of knowledge, we must recognize that the production of knowledge is very much the work of humans, and occurs in what we could call the *transitive* dimension (Bhaskar 1989, p. 18). Acknowledging

1 the work of sociologists, the practice of science is a social
 2 process drawing on existing theories, results, anomalies, and
 3 conjectures (the transitive objects of knowledge) to generate
 4 improved knowledge of science's intransitive objects. This
 5 distinction allows us to admit the *epistemic* relativity of
 6 science, the fact that knowledge is always historically and
 7 socially located, without losing the ontological dimension.
 8 We should also note that such epistemic relativity does not
 9 imply a corresponding *judgmental* relativity (i.e., that all
 10 views are equally valid and that there are no rational grounds
 11 for choosing between them).

12
 13 We can now describe the critical realist scientific method-
 14 ology, what Bhaskar calls *retroduction* (this is essentially the
 15 same as "abduction," as developed by C. S. Peirce (1931–
 16 1958, ss. 5.145) in contrast to induction and deduction). We
 17 take some unexplained phenomenon that is of interest to us
 18 and propose hypothetical mechanisms that, *if they existed*,
 19 would generate or cause that which is to be explained. So, we
 20 move from experiences in the empirical domain to possible
 21 structures or mechanisms in the real domain. This is the
 22 essential methodological step in CR studies: to move from
 23 descriptions of empirical events or regularities to potential
 24 causal mechanisms, of a variety of kinds, some of which may
 25 be nonphysical and nonobservable, the interaction of which
 26 could potentially have generated the events. Such hypotheses
 27 do not, of course, prove that the mechanisms do in fact exist.
 28 And, we may have competing explanations proposed, so there
 29 is then a further stage within the methodology in which more
 30 research has to be carried out to try and eliminate some of the
 31 explanations and perhaps support others.

32
 33 One could ask: How do we *know* that such hypothetical
 34 mechanisms actually do exist rather than being merely
 35 interesting ideas? At one level, the answer is that we can
 36 never know for certain, since CR accepts that knowledge is
 37 always fallible. More practically, however, the intransitivity
 38 of real structures means that they will always have the poten-
 39 tial for effects that go beyond us (i.e., are out of our control),
 40 and the approach means that we should aim to eliminate
 41 alternative explanations by testing in some way for their
 42 potential effects. This methodology is known as DREI:
 43 describe the events of interest; retroduce explanatory mech-
 44 anisms; eliminate false hypotheses; identify the correct
 45 mechanisms. In terms of research methods, CR is eclectic.
 46 Because the underlying structures may have a variety of
 47 forms—material, social, and cognitive—we need a variety of
 48 epistemological methods to access them. Traditionally, CR
 49 has been somewhat hostile to statistical methods, especially
 50 in social science, on the grounds that they assume a degree of
 51 closure that is seldom present (Olsen and Morgan 2005) but
 52 there is now a greater acceptance of their value (Mingers

2006; Pratschke 2003). CR also licenses and underpins the
 idea of combining different research methods, what is called
 mixed-method research or multimethodology (Mingers 2001;
 Venkatesh et al. 2013). Wynn and Williams (2012) have
 produced a valuable description of principles for critical
 realist case study research.

We have so far discussed the ontological commitments of CR,
 and we now move to a more epistemological argument: that
 social science is essentially similar to natural science in its
 realist character, albeit with modifications to reflect the par-
 ticular nature of the social world. We can begin by asking
 what would rule out a realist approach to social science. The
 answer is presumably that there are no intransitive objects for
 social science to investigate. Such an argument could come
 from the extreme constructivists (or superidealists, as Bhaskar
 calls them) who would also apply it to the natural world, or
 from those such as constructivists or individualists who would
 argue for the distinctive nature of social phenomena as being
 intrinsically meaningful and not existing independently of the
 mental processes of social actors.

Bhaskar's (1979, Ch. 2) primary argument is against method-
 ological individualists who maintain that all explanations can
 be couched in terms of an individual's beliefs and actions.
 The first refutation concerns emergent properties: there are
 attributes that can be applied to people that concern physical
 features, height, weight; there are attributes that we share with
 other animals such as pain or hunger; but there are many
 attributes, essentially human ones, that are unavoidably social,
 for example *bachelor*, *banker*, or *nun*. These are only intel-
 ligible within the context of a social institution or practice.
 The second argument is that many activities we undertake,
 most obviously, perhaps, language, must already exist and be
 available for people to learn and then use. As Wittgenstein
 (1958) argued, there can be no such thing as a private lan-
 guage; every time anyone has a conversation, uses a credit
 card, or waits for a train, they are assuming the existence of
 a structured, intransitive domain of resources, concepts, prac-
 tices, and relationships. The successful occurrence of social
 activities warrants the existence of causally efficacious,
 although unobservable, social structures.

Bhaskar does accept, however, that social phenomena are
 inherently different from material phenomena and that this
 does put limits on the nature of social science (see Bhaskar
 1979). Social science is, however, still driven by the exist-
 ence of an intransitive domain of generative mechanisms; a
 recognition of the epistemic (but not judgmental) relativity of
 knowledge; and a retroductive methodology that explains
 events by hypothesizing causal mechanisms.

1 Social Theory Within Critical Realism ■

2
3 Building on these conceptual foundations, a number of ap-
4 proaches to the social world have been developed. Prominent
5 among them, and figuring in contributions to this special
6 issue, are the work of Margaret Archer (1995) in sociology
7 and Tony Lawson (1997) in economics. It is important to
8 note that both started from a critical engagement with existing
9 perspectives in their respective domains, an engagement
10 which saw them turn to critical realism in its role as an
11 “under-laborer” to help them develop their own approaches.
12 This is important because it emphasizes that critical realism
13 both requires and facilitates detailed engagement with other
14 traditions, as illustrated by the connections that Allen et al.
15 (2013) draw with activity theory in their contribution. It also
16 points to on-going debate between those that share the basic
17 ontological commitments outlined in the previous section.
18 Bhaskar (1979) himself developed an application of his ideas
19 to the social world which he termed the transformational
20 model of social action (TMSA). It is worth noting that
21 aspects of this inform Giddens’ (1984) arguments in devel-
22 oping his widely influential structuration theory (Mingers
23 2004a). The TMSA has been broadly endorsed by Lawson
24 and others, such as Faulkner and Runde (2013) who use it as
25 a backdrop to their conceptual explorations of materiality in
26 this issue. By contrast, Archer has been more critical and has
27 developed her approach over an extensive series of books
28 (Archer 1988, 1995, 2000, 2003, 2007, 2012). As it is devel-
29 oped at such length and is employed by a number of contrib-
30 utors to this special issue, Archer’s approach is worth briefly
31 exploring a little further.

32
33 Archer’s work is closely associated with her contribution to
34 the structure–agency debate. The particular relevance to the
35 IS domain is that she develops her ideas through an extensive
36 critique of the work of Giddens, whose structuration theory
37 has been widely used as a guiding theory, notably in the work
38 of Orlikowski (2000). Archer suggest that Giddens’ formula-
39 tion of structures as “memory traces” conflates agency and
40 structure and does not allow for a consideration of their devel-
41 opment and relationship over time. We can trace the contin-
42 uing influence of this tendency in the ideas of socio-
43 materiality, where the social and the material are seen as
44 constitutively entangled (Orlikowski and Scott 2008). By
45 contrast, Archer’s ideas, with their notion of “analytical
46 dualism,” enable us to refresh traditions such as socio-
47 technical systems that examine the interplay between the
48 social and the material over time (Leonardi and Barley 2008).
49 Archer’s work, however, is about more than the formulation
50 of agency as taking place always in conditions which predate
51 action and which shape the opportunities available. Her more

recent work has focused on the nature of reflexivity. Using
the notion of the “internal conversation,” by which humans
monitor the on-going status of their central concerns, she
argues that all humans are reflexive, but that they deploy
different modes of reflexivity. Such modes, she argues, are
linked to particular combinations of structural and cultural
moments, both in time and space. Dobson et al. (2013) use
these ideas productively to look at the fate of ICT develop-
ments in rural Australia. There is much to be done to develop
these ideas, development which will happen as the ideas are
put into practice, but Archer’s work provides a rich seam of
concepts which could help us better understand questions of
IS use.

Such use is not without its challenges. A key injunction from
Archer is that we need to develop “analytical narratives” in
which the interplay of agency, structure and culture is ex-
amined over time. Njihia and Merali (2013) essay such a
narrative in their account of ICT4D in Kenya, but this is a
difficult task within the confines of a journal article. Archer’s
(1979) own early empirical work on the development of
educational systems covers a 300 year period in some 800
pages! That points to another challenge, in that her ideas are
developed on the terrain of social theory, covering often large
sweeps of time. Relating this to the examination of contem-
porary organizations and their use of IS can seem daunting.
Archer has relatively little to say about either, but theorists
such as Elder-Vass (2008) in the same tradition and those
working in organization theory are starting to translate the
ideas to a more usable scale (Ackroyd and Fleetwood 2000).
By the same token, the work of both Lawson and Archer pro-
ceeds by way of the critique of existing positions and the
development of responses at the level of general and abstract
theory. This often seems distant from the concerns of those
examining more situated action and a key challenge is
showing how these ideas can be applied to aid concrete
research. This special issue is one step in progressing this
agenda, and we reflect on some of the methodological
challenges that this posed in the next section. However,
before doing this, it is worth outlining briefly some oppor-
tunities for taking some of the ideas thrown out by Archer
forward.

In arguing for the centrality of *The Reflexive Imperative in
Late Modernity*, Archer suggests that

From the 1980s onwards, the synergy between
multi-national production and information tech-
nology resulted in unprecedented morphogenesis,
whose generative mechanism is for variety to spawn
more variety (2012, p. 64).

1 This is surely a set of claims which are the central terrain of
 2 scholars in our field. One way in which we can contribute to
 3 this debate is by testing the strength of such claims, which rest
 4 on a limited engagement with the detail of organizational
 5 research. One of the interesting tensions is that Archer's
 6 argument for the centrality of reflexivity in contemporary
 7 conditions tends to downplay both routine action and tacit
 8 forms of knowing, whereas a considerable volume of work on
 9 organizations and IS stresses the centrality of both (Mutch
 10 2010a). Archer's claims might cause us to reassess these
 11 positions. It also might suggest the need for more focus on
 12 how the systems we study have changed the ways in which
 13 actors within organizations use information. This is chal-
 14 lenging, because it falls at the intersection of a number of
 15 disciplinary domains. It also suggests that more of our work
 16 ought to be on the use of systems over time, as opposed to
 17 looking at how systems are implemented. Although we
 18 recognize the problems associated with enterprise systems, it
 19 remains the case that they, however imperfectly, are central to
 20 the activities of multinational organizations and, one assumes,
 21 to the way in which those who work in them use the infor-
 22 mation they supply to carry out their work. Whether such
 23 systems shift the mode of reflexivity that s deploy, perhaps by
 24 demanding a more systemic and abstract form of reasoning,
 25 and whether such shifts are widespread, are important ques-
 26 tions that could, in turn feed into these broader debates at the
 27 level of social theory.

28 Themes in the Special Issue: Theory 29 Building, Research Methods, 30 Applications

31
 32 This special issue attracted a range of contributions working
 33 within and across the boundaries of critical realist thinking
 34 and methods. While most papers had elements of all three
 35 contributions—theory building, methods, and applications of
 36 CR—authors did tend to prioritize in which area they were
 37 going to make their primary intellectual and research effort.

38 Theory Building

39
 40 Two papers—those by Faulkner and Runde and by Volkoff
 41 and Strong—focus primarily on theory development, while a
 42 third—that by Allen, Brown, Karanasios, and Norman—
 43 compares and relates critical realist concepts with activity
 44 theory and provides demonstrations of theories in action.

45
 46 In “Technological Objects, Social Position, and the Trans-
 47 formational Model of Social Activity,” Faulkner and Runde

identify a gap in IS-related applications of critical realism. The lack of a systematic theory of the nature, position and identity of technological objects within the TMSA leads them to lay tracks down here, with particular attention to a category particularly key for modern information systems: nonmaterial technological objects. Accepting the TMSA as a “highly generalized but...descriptively accurate image of how society is organized, reproduced, and transformed” (p. 1), their important contribution here is to elaborate a theory of the nature and identity of technological objects and integrate this theory within the TMSA. The theory itself applies to material as well as nonmaterial technical objects. Briefly stated, they suggest that an object possesses a particular technical identity within a community if (1) it has assigned to it the function associated with that technical identity and (2) its structure is such that it is generally able to perform that function. The paper then, valuably, imports the theory into the TMSA. How this is done is a key contribution of the paper.

In “Critical Realism and Affordances: Theorizing IT-Associated Organizational Change Processes,” Volkoff and Strong provide theory development in developing and operationalizing critical realism's concept of generative mechanism for an IS context. Using Gibson's affordance theory from evolutionary psychology, Volkoff and Strong show how affordances are a specific form of generative mechanism and that “affordances are the generative mechanisms we need to specify” (p. 1). For these authors, affordance refers to what is offered, provided, or furnished to someone or something by an object. An affordance exists at what critical realists refer to as the domain of the *real*. Their contribution here is to provide a consistent use of the concept and a clear ontology. Their subsequent contribution is to provide to CR and generative mechanisms the opportunity for more fine-grained explanations of causality, through the development of middle range theory using the concept of affordance. This theory contribution is illustrated by reanalyzing two published cases involving an enterprise system and a custom-built software system. Volkoff and Strong provide a critical realist lens to the cases, identifying across them 19 affordances, and developing the image of affordances as “a thick bundle of interacting strands” (p. 12). It is a highly useful demonstration of how generative mechanisms, informed by affordance theory, can be operationalized in IS research, and also rescues the critical realist underpinnings of the original concept of affordance.

Allen, Brown, Karanasios, and Norman also make a contribution to theory. Their paper is titled “How Should Technology-Mediated Organizational Change Be Explained? A Comparison of the Contributions of Critical Realism and Activity Theory.” They argue that critical realism and

1 activity theory can complement one another in forging a
 2 “philosophically coherent yet practically attuned materialist
 3 framework for understanding IS and the way it supports and
 4 transforms work activity” (p. 2). One strong argument the
 5 authors make is that activity theory addresses some weakness
 6 in CR they identify, particularly in Archer’s (1995) morpho-
 7 genetic approach. They focus specifically on *inscription* and
 8 social and cultural relations in technology. Activity theory as
 9 espoused by Ilyenkov (1977) is shown to foreground as
 10 essential certain aspects neglected until recently within
 11 critical realism, namely semiotics and the mediation of sub-
 12 ject and object by technology. The paper also offers two
 13 cases of technology-mediated organizational change con-
 14 cerning paramedic treatment of heart attack patients and
 15 ambulance dispatch activity. The authors provide a detailed
 16 account of the processes of change through tensions and
 17 contradictions in activity systems, and also introduce the
 18 concept of *congruencies* involving temporary stabilization.
 19 By building further on CR-related insights on the inscription
 20 of social and cultural relations within technology, they show
 21 how the organizational performance management agenda is
 22 mediated through IS operationalization in ways that affect the
 23 power structure, as well as the efficiency of the organization.

24 **Methods and Applications**

25
 26 In “Methodological Implications of Critical Realism for
 27 Mixed-Methods Research,” Zachariadis, Scott, and Barrett
 28 examine key CR ideas on causation, validity, and generali-
 29 zability, and illustrate how these shape the logic of inference
 30 in the research process through retroduction. They make a
 31 major contribution in using mixed-methods research within a
 32 critical realist framework. As they point out, the methodo-
 33 logical implications of CR for mixed methods research have
 34 been largely unexplored. They usefully explore what happens
 35 when working within CR’s stratified ontology and focusing
 36 on underlying mechanisms, and demonstrate that this
 37 refocusing leads to a different (from conventional) under-
 38 standing of concepts of reliability, validity, and inference
 39 quality. In designing mixed-methods research, they point out
 40 that the role of quantitative methods within CR is largely
 41 descriptive since generalizations and correlations between
 42 variables alone cannot uncover evidence regarding causal
 43 mechanisms that generate actual events observed, or predict
 44 future incidents. Qualitative methods within CR have a more
 45 profound role, as they are more capable of describing a
 46 phenomenon, constructing propositions, and identifying
 47 structured interactions between complex mechanisms. At the
 48 same time, for these authors, CR does not commit to a single
 49 type of research. CR’s critical methodological pluralism is
 50 grounded on its ontological and epistemological assumptions,

thus preserving a strong link between meta-theory and
 method. As well as this important theoretical contribution to
 developing critical realist-informed methods, the authors also
 contribute a strong demonstration of the applicability of their
 thinking in a case study of the effect of SWIFT adoption on
 bank performance. This illustrates how the logic of retro-
 duction can guide a dynamic interplay between methods
 involving constant comparison. The mixed methods approach
 enabled moves between situated narrative and statistical
 descriptions of populations in order to uncover generative
 mechanisms and make robust meta-inferences.

Three other papers are relatively more straightforward,
 although imaginative and insightful applications of morpho-
 genetic analysis and CR-informed methods, particularly
 leveraging the concept of generative mechanisms. In “The
 Broader Context for ICT4D Projects: A Morphogenetic
 Analysis,” Njihia and Merali demonstrate the power of
 Archer’s morphogenetic approach (MA) for developing
 insights about the process and relational dynamics of ICT
 projects in complex contexts—in this case, the Kenyan public
 sector across a 40-plus year time line. As the authors point
 out, Archer conceived MA as the practical complement of CR
 philosophy, supplying an explanatory methodology grounded
 in an adequate social ontology and of practical use for anal-
 ysts. A great strength of the paper is that MA is used in an
 in-depth study to reveal over a long time line the processes
 and mechanisms that explain how the ICT for development
 trajectory emerged from the interplay of interactions at dif-
 ferent levels of players in global, national, public, private,
 third sector, and civil society institutions and organizations.
 Njihia and Merali found that MA made it incumbent on them
 to look for deep systemic generative causal mechanisms and
 to account for the import and impact of the broader context.
 Archer’s analytic apparatus enabled separation of the parts
 from the whole, the analysis of time and temporality in pro-
 cesses of transformation, and the role of network structures
 and dynamics in explaining ICT-related change. The authors
 also see the adoption of CR methodology and its emancipa-
 tory ethos as potentially changing how ICT4D studies are
 conducted, including under what assumptions they are
 pursued.

In “The Generative Mechanisms of Digital Infrastructure
 Evolution,” Henfridsson and Bygstad contribute a major
 study of the important and neglected area of digital infra-
 structure in contemporary organizations. Their paper deals
 with the research question: Which mechanism contingently
 causes digital infrastructure evolution? The researchers
 choose critical realism as an intellectual structure for its
 emphasis on generative mechanisms, because there has been

1 all too little research on digital infrastructure geared toward
 2 developing a comprehensive understanding of the range of
 3 contingencies of causal structures in its evolution. Henfrids-
 4 son and Bygstad also develop a configurational perspective by
 5 using a multimethod research design. This involved a four-
 6 year in-depth case study of a new entrant airline in order to
 7 identify mechanisms with the power to cause digital structure
 8 evolution. The paper uncovers two conditions that provided
 9 a powerful environment for digital infrastructure evolution:
 10 an enabling, service-oriented architecture and an open,
 11 entrepreneurial culture. But while these conditions triggered
 12 the evolution, the analysis uncovered three mechanisms
 13 behind the successful evolution observed at the airline: the
 14 innovation mechanism, adoption mechanism, and scaling
 15 mechanism (AIS). The study is notable not least for its next
 16 step methodologically: a systematic collection and coding of
 17 41 case studies from the research literature on digital
 18 infrastructure, with the coding scheme focusing on three
 19 elements of configuration, namely context, mechanisms, and
 20 outcome. They find multiple causal paths of digital infra-
 21 structure evolution, but, valuably, work through in detail the
 22 contingent arrangements that produce successful and
 23 unsuccessful outcomes.

24
 25 Williams and Karahanna also tackle a big subject armed with
 26 critical realist concepts and methods. Their paper is titled
 27 “Causal Explanation in the Coordinating Process: A Critical
 28 Realist Case Study of Federated IT Governance Structures.”
 29 Here, the researchers focus on a perennial issue in IS, that of
 30 effective IT governance structures. However, the study is
 31 unusual in tackling the very neglected, although critical, issue
 32 of coordination and how it is achieved. An immediate contri-
 33 bution is the discussion of coordination mechanisms and their
 34 role. A key product here is a conceptualization of the co-
 35 ordinating process based on a critical realist perspective. The
 36 researchers then carry out a comparative longitudinal case
 37 study of two coordinating efforts in a federated ITG structure.
 38 Their objective was to conduct a critical realist search for
 39 causal mechanisms. Using a logic employing deductive,
 40 inductive, and retroductive elements, they identify two causal
 41 mechanisms—consensus making and unit aligning—that help
 42 to explain the coordinating process and outcomes observed in
 43 the two efforts. Because the case research is so rich, the
 44 authors are able also to develop a multilevel understanding of
 45 unit level and consensus-making coordinating as macro-
 46 micro, micro-macro, and micro-micro level mechanisms.
 47 The paper also discusses complementarity with rational
 48 choice and power/politics theories as explanations.

49
 50 The final paper selected for this special issue that we will
 51 discuss provides a highly interesting, CR-informed case

application at the country and regional levels. In “Explaining
 Broadband Adoption in Rural Australia: Modes of Reflex-
 ivity and the Morphogenetic Approach,” Dobson, Jackson,
 and Gengatharen use critical realism as an “under-laborer” to
 help examine the complex reality of rural adoption for com-
 munities and small business in the regions. In this paper, a
 study of the development and adoption of the Australian
 National Broadband Network takes the foreground. However,
 Danermark et al. (2002) propose a critical realist method
 involving six stages in explanatory research and this is used
 to guide the methodological development, while Archer’s
 morphogenetic model provides the basic social theory for
 examining the intimate relationship of broadband and use
 with rural social dynamics. The paper is notable for using
 Archer’s more recent work on reflexivity to structure and
 inform the analysis. The paper demonstrates well how Daner-
 mark et al. can be applied, in particular the central abstract
 processes of analytical resolution, abduction/theoretical
 description, retroduction, and comparison with different
 theories. The study is also rare in IS in using Archer’s later
 publications to address how an agent’s internal reflexivity
 (“the internal conversation”) interacts with imposing struc-
 tural conditions to potentially create change. Archer suggests
 four modes of reflexivity—communicative, autonomous,
 meta, and fractured—and the study shows how these can play
 out in specific contexts, identifying agency as having an
 important role in the mechanism by which agents interact with
 relevant cultural and socio-cultural structures in morpho-
 genetic or morphostatic sequences as agents adopt broadband
 or not.

Conclusion

We are grateful to the team of AEs who not only did a fine
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 Williams, and Donald Wynn. It will be noted that some of
 these people also submitted articles; we ensured that there
 was strict separation between their roles. We received 30
 submissions, which was very pleasing. This is, of course, an
 emerging and developing area of interest, and so it is perhaps
 not surprising that some familiar names appear. By the same
 token, however, we welcome some new voices to the conver-
 sation and we are encouraged by some new connections that
 are made by our contributors. We hope that our readers also
 find value in the work presented here and that it might
 encourage them to explore further the rich resources offered
 by critical realism.

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