

IMP theory in light of process- and system theories

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Abstract

This paper compares and discusses IMP theory in relation to Process Theory and Systems Theory, and also relates it to the ANT. It contrasts and illuminates ontological and epistemological underpinnings, methodologies and theories while also throwing some light on their historical roots and mutual influences over time. It argues that IMP is representing a process based economic theory of value creation that is rooted in a fundamental critique of main stream economic and marketing theory as well as in a deviation from the basic conceptions of the systems theories by which it was influenced in an early phase. From there the IMP developed more flexible analytical constructs that show more kinship with process thinking than with systems thinking. The IMP is also found to distinguish itself from both ANT and Systems Theory in maintaining a symmetrical and reciprocal conception of interaction where the others in different ways focus on the unification of an acting unit in relation to an external environment. This is a particular strength of IMP, but also a challenge that calls for further clarification of analytical concepts.

Key words:

Keywords: IMP theory, industrial networks, process, systems, ANT, ontology, epistemology

1. Introduction

The purpose of this article is to compare and discuss essential aspects of the IMP tradition in relation to two areas of theorising that may be seen as relatively close to it, or even as part of it: process theories and systems theories. I will do this with a particular emphasis on discussing how these three areas differ in their fundamental approaches and conceptualizations, and what implications this may have for their modes of research and theorizing. In addition to comparing their fundamental underpinnings, I will address and discuss a few selected topics, such as the different conceptions of agency in IMP and Actor-Network Theory (ANT) and particular characteristics of systems thinking such as its conceptual understanding of internal hierarchy and complexity.

One way to portray the relationship between these three areas of theory is by seeing IMP in relation to the two others, with process theory leaning more towards emergent phenomena and systems theories leaning more towards unity of analytical entities, their internal characteristics and the internal/external distinction than does the IMP.

1.1 Roots of process and systems thinking in IMP

As a point of departure, it should be noted that also the IMP can be seen as fundamentally rooted in a process view of the world - and of economic activities in particular. It departs from the assumption that resources are heterogeneous and cannot be fully known by anyone. Hence, to relate and to interact is a necessary requirement for both knowledge and value creation. In this per-

spective, the economy must be constituted by interactional processes of learning and value creation that includes the mental, the social as well as the natural/material elements of the world. In essence, this process view seems to be fundamental to how the human experience of creation of society is understood by all three areas of theory.

IMP can also be seen as having roots in early systems thinking, in particular in early economic systems theory (Boulding, 1956), in systems approaches to the early developments of the management sciences and operation research (Churchman, 1955, 1994), in Nordic industrial systems analysis (Johanson and Mattsson, 1986) and in the early understanding of distribution systems (Gadde, 2000; 2011, Gadde & Ford, 2008). The latter links back to Breyer's (1937) system oriented approach to a theory of distribution channels, and to Alderson (1965) and his functional and system based holistic theory of marketing and distribution. In their view, the interpretations of marketing and distribution operations concern how these contribute to service the system as a whole. The distribution system was seen as a functional unity with need for internal order and systemic management, with boundaries that separate it from an external environment that it is acting upon.

The IMP network approach can in part be seen as a critique of this claim for unity and internal/external distinction in systems thinking – and as a search for a different approach to conceptually permit more open and more divergent interactions such as represented by dyads, triads and nets, while it continued to build on the functional and structural insights of the early system theories. IMP does indeed have a diverse set of origins, and has continued to explore contributions from both process thinking and systems theory over the years. Thus, a comparative

analysis of distinctions between IMP, process and systems thinking should be of relevance to many IMP researchers that are already engaging across the boundaries of these theory traditions.

The IMP approach is leaning towards what we may denote as “material economic analysis” focusing on the actual, observable economic activities, as opposed, for instance, to focusing on the importance of particular meaning or intent on the side of the participating actors, dyads or networks. As such, the IMP is an empirical, materially oriented real-economy domain of research and theorising. As a consequence, the networks that typically make up the subjects of the IMP narratives are those that are related through their actual economic value creating and -distributing interactions, not through their sharing of ideas about what they want to achieve and how they may be going to get there - which would typically be the subjects in, for instance, a business venturing narrative. In IMP conceptions and analytical constructs, those that are related, interacted and interdependent are not *ex ante* identified as representatives of similar or co-ordinated intentions. Relationships, interactions and interdependencies are generalized beyond specific meaning and are – in this sense - primarily social-materially represented. As a consequence, struggles over intents and objectives are just as easily found and analysed within dyadic or network relationships as in between rival dyads or networks. In this sense, IMP sees ideas as heterogeneous “entities” – just like resources. And, just like resources, they must interact with others if they are to generate impact and value.

1.2 Representation of “meaning” in IMP analysis

However, the role of “the mental” keeps challenging IMP researchers. For instance, the introduction of mental “network pictures” by some may be seen as an attempt to incorporate the roles of particularly influential ideas or “idea-nets” into IMP analysis, by arguing that such phenomena have a formatting impact on how certain networked economies emerge and change (Henneberg, Mouzas and Naude, 2006). One question then is whether this, for instance, should be seen as the introduction of “ideas” as a fourth category in the ARA-model, in addition to resources, activities and actors. Does it add anything to introduce a mental dimension to the entire approach of the general IMP theory? Or could the idea of a mental “network picture” imply some kind of unified, intentional IMP networked agency?

The first approach has been discussed, for example, by Håkansson and Waluszewski (2002), who see interacted network structures as associated with idea structures that are more or less divergent and typically more extended than the activated structures. These idea structures can be seen as representing “interacted heterogeneous ideas” that in abstract terms are analytically quite similar to “interacted heterogeneous resources” and hence in congruence with fundamental IMP conceptions. The second approach, however, points in a different direction, by introducing a sort of “one-sided intentionality” on the side of a networked collective, which does not have an immediate relational counterpart, but rather opposes some “separate opponent” seen as a different interrelated network representing a different “network picture”: an external competitor. And both of them are seen as intentional actors in an environment that appears as a competitive battleground where intentional actions are focused on rather than interactional reactions. Hence, the introduction of homogeneous intentionality on the side of a network implies a deviation from the fundamental approach of the IMP theory and turns it over to a more traditional emergent, organizational

and market oriented mode of thinking. As such, these efforts are quite illustrative of what IMP is and what it apparently is not.

1.3 Outline and ambition of article

I would like to start this exploration into the three areas of theorising by briefly introducing and discussing a few basic conceptions from within early 20th century process philosophy¹ – in relation to the noted IMP fundamentals. Process philosophy is also where Actor Network Theory has obtained a substantial share of its inspiration (Harman, 2009; Latour, 1993), and hopefully this introduction of some common roots will contribute to a clarification of important similarities as well as differences.

General Systems Theory appears to have had its major roots in thinking related to biological systems rather than business systems (von Bertalanffy, 1945, 1950, 1951, 1968; Huchington, 2011; Maturana and Varela, 1980; Quastler, 1953). However, it also emerged in relation to industrial thinking and the early management sciences, not at least through the systems philosopher and early initiator of operations research, West Churchman (1955, 1994), and the American economist Kenneth Boulding (1956). General Systems Theory has also been included in sociology, not least by Luhmann (1984), and has made substantial advances into the area of information and communication science and technology (Simon, 1965).

The ambition of this paper is primarily to contribute to the understanding of analytical differences at a fairly abstract level of discussion, and to discuss and exemplify how these differences may be productively used in empirically based studies. This will typically imply some degree of simplification in terms of fully representing the true breath and internal complexities of the three domains of theories addressed. Hence, obviously, more rigorous work should be done to explore the actual richness of what in this case is sacrificed for the purpose of simplicity.

2. Methodological considerations

The industrial network-, process- and systems theories that I will present and discuss represent three different modes of thinking about relatedness, interaction and interdependencies. To address this broad topic will require positioning in relation to some general philosophy of knowledge. In addition to this, I have also used this opportunity to develop and present a simple, general model of scientific theorizing, in order to provide a schema for a structured discussion of topics that are complex and that move between perspectives, theories and analytical conceptions at multiple levels of analysis.

2.1 A relational philosophy of knowledge

To take the knowledge philosophy first, I position this discussion within a fundamentally relational, realist perspective on knowledge, which presupposes that we can only have knowledge of phenomena that we somehow relate to. Everything else is beyond what we – as human beings – may know of (Whitehead, 1978; Bergson, 1975, 1983; Felt, 2002). This view is fully consistent with the IMP perspective on knowledge, which argues that the world is made of heterogeneous entities that are “unknowable” in the total sense (Håkansson et al, 2009). To relate and to interact is a fundamental requirement, a necessity in order for us to have knowledge of these heterogeneous resources, and 1. For a discussion of process philosophy, see Olsen 2011, Rescher 1996, Leclerc 1990

for us to exploit them for economic objectives.

Secondly, I assume that perspectivism is fundamental to any knowledge we may have about the empirical universe (Felt, 2002). We may only make sense of the empirical if the brain is capable of ordering some conceptual framing by which to obtain focus and interpret meaning from the streams of complex sensing of whatever is empirical. Any given conceptual framing represents a disciplining of the mind to comprehend a perspective that is thereby fundamentally limited.

Finally, I maintain that every perspective is also constrained by some horizon beyond which we are no longer able to observe. We may move the horizon by introducing technologies to see further, but we cannot fully remove it. Hence, this discussion is rooted in a relational and perspective-horizontalist philosophy of knowledge that I believe is common to both psychologists and phenomenologists alike (Dreyfus and Dreyfus, 1986, 1988).

Perspectivism implies that, in order to maintain the intellectual freedom to evaluate what we know from within a particular perspective, we need to revert to a different point of observation from where to apply a different perspective from which to “see things differently”. That is, we may use opportunities for triangulation of perspectives to escape from “logical conceptual traps”.

2.2 The structure of scientific investigation and theorising

Based on this general epistemological positioning, I maintain that the different areas of theorising we typically associate with paradigms fundamentally separate at the level of mental, conceptual framing, not at the level of empirically based theories. A new paradigm results from the successful creation of a different perspective, with a new conceptual framing that turns out to be gradually acknowledged as knowledge-productive. It does not seem to result from rejection caused by falsification of theory concerning the empirical as advocated by Popper. Paradigmatic shifts may result from declining returns to old paradigms and increasing or higher returns to new. Only theory seems to change as a result of new empirical evidence, not paradigms. The well-known Lakatosian version of this argument is that the conceptual core of a paradigm is based on some tautological, irrefutable logical construct that is protected by “a belt” of supporting assumptions so that the core is well protected (Lakatos, 1977). It follows from this that what we call “scientific theories” result from the interactions of analytical core constructs with empirical observations, interpretations, measuring etc. to form disciplined explanations about the empirical in the perspective essentially ensured by the given conceptual core. Theory (propositions about the true nature of something) depends on empirical content, where the more general theories cover a broader set of empirical phenomena than medium range theories or theoretical propositions.

This internal structure of scientific theorising causes the problem that the process philosopher Alfred N. Whitehead denoted as “the fallacy of misplaced concreteness”. It results from the possibility that the thinker may confuse a simplistic deduction from a purely mentally generated analytical construct in order to claim an explanation about something of empirical matter, rather than from actually investigating into the empirical matter – which Whitehead argues is a necessary requirement for obtaining actual knowledge about it (Whitehead, 1978 (1929)). Hence, the knowledge claim with respect to the concrete empirical object is misplaced. To Whitehead, this was central to his cri-

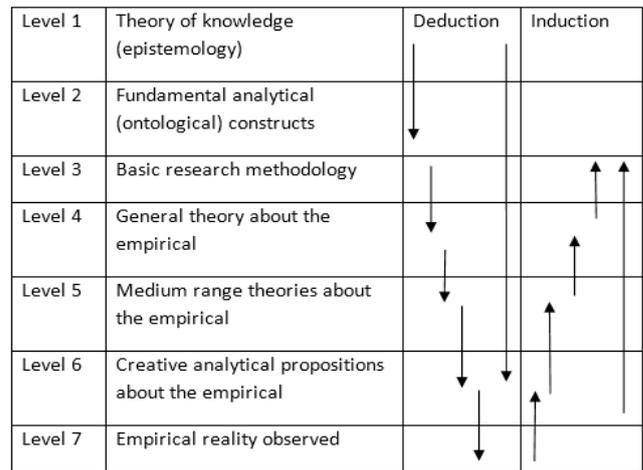


Figure 1: Model of scientific theorising

tique of historical rationalism within philosophy of knowledge at the time - in the late 1920s (Olsen, 2011). Nowadays, this is referred to as the tendency to mix up the context of justification of analytical constructs with the context of empirical investigation (Bromley, 1990). An example of this would be to claim that “all humans are maximizing their individual utility function” is a true statement about the empirical if the proof of this claim is that this must be so because behaving differently would indicate that the individual has a different preference function, which, when properly accounted for, will perfectly explain his or her choices in life. This conclusion is simply derived from the conceptual, logical combination of individual preferences, individual utility and individual choice to explain any individual decision whatsoever.

Theory about the matters of the world – as opposed to mental analytical constructs and speculative metaphysics - must accordingly be based on empirical investigations into something that exists in time and space. This implies that theories about something empirical typically call for more than one paradigm/perspective-horizon due to the influences of the empirical on the thinker. Hence, induction from grounded empirical studies calls for a plurality of perspectives and theories, whereas deduction typically ensures in-depth and more focused modes of investigation and theory development. Induction is, accordingly, a divergent process, whereas deduction is typically a lot more convergent. As a result, we may easily think of science disciplines as containing more than one paradigm.

To somehow visualise these processes of scientific knowledge production, I have outlined the following simple model of the hierarchy of scientific theorising in normal sciences. The model will – hopefully – also serve as a useful point of reference in the following discussion of the three different domains of theory.

The model places “general theory” at level 4 in between two different kinds of processes: the mental creative processes of mind at level 1 and 2 that generate propositional analytical framings (fundamental ontological assumptions), and the processes of the real world at level 7 that represent the empirical realities to be studied (Leclerc, 1990; Olsen, 2011). General theories result from the iterative interactions between deductive reasoning (top down) and inductive observations, interpretations and propositions about the empirical (bottom up). The combining is required for empirical data to be identified, selected and processed in a meaningful way.

It furthermore illustrates the existence of various levels of knowledge generating work at which there may be inductive-deductive loops and logical implications. Note that deduction typi-

cally connects from level 2 to level 7, whereas induction from the empirical – within a given paradigm – typically runs from level 7 to level 3 only, due to the said protection of the analytical core of the paradigm.

The three domains of theory, which I will now present in brief, discuss and compare, fundamentally differ at level 2 in the above model, whereas they of course may all be applied to study the same empirical phenomena at level 7. The result of the combining will be different. One important implication of the discussion above is that triangulating from points of observation within different theoretical domains of this kind may offer sound opportunity to avoid “the fallacy of misplaced concreteness”. To be able to move freely between different perspectives is also a way that researchers may avoid the particular limitations represented by the perspective-horizon constraints of any given theory.

3. The IMP theory

The fundamental ontological position defining the IMP as an area of theory is the assumption that resources are heterogeneous and only partially knowable, and as a consequence, that relations and interactions are fundamental constituents of the economy. In the most simplistic representation this concerns a dyadic relationship between two (business) entities. From there, the analytical constructs have extended in multiple dimensions to represent complex and dynamic network models.

The tradition emerged as a primarily European research tradition in the early 1980s, not at least in opposition to the completely dominant competitive market based view of marketing and purchasing at the time. It has come to represent the possibly most influential European contribution to the otherwise US dominated area of economic marketing theory. Major contributions to the tradition include the three seminal books by Håkansson 1982, Håkansson and Snehota 1995 and Håkansson et al 2009. These may be said to represent a broad representation of a dominant strand in the emergence of the tradition through nearly three decades. Other important early contributions have been presented in Axelsson & Easton 1992, by Ford (1980, 1990) and by Johanson & Mattsson (1985, 1986). Over these years - and as many scholars have expanded the range of issues addressed, such as to innovation and supply chain management -- the tradition has become quite diverse, as for instance illustrated by the efforts to incorporate “mental pictures” as another basic category into IMP analytical modelling (Henneberg, Mouzas & Naude, 2006).

3.1 A brief extract of core IMP concepts

In the following I will omit most of these diversities by staying close to what I see as the essentials of the analytical and theoretical contributions of the domain. One way to do so is to obtain a brief extract from IMP theory essentially pulled from a recent and rather dense presentation of the essence of IMP Group theorising by Ford et al. (2011: 82-103). Their presentation argues that to IMP the idea has been central that substantive and lasting interactions between individual (organised) economic agents is a core characteristic of business and economic landscapes. IMP research describes and explains how such interactions provide the means of economic, industrial and marketing coordination across firms. Interaction is the major means by which companies systematically combine their resources, activities and actors with each other in order to harvest collective gains from such combining. These collective gains are the values created in the

economy. It is a ubiquitous process as well as a working structure for the network (ibid: 83).

This ontological idea of “business interaction of heterogeneous resources, activities and actors” accordingly constitutes IMP as a research program (Figure 1: level 2) (ibid: 85-86). Based on this, the analytical apparatus is expanded to networks by connecting more economic actors to the original dyadic model – which then analytically defines “an industrial network” (ibid: 87). These models provide a basis for analysing both structural and dynamic outcomes and issues. It is clear that there is a process view within IMP associated with “network interaction”, seen for instance as network changing, problem solving or interface adjusting activities aimed, for example, at creating more effective interfaces across organisational or other kinds of borders. Hence, the IMP is based on a process view as well as structural analysis of the empirical, with the analytical modelling approach focusing primarily on the structural side - to structure analysis of dynamic phenomena.

The content of the interactions as well as the substances that are being connected are seen as multidimensional and multiple in kind. To deal with these, the IMP has developed a number of analytical categories and models, of which the ARA model (activities-resources-actors) is particularly important for the entire bulk of methodological constructs (Figure 1: level 3). It quite simply suggests that a given business relationship may be seen as separated into different “layers”, such as “actor layer, activity layer and resource layer”, corresponding to the typology included in the ARA model (ibid: 88-89).

Given this approach, the process dimension is in part addressed through a concept of “friction”, which is only partly similar to how friction is understood in mechanical physics. In IMP it is seen more prominently as a “ubiquitous force within network relationships” that results from the impacts of different intentions and interests on each side of a relationship. “Friction” is a succession of mutual reactions – or mutually influencing forces across relationships. Hence, the dynamic – or “creational” perspective in IMP is not focussed on growth or expansion of business entities but on the dynamics that are being created through reciprocal interactions. It also works on human minds – as something that causes more intensified interaction processes to innovate, to adjust interfaces or otherwise to alter business relations or aspects thereof.

The IMP concept of friction is rather an attempt at expanding from a structural theory to a theory that also incorporates what we may call “creative processes” or “creations” in direct association with the IMP core (business relationship/interdependence). Rather than establishing a theory that is explicitly based on a separate or genuine idea about “creative processes of becoming of new entities”, the IMP maintains a disciplined connecting of what is creative to the structural core of its domain. It accordingly argues that there is no such thing as a new network, only deviations from already (historically) existing networks - caused by sufficiently strong friction forces (ibid :88). There is no need for a theory of how business networks emerge in the first place, because there can be no such processes. By deductive inference, no business can emerge from something not networked, an argument which of course may not result from an empirically grounded theory, but also from a reasonable, as well as logical, justification of the particular analytical construct applied to the context.

The IMP has also moved to explicitly incorporate the dimensions of both time and space, where time of course represents an elaboration into the dynamics of interactions and network-

ing over time, whereas space rather relates to what characterises the outcomes of the dynamics observed across different business landscapes. When explaining the particular dynamics and outcomes of interactions across resource and activity layers and across time and space dimensions - based on a substantial number of detailed research projects - the IMP seems to approach what we may denote as a “general theory of business interaction” (ibid:94) (Figure 1: level 4). In this theory a variety of theoretical propositions are put into a theory that explains how business networks over time develop to form particular characteristics, such as increased path dependency of resource constellations, more co-evolution across actor webs and more specialisations across activity sets over time.

Furthermore, it also aims at explaining the observed increased heterogeneity of resource constellations, the observed expansion of interactions across actors and the observed higher degrees of interdependency across activities in the spatial dimension. This “General IMP Theory” is essentially contained within the domain of industry, logistics, marketing and purchasing research, but also incorporates elements of technology development and innovation theory, as a number of the empirical research projects either focus on or touch upon such issues.

3.2 The concept of value creation in IMP

There are also some attempts made at pulling into more explicit economic theorising. These are efforts aimed at developing a theory rooted in “interaction” and “interdependency” as the core logic of value creation. The value of an entity is argued to depend on what it is being connected to – a basic understanding rather similar to the “value creation as re-combination of resources” argument in Schumpeterian innovation/creative destruction theory (Schumpeter, 1939). Furthermore, the economic value will depend on how this interconnecting is performed within the inter-related networks of activities, resources and actors.

The IMP in this way provides the important understanding that to any business entity, relations, interactions and some degree of interdependency represent necessary links to others who thereby “decide” on the value of the given business activities. The underlying logic of this is quite similar to the understanding in semiotic thinking that the meaning (and value) of, for instance a symbol, fundamentally depends on how the symbol is related to other symbols such as when a word is changed by taking away a letter, when letters in a word are ordered differently, or when the positions of words in a sentence are changed, or when another word is brought into the sentence. A structural change immediately results in a change in the meaning of the word or the sentence. Hence, in relation to “the meaning of value”, the IMP applies an analytical approach in which specific network structure and specific (interpretations of) value are simultaneously defined. A change in network structure corresponds to an immediate change in economic value, and vice versa.

Below the general IMP theory (Figure 1: level 4), there is a successive emergence of additional or adjusted medium range IMP theories – typically addressing particular settings, such as the relationship between the development, the manufacturing and the marketing context of a certain innovation project and -process, the variety of networked structures across or within various industries and markets, the particularities of technology development networks, etc., that represent contributions at level 5. Most of these are based on detailed, almost anthropological case studies that contain streams of analytical propositions suggested by the researchers as creative reflections of their obser-

vations, typically interpreted within the perspective-horizon of the general IMP theory (Figure 1: level 6). These propositions are the building blocks for the continuous expansion of the IMP theory to deal more adequately with the economic phenomena it addresses.

3.3 The relationship between networks and their “meaning”

I find that - in relation to the IMP conceptual framing of relationship, interaction and interdependency and networks thereof as outlined above -- the role of particular representations of meaning, purpose and intent among business actors represents an important analytical challenge to the IMP. This seems to follow as a consequence of the emphasis on processes of reciprocal reactions in relationships and interactions rather than on unity of interacted entities. It represents the difference between traditional economic and marketing approaches based on the idea of intentional business unities and IMP’s reciprocal reaction based approach.

As a consequence, the IMP becomes somewhat “neutral” or “distant” to issues associated with intentionality by downplaying the roles of subjective agency, of target oriented mobilization processes, of power strategies and dominance with respect to relational and network control. Potentially important dimensions of rivalry and competition appear to be difficult or at least complex to address. Because the specific meaning of a relationship between two or more parties is not seen as unified or co-ordinated, it is also somewhat complex to make sense of how exactly a change in a relationship crosses over the borders into the entities at the two sides of a relationship to change what they are. It is thereby – conceptually - hard to grasp how the two parties actually move or change in relation to each other.

In this perspective, the IMP approach to conceptualizing “value creation” is interesting, as in this case the meaning category “value” is co-defined with its associated network structure, by which we may directly analyse how a change in network structure has value effects on the calculations and accounts within the participating entities (businesses). Value calculations within each of the participating units thereby represent agency forces with substantial effects on network coordination and interaction. We may also note that in this case economic value is seen as directly represented by the given network, while at the same time we may also have different views of the actual value represented within the network. The specific economic value for each participant as well as the overall assessments of the united value of the network may still be contested. In a similar way, we may argue that any given social-material network structure represents a particular idea (or meaning) structure that is partly representing unity, partly contested representations.

However, it may also be that these issues have been addressed elsewhere and that pulling from other research domains may at least offer comparative benchmarks for a discussion of how the notion of “specific meaning” may relate to “specific network” in terms of how we understand relationships and interaction as well as the dynamics between inter-relational and inter-organizational change in an overall network based theory such as the IMP.

Through the processes of IMP research and theorising, there are typically a number of such empirical observations that are well described but may be quite difficult to conceptualize. This calls for explorative approaches (such as “the roles of mental pictures”) for expanding from the paradigm’s dominant core (such as adding a mental dimension) or for further efforts to de-

velop additional analytical constructs that are genuinely based on the IMP heterogeneous resources and relational interdependency approach. A number of IMP descriptive and discussant texts address these kinds of issues – leading to various efforts to create additional analytical constructs (Medlin, 2002; Leek et al., 2003; Dubois and Araujo, 2004; Waluszewski, 2004; Håkansson and Waluszewski, 2007; Håkansson et al., 2009; Axelsson, 2011, Gadde, 2011; Hulthén & Mattsson, 2011). Others suggest combining IMP theorising with analytical approaches that are more specifically oriented towards analysis of emergent processes – such as Actor-Network Theory (ANT) (Araujo, 1998; Mattsson, 2003; Hoholm, 2011).

4. Process philosophy - and the ANT approach

In the following I will briefly present some aspects of process philosophy before moving to a discussion of how the ANT version of process thinking has addressed and conceptualized issues related to this discussion of relationships, interactions and interdependencies.

Philosophical debate took a rather dramatic turn as a result of Darwin's evolutionary theory, which at the time fundamentally challenged the prevalent understanding of world creation with respect to God. For instance, the new process philosophical, evolutionary perspective stimulated a new interpretation of the role of human creativity and knowledge in relation to all aspects of human society and nature. The biological idea of evolutionary process and progress translated into a process theory of societal progress. This occurred in the last decades of the 19th and the first part of the 20th century, a time when science, new technologies, mass-product industrialisation and speedy communication really impressed the world. At the level of metaphysical philosophy, philosophers like Charles Sanders Pierce (1839-1914), William James (1842-1910), Henry Bergson (1859-1941), Alfred N. Whitehead (1861-1947) and William H. Sheldon (1875-1952) came up with a variety of analytical approaches to formulate an overall interpretation of this new world. Pierce and Bergson based their approaches on constructs derived primarily from biology, Whitehead and Sheldon from different areas of physics (quantum theory and electromagnetism respectively), whereas James based his approach on core conceptions from within the new area of psychology (Rescher, 1996).

Process philosophy also had a substantial impact on epistemology. In particular the British philosopher Alfred N. Whitehead came to represent a radical rejection of traditional philosophy of knowledge by formulating, in strict scientific terms, the modern interpretation of science as we now generally perceive it: as propositional theories about the world – not necessarily as true statements rooted in some kind of direct intuition between the thoughtful mind and the empirical world as represented, for instance, by mathematics. Thus, he diverged from the idea of science as based on “true and certain mathematical laws of nature”, such as within the historical philosophies that came to dominate in the 17th, 18th and 19th centuries (Leclerc, 1990; Olsen, 2011).

Whitehead's new philosophy of creation is rooted in the understanding that creation results from “processes of interaction”. To put it simply, there are purely mental processes of mind and there are actual processes in nature and society, which he denoted as “physical processes” (physical prehension in Whitehead's wording). These physical processes act upon others. Hence, not only humans (souls) were seen as having the capacity to act (to impact, to influence) as opposed to “matter”, which by historical rationalism and empiricism was seen only as a “passive receiver”. Also the material, the social and any combinations thereof,

were now seen as “acting” (impacting/influencing). Creation – according to Whitehead – results from the internal interactions of such mental processes of mind with the physical processes of the world. Hence, man is part of creation through “influencing and being influenced by the social-material world he interacts with” (Leclerc, 1990; Dibben, 2008; Olsen, 2011). This conceptual understanding of creation processes represents the analytical core of Whiteheadian process thinking (level 1 in the model above), which, for instance, is carried over to ANT (Latour, 1996) and which is also similar to the fundamentals of IMP thinking.

One of the criticisms of Whitehead's process philosophy regards his theory of time, which is said to exclude a conception of the human experience of continuity, and thereby of entities that we clearly perceive as unified (Felt, 1985). Continuity in theories of time has generally been associated with reflexivity: the human capacity to mentally integrate elements of both past and future in a moving present by means of immediate experience or reflection. This ability is fundamental to our understanding of wholeness, of self as an integrated unit and of life as a continuous, reflexive experience. This understanding of unity is essential in systems theory, and we may at least implicitly interpret system philosophy as one source of this critique of Whitehead's physical conception of time as being simply a succession of epochal micro-moments of time, because it implies a conception of unity (wholeness) in his philosophy that is rather loose. Contrary to process philosophers' focus on creation processes, systems thinkers turned their attention to complex unities (systems) that maintain their unity over time, and the relationships between such units and their environments.

4.1 Actor Network Theory (ANT)

ANT is a process oriented methodological theory that has major roots in Whitehead's philosophy (Harman, 2009). It combines the essence of this theory with later contributions - in particular from philosophy of language (semiotics) - to build a unified methodological apparatus (Figure 1: level 3) to study processes of becoming of new actualities in the human-social-material world (Law and Hassard, 1999; Latour, 1993; Callon, 1986). Over the last three decades ANT has primarily prevailed within the area of science and technology studies, but has more recently also expanded into other fields, such as market creation studies (Callon, 1999), innovation studies (Akrich, Callon and Latour, 2002a,b, Hoholm, 2011) and, to some degree, also business network studies (Mattsson, 2003; Araujo, 2007). Somewhat differently from IMP, it is explicitly rooted in various traditions in philosophy – in particular due to contributions of the French philosopher Bruno Latour.

As a result, ANT is quite explicit about the status of ANT as essentially a conceptual and methodological theory, rather than an empirically based theory about certain particularities of the world (Laursen and Olesen, 1996). It constitutes a paradigm (level 2) based on a conceptualisation of “creative interaction” (interacting “actor-network” of human-social-material content). On this basis it provides a methodology (level 3) said to be useful to conduct empirical studies where all insights about the empirical are said “to be handed over to empirical studies” (levels 4-7).

Many ANT empirical studies have then gradually generated what we might regard as “more or less general ANT theories” at level 4 about various parts of the actual world – for instance in the area of “market making theory” as represented by Callon (1999), Olsen (2005) or innovation theory (Akrich, Callon and Latour, 2002a, b; Oudshoorn and Pinch, 2008; Garud and

Karnøe, 2001; Hoholm, 2011).

The actor-network, as defined by ANT thinkers, is, a priori, a circulating, dynamic processing entity that incorporates a representation of internal formatting/structuring as well as of agency, which may “speak for” or otherwise represent the given actor-network. The acting of this agency, however, cannot be separated from “the network”, and hence the notion of acting includes both the mental and the physical kinds of processes as elaborated by Whitehead. Contrary to Whitehead, however, ANT does not really maintain a clear distinction between the mental and the physical sides of such creative processes, a possible “over-simplification” – or loss of distinction - which has been a source of confusion to many.

The structuring of an actor-network analytically starts from something very loose and unstable – such as a new business idea or business plan, gradually becoming more stable as a function of its inclusion-transformation (translation) of more entities into itself. ANT accordingly has a conception of “variable stabilities”, which is also closely associated with its conception of power as constituted by the linking of formatted elements with some persuasive capacity vis-à-vis others (Latour, 1991). The stabilised actor-network may then gradually form more persuasive, linked power structures, such as the capacity to persuade potentially ignorant or disinterested consumers to buy a company’s products. Power is the effect of this linked network of more or less persuasive elements that may develop into even more extended powers, or break apart and thereby lose its powers, say if the product of this particular business venture is later shown to be dangerous to the environment. This dynamic notion of power is core to ANT’s perception of variable relational dependencies and of variable predictability.

On this basis, we may observe that there are some striking differences between the IMP and the ANT analytical concepts to describe and represent the networked subjects of their narratives. What constitutes interaction, and hence also relationships and interdependencies, are accordingly also somewhat different. One such difference is that in the IMP, actors are represented as one category out of several that make up the empirical content of a given network, whereas in ANT the network itself is to be identified with a particular agency. The actor-network has acting and/or impacting capacity associated with particular objectives. This has the consequence that the actor-networks that typically appear in ANT analysis are acting networks with particular purpose and meaning to persuade and include others - to impact the world around them, act upon it or expand within it.

With such a network construct at its core, ANT has emerged to conceptualize processes and construct analytical models that exploit this acting/impacting analytical construct, for instance by analytically specifying how an actor-network may expand or decline in the world, how it may add to or lose its powers to influence others or how somebody on the outside of the network may be enrolled into it, such as a new investor into a start-up company. In all of these it is presupposed that the actor-network carries particular purpose that is represented in these processes, which, for instance, has to do with the particular interpretations and distributions of complementary roles within the actor-network. Relationships and interactions are accordingly also held together by the particular meaning-dimension of things (Callon & Latour 1981, Callon 1986, Latour, 1991, 1993, Olsen 2000).

4.2 Important differences between ANT and IMP

As a result of these analytical differences, the networks typically

identified and analysed by IMP researchers would usually not be the same as those addressed by ANT – in one and the same empirical setting. The IMP networks would be those that are actually interacted in the real-economic, material and practical sense, which appears to be very similar to Whitehead’s understanding of “physical prehension” (interaction). It is about successive, reciprocal reaction processes. Creation is the processes of mutual interaction that are actually going on in between whatever is actually there. To IMP, the economy – or economic value - is the outcome of such interactions between heterogeneous entities – be they resources, activities, actors or ideas.

ANT is rather about persuasion. To the ANT, the (actor-) networks perceived of would typically be those that stand out as purposeful entities that are in the process of expanding their impact, domination and extendedness in the world – in rivalry with other similar kinds of (actor-) networks. ANT is rather representing the interacting of “mental and physical prehensions” in Whitehead’s wording, where the mental dimension - at least implicitly- seems to imply a role for unity and intentionality on the side of the actor-network. The result of this is a very different approach to economic theorizing, where the ANT sees the economy as the outcome of formatting processes driven by particular actor-networks that are there to shape and to transform the economy (Callon, 1998). It is about the power of actor-networks to shape or influence the forms of interaction within an economic domain – which implies a representation of intentionality and unity of action. As a result, ANT theory of markets is not so much about the economy, as such, as it is about the shaping of the particular forms that define and shape how the economy works: the economy is a creation, and particular historical actor-networks are the creators of it.

If we carry these differences over to the industrial marketing area of research, there seems to be no particular reason why the IMP should adopt a conceptual understanding of agency similar to that of the ANT in order to deal more effectively with the kind of issues I have raised in the introduction of this paper and in my discussion of challenges to the IMP. It seems to me these issues can just as well be addressed and analysed by using the already established ANT approach. One should rather recognize their distinctive ontological and epistemological differences and their associated different advantages for different research objectives and different kinds of analysis. A further development of an IMP conception of agency should, perhaps, rather focus on specifying how we can better make sense of the roles and functions of industrial network management – an interactional, networked conception of managerial agency? “Interacted agency”?

5. Systems philosophy and systems theories

As stated in the introduction of this paper, the IMP industrial network approach emerged from a critique of traditional economic and marketing theory and its assumptions about resource homogeneity and independency of actors. It appears to have been substantially influenced and inspired by some of the early systems theories, such as the work of Kenneth Boulding and that of West Churchman, who can be seen as early contributors to the area of management sciences in the 1950s and 60s. Other influential sources were the works of Breyer (1934) and of Alderson (1965) associated with industrial systems and distribution systems thinking (Gadde 2000; 2011).

However, we may also interpret the emerging IMP tradition as an implicit critique of the focus on unity and environment in systems thinking, with its necessary concern with borders, in-

ternal consistency and with some kind of coherent action seen as the joint, systemic outcome of coordinated actions within the “unit” labelled “system”. To the IMP, processes of interaction between heterogeneous entities are what constitute the economy, not some systemic order that can be seen as a separable unity as opposed to its environment. Hence, the IMP approach needed a more open analytical framework that permitted more process and less unity requirements.

However, process and systems philosophies share the same fundamental interest in dynamic interactions. It is also quite clear that systems philosophy has been influenced by the earlier process philosophers. Rather than emerging out of mainstream philosophy, systems philosophy developed primarily in relation to the life sciences (Quastler, 1953), to cybernetic technologies (Ross Ashby, 1961) and to information technologies (Simon, 1964) where dynamic interaction in relation to unity – or wholeness – emerged as a core analytical issue. There are, accordingly, a wide range of systems theories across the sciences, of which only a few are addressed in this paper.

One of their main contributors was the biologist, Ludwig von Bertalanffy, who published his “*Algemeinen Systemlehre*” in 1945 and, in English, “*An Outline of General Systems Theory*” in 1950. In his theory, he applied holistic concepts in the study of organisms in opposition to the purely analytical and reductionist paradigm dominant within biology at the time. He also suggested that his system-framework to understand complex processes could be applied to other domains, such as society and technology. The theory focuses particularly on the ordering and formal patterning of complexities, and theorises powers and capabilities of organised systems as contained in their richness and the internal hierarchical ordering of their interrelated parts. His concept of power is different from that of process theory, as it is primarily associated with the internal characteristics of some unit in terms of its complexity and hierarchical order.

Other important contributors were Erwin Laszlo (1972), Joël de Rosney (1979) and Ilya Prigogine (1977)², of whom at least Laszlo and Prigogine were substantially influenced by Whitehead’s process philosophy (Huchingson, 2011; Prigogine, 1980). In addition to this, a number of contributions came from cybernetics and the rapidly growing area of information and control technology – for instance as represented by Herbert Simon and John von Neumann, who also made important contributions to economic theory. Still, systems theory is dominantly rooted in science and technology rather than philosophy, where it is pragmatically applied in different versions. Within sociology, the German sociologist Niklas Luhmann (1984) has been a major contributor to systems theory, pulling from biology (Maturana & Varela, 1980), phenomenology, anthropology, and from mathematics and logics to build a sociological theory with particular emphasis on communications as the fundamental units in social systems.

Indeed, it appears to be the case that General System Theory in the 1970s partly emerged as an attempt at unifying a quite diverse development of system theorising at the time – by reverting to a higher level of analytical abstraction. The associated unification program obviously contributed to the highly abstract and philosophically grounded analytical conceptions applied by the systems philosophers at the time.

Both Whitehead and Laszlo departed from the same fundamental supposition that the principal entities of human reality are “natural-cognitive” entities. But whereas Whitehead, in-

fluenced by quantum physics, based his theory on the idea of self-organising processes of micro natural-cognitive occasions forming “societies of actual occasions/entities” through interaction, systems theory developed in relation to the idea of a living unit, made of complex internal interactions that at the same time interacted with a complex environment. Hence, to Whitehead, unity is merely a clustering of interactions that are outcomes of complex processes. These are also seen to interact with other entities in even more extended creative processes. Ontological priority is clearly given to process over unity. To system philosophers, the priority is the opposite: unity over process.

5.1 Core analytical concepts in System Theory

Systems theory accordingly introduced a clearer concept of unity by drawing particular focus to what constitutes a distinction, a border or a separation between entities. By differentiating one system from another, the idea of dynamics is separated into two sides: the internal and the external. A system may also be internally composed of a number of other systems that can be further divided into other subsystems. It may, at the same time, be part of more extended systems that might again be seen as included in even more extended systems, etc. This conceptual understanding is an essential part of the core of systems thinking (Figure 1: level 1). Hence, to analyse a system necessitates a dual internal-external perspective at any level of analysis. This understanding of the ordering of the world in layers of more extended interactions was similar to that of Whitehead, but the introduction of distinct unities by systems theory obviously made this view a lot more operational and practical in use.

Systems theory, accordingly, needed to deductively theorise what constitutes a dynamic system across all kinds of natural and artificial systems (Figure 1: level 2). Systems as distinctly separated entities required some theory of how autonomy, durability and change could be conceptualised at the ontological level. They did so by outlining certain characteristics, such as adaptive self-stabilisation, self-organisation, hierarchical ordering and non-summativity of systems. These defined the basic identity, stability and dynamic mechanisms of systems that permit us to talk about dynamic systems as such. It also constitutes the basis for developing the methodological tools needed for empirical analysis and theorising within the system – or “dynamic unity”-based approach (Figure 1: level 3).

The introduction of a clearer conception of unity within an environment of other units provided a systematic approach to dealing with relations as potentially adaptive connections between units/systems that could be manipulated and influenced. Connectivity and relations were no longer just there, but were problematic, needed to be accounted for and could be acted upon to improve the functioning of the system. Hence, this ontological distinction between systems and process thinking is critical and points at the attractiveness of systems thinking, for instance, for some of those working with information technologies in relation to all kinds of areas of modern economies. Systems theory in this broad sense has a fairly dense, simplified core and a broad and pluralistic range of practical applications.

Given this understanding of a relational – or interdependent - character of systems that can be integrated into other systems or can be separable into internal subsystems, one may ask how the idea of “freedom” may apply to such systems. The answer from systems philosophers is that freedom primarily is a function of complexity and organisation. Entities of higher-order have hierarchical internal structures. They include rich and varied subsys-

2. Prigogine received the Nobel Prize in chemistry in 1977 for his work on thermodynamic systems.

tems of various types with complex connections between them. This organised complexity provides a greater capacity for spontaneity as well as for strategic flexibility in relation to changes in the environment. The greater the complexity, the greater will be the freedom to manoeuvre.

Contrary to process philosophy and ANT, systems theory departs from an interdependency assumption in which freedom and variable dependencies have to be accounted for and explained in relation to empirical evidence. The complexity explanation of what constitutes freedom is part of a different conception of power than the constructivist version offered by ANT, namely that power-relations are associated with variable dependencies and flexibilities that favour the complex system over the simple. Hence, process and systems thinking represent different conceptual approaches to dealing with “freedom” and “variable dependencies” which are interesting and potentially applicable also to industrial marketing and management researchers.

Systems theory is distinctly paradigmatic. Everything can in principle be looked upon and defined as a system or a subsystem, such as everything that is typically studied within the industrial marketing management domain. However, its concerns are rather different as it typically addresses the relationship between particular units (entities) and their environment in a broad and complex sense, whereas the IMP approach is to simplify “environment” into “relevant relationships to others”, in which case what remains of “the environment” is rather regarded as part of the background. Systems theory does not focus on the activities in between two or more systems, but turns its attention to the borderline between the inside and the outside of the given entity (system). In relation to such a phenomenon as industrial networks, it would either see the industrial network as a system and focus on the interactions between the entire network and its environments, or turns its focus to the various parts (sub-systems), such as represented by individual firms in the network, to analyse how they might interact with, manipulate or adopt to the other parts of the network. There is no analytical space outside or in between systems where interaction is conceptually possible, such as in IMP thinking.

In this sense, the concepts of interaction, relationship and interdependency are also rather different from what is represented by the IMP (as well as the ANT). The idea of “a relationship” is particularly hard to grasp through systems thinking, as “a relationship” tends to expand into rather complex images of what constitutes “the other” as something clearly separated from all the other parts of the environment. Or it is being treated as something internal to the system, as relationships between its parts, where the logic of the relationship is to support the overall functioning of the system as a whole. Systems theory has this more holistic three-dimensional spatial analytical form that forces us to think of systems as internally coherent and functional, where network theories simplify by using one-dimensional geometric “node-line” models where what is outside of the nodes and the lines are excluded from attention and handed over to the background (context).

However, it is also clear that systems theory has its distinct advantages also in the context of industrial marketing management research, for instance by offering complementary approaches to analyse the relationship between the internal structures and capacities of firms and the way they interact with, seek to dominate or change others (their environment). It may also be productively applied to analyse the role of hierarchies and complexities in business to business relationships with perspectives and analytical tools that are complementary to those of IMP, to deal more

explicitly with issues such as power, domination and relative freedom/flexibility.

6. Concluding comments

The aim of this paper has been to initiate a discussion of the IMP theory by focussing its relationships to process theory and to systems theory. It has aimed at illuminating and contrasting epistemological and ontological underpinnings, methodological approaches and theories, while also throwing some light on their historical roots. As such, it has been an attempt at clarifying essential differences between these three traditions as well as some of their mutual influences, overlaps and similarities. This is also an occasion to underline the appreciation of pluralism in science. Triangulation of perspectives is a necessary part of the intellectual exercises of the disciplined creativity needed to develop theory about the world around us – and also to check for possible logical traps of the “fallacy of misplaced concreteness” kind.

Where as process- and systems theories represent very broad areas of application across the sciences and can be traced also to very general metaphysical perspectives in the history of philosophy, IMP belongs to an applied area of academic research that we associate with business economics and management studies. However, what I have argued is the core of IMP thinking also reflects a close similarity with the fundamentals of process thinking in seeing interactions as the essential characteristic of the human experience of social-material creation that we associate with “the economy”. I have also argued that the IMP has received important inspirations from early systems thinking – in particular the early operations, logistics and management traditions of the 1950s, -60s and -70s. Dissatisfaction with systems theory concepts and constraints contributed to the emerging of more open, interactional conceptions within the early IMP tradition, concepts that I think reflect more kinship with process thinking than with systems thinking. However, it should also be noted that IMP is not a completely coherent area of theory, and that there are of course strings of more system oriented research represented.

In analytical terms, the IMP can more precisely be characterized as rooted in a critique of main stream economics as well as main stream marketing and competitive market thought. In particular it argues that resources must be seen as heterogeneous as opposed to the homogeneity assumption in economics, and that knowledge should not be seen as given and distributed, but as relationally dependent. We may not have knowledge about something that we are not related to and have never somehow been related to. Hence, ignorance – not full information – must be the adequate analytical point of departure for understanding what economic development is, how it emerges and how it becomes more productive, more specialized, more interdependent, etc. Relating and interacting across heterogeneous resources, actors and activities are necessary for any learning and any economic activity to emerge. This is completely consistent, for instance, with Whitehead’s process philosophy of creation.

The economic theory of IMP is not primarily about resource allocation, such as is main stream economics. It is rather about value creation and as such we may, at the very general level, see it as a representative of economic process thinking where interactions and interdependencies over time, across space and within and across minds are seen as fundamental constituents of economic value creation in society.

The principle of interaction in IMP is reciprocal. The two

sides of the interaction are treated symmetrically, which analytically leads to a succession of actions, reactions, counter-reactions, etc. In contrast to this, I have argued that Actor-Network Theory (ANT), which is substantially influenced by process philosophy as well, is rather interpreting interaction as an act of persuasion and an attempt at transformation of “the other” to become included into the acting entity. Hence, ANT is about emergent phenomena that are somehow unified and semi-stabilized, represented by “spokespersons” or others that are there to expand their actor-networks, to convince, persuade or force different actor-networks to dissolve and/or to be absorbed into the expanding actor-network. The ANT kind of networks that are studied are represented by their meaning, their intentions, ambitions, etc. in ways that are quite similar to how economic and management theories see firms and organizations as acting subjects. Hence, their relationship to other actor-networks is primarily one of rivalry for domination and control, or inclusion and controlled transformation. The conclusion from this discussion is that it does not make much sense for the IMP to incorporate analytical conceptions into IMP analysis that seek to associate networks with some kind of unified meaning-based representation of it – such as attempted by the “mental network picture” approach. This approach contradicts the IMP concept of interaction – which is at the core of what the IMP really is about. It is better, then, just to use the ANT analytical apparatus for such analysis – if adequate to the research problem at hand.

In contrast to IMP, the ANT has a rather clear analytical concept of agency, seen as a representation of the acting, intentional capacity – or impact or influence – of a given actor-network. The IMP certainly deals with actors of multiple kinds as empirical objects, but there is no clear and unified conception of how the kind of “interacted agency” of the reciprocal, interacting and at least partially interdependent “agency” can be analytically represented.

Systems theory, on the other hand, is conceptually based on the identification of “unity” and on the analytical act of drawing a distinction between the inside and the outside. Similar to Process Philosophy, IMP and ANT, interaction is still fundamental to systems thinking, but the analytical framing is very different. Interaction is now something that occurs in the inside, on the outside and/or across the inside-outside distinction/border. “The inside” tends to be perceived of as a three dimensional space where whatever is there is assumed to play some role in producing a complex functional output to be delivered across to something at the outside. In this sense, the inside tends to have a kind of functional homogenous purpose where all the parts are, or should be, effectively coordinated. On the outside, there is the environment, which is complex, dynamic and demanding with respect to the functional requirements of “the inside”. Hence, the most critical interactions in systems analysis are typically those that occur across the inside-outside distinction.

Despite the fact that IMP shares the overall holistic - and also to some degree the functional view of systems theory, the IMP seems to have rejected the implicit call for internal, functional consistency as well as the asymmetric relationship between the inside and the outside represented by systems theory. By shifting from conceptions that in geometrical terms are representations of three dimensional spaces (rooms) where whatever inside the room must be analytically represented and characterized, the IMP (as well as ANT) has moved to one-dimensional representations such as “nodes”, “lines” and “networks” of nodes and lines. This has the effect that one does not have to characterize what is not included in nodes and lines, whatever is in between

or near by, by only including what is actually in focus. Everything else is moved back into a complex context that is seen as important, but analytically, so mostly as a source for identifying things that can be brought into focus -- that should be represented as a relevant/important node in a network analytical model. The analytical simplicity and flexibility that results from this is a tremendous advantage to grounded empirical research of the kind that IMP and ANT are generally doing.

However, there are of course also many advantages to applying system analysis when addressing research problems that call for analysis of complex functional phenomena, and quite often IMP research fields contain phenomena that are highly coordinated over substantial periods of time and across geographical space to a degree that one may productively see them as “systems” rather than “networks” and thereby apply more of the analytical apparatus of systems theory. For instance, I have pointed at the potential usefulness of system theories of power and flexibility (variable dependency) in relation to system internal hierarchies and complexities in analysis of networked power and interdependency. Can a system theory conceptual framing of these phenomena be exploited to advance IMP network theory based understanding of interacted agencies in business analysis?

I may finally also conclude that the IMP is distinguished from both ANT and Systems Theory in that IMP insists on maintaining an a priori symmetrical and reciprocal conception of interaction, where the two others have given priority to representing a unification of an acting unit in relation to an external environment of “others”. The IMP approach could perhaps be seen as a more radical opposition to the idea of basing analysis on units that can be perceived of as independent. This is a unique strength of the IMP, but also its challenge: to go further to clarify its analytical constructs and to make them more applicable to different kinds of analysis within the broader area of economic theorizing.

My hope is that this limited attempt at providing some clarifications and background thinking may be of some use to such efforts. However, it is also clear that, in the broad approach to this discussion that I have taken here, there are numerous topics to which I have not been able to give scope for the significance they probably represent. Those will be left for later work – or for others to explore and argue.

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