Trikonic Inter-Enterprise Architectonic

Gary Richmond

City University of New York
New York, USA
garyrichmond@rcn.com

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Abstract. There is a need for information, application, and other enterprise architectures which are robust and flexible enough to meet the challenges of today's heterogeneous, rapidly changing, digitally networked environment. Developing advanced architectures may prove essential for achieving emerging research, business, and social goals. Indeed, the profoundly changed landscape suggests that a new paradigm may be needed, an *inter-enterprise architectonic* (I-EA) informing architectures capable of integrating all key components and processes in an increasingly interconnected environment. To meet this challenge, a systems architectonic is outlined that is based on the trichotomic category theory of Charles S. Peirce. *Trikonic Inter-Enterprise Architectonic* involves a pragmatic approach to the observation and manipulation of diagrams as models of enterprise and inter-enterprise processes.

1. Introduction

Peter Skagestad in "'The Mind's Machines: The Turing Machine, the Memex, and the Personal Computer" [18] considers the history of Artificial Intelligence (AI) in relation to Intelligence Augmentation (IA) and concludes that the American scientist, logician and philosopher, Charles S. Peirce, provided a theoretical basis for IA analogous to Turing's for AI. Besides being keenly interested in the possibility of the evolution of human consciousness as such, Peirce seems even to have anticipated Doug Engelbart's notion of the co-evolution of man and machine. In another paper on 'virtuality' as a central concept in Peirce's pragmatism Skagestad goes so far as to suggest that "in Peirce's thought . . . we find the most promising philosophical framework available for the understanding and advancement of the project of augmenting human intellect through the development and use of virtual technologies"[1] [19].

Whatever the exact intellectual genealogy of the AI-IA connection may prove to be, there can be little question that in our digital networked era there appears to be a marked interpenetration of "man and machine" at least in the sense that it has become something of a truism that information technology is having a significant impact on our personal and professional lives, especially by profoundly influencing the structure and functioning of many organizations and institutions. For example, most large enterprises are to some extent already infra-structurally distributed computing systems. Meanwhile a new ecosystem of "pervasive networks, reusable services, and distributed data" [28] is changing the way nearly all enterprises operate in a deeply networked environment. In addition, the ubiquitousness and power of the internet has brought about a substantial increase in the participation of consumers of information through web-based services. Looking creatively to the future, evolving networks seem even to have the potential for catalyzing the growth of new forms of cross-disciplinary research and new models of inter-enterprise collaboration such as are implied by the idea of a Pragmatic Web [3, 4, 17]. New architectures may be needed in order to help guide the creation of the conditions which would allow for enterprise and, in particular, inter-enterprise endeavors to respond quickly and creatively to difficult challenges and fresh opportunities in a highly volatile environment. It is likely that in the future IT researchers and technologists will need to work closely with business leaders and other decision makers to more fully integrate the technical and semantic aspects of nets with the purposes of the users of these technologies.

Many businesses and other enterprises are finding that a good deal of what they are providing today is 'services' dependent on information technologies [7]. It has been suggested that because of this service orientation we will need more than ever to "apply technology, engineering and disciplined thinking and design to the people aspect of businesses" [27]. For the business sector *service oriented architecture* (SOA) has been a creative response to the new context, while even those at the forefront of SOA development have had to admit that much remains to be done. For example, SAP acknowledges, in consideration of its own Enterprise Services Architecture (ESA) which is meant to be a "blueprint for how enterprise software should be constructed to provide the maximum business value," that "the current state of the art is a long way from ESA" [28]. To move things forward a new architectural paradigm may be needed, one affording overarching design principles for creating and assembling all components in a landscape involving myriad diverse distributed users in a wide variety of inter-connected activities. Such a model would be in effect a veritable *inter-enterprise architectonic* (I-EA) capable of guiding the development of powerful new architectures for bringing about the coherence of all key components, processes, and user functions in, especially, large-scale projects involving several enterprises and perhaps hundreds of thousands of users when we include—as we now must—digitally connected customers and clients.

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[1] Skagestad notes, however, that for Peirce "reasoning in the fullest sense of the word could not be represented by an algorithm, but involved observation and experimentation as essential ingredients" [19].

The architectonic to be discussed here is based on Peirce's *trichotomic category theory* and in the present case involves the creation and observation of diagrams of the pertinent *patterns of processes* factoring into the functioning and growth of especially inter-connected enterprises. In [14] we outlined a diagrammatic approach to the category theory of Peirce, *Trikonic,* as a more iconic representation of his science of *Trichotomic*, an applied science with considerable untapped potential to contribute to the development of new models and architectures needed in all fields. *Trikonic* is developed here in the direction of a type of tricategorial *vector cycle analysis-synthesis* employing diagrams of key structures and processes important to enterprise and inter-enterprise development. At the heart of this approach is the principle that the growth of ideas in complex systems is facilitated by individual and group diagram observation and manipulation, potentially eliciting novel approaches and strategies for stimulating in particular inter-enterprise projects and partnerships. Here we will expand the argument made in [15] that diagram observation supports domain and cross-domain analysis and, going beyond analysis, tends towards the synthesis of the patterns and structures needed for project and enterprise development.

Architectures that are fully responsive to tomorrow's landscape will allow for flexible and rapid system modifications addressing changing enterprise and inter-enterprise goals and requirements. It will be argued that *trikonic architectonic* could contribute to the development of architectures powerful and flexible enough to meet this challenge, moving beyond building collections of infrastructural functionality towards conceiving entire inter-enterprise ecosystems architectonically. Section 2 examines Peirce's *systems architectonic* built on his category theory and explicated in his semeiotic. The system of his *classification of the science*s is considered as a preliminary but significant step in a tricategorial analysis with implications for cross-disciplinarity in today's networked landscape. Section 3 shows how trikonic offers a "more iconic" approach to Peirce's trichotomic analysis. Section 4 considers how trikonic might assist in the development of the kinds of inter-enterprise architectures which will be needed in the future. Building on this foundation *Trikonic Inter-Enterprise Architectonic* (|>*k I-EA) is outlined. Section 5 introduces a variety of *vector cycle analysis-synthesis* involving the creation, observation, and manipulation of design templates for analyzing possible structures and strategies, patterns and processes involved in distributed settings such as inter-enterprise partnerships. Section 6 concludes with prospects for the future.

2. Architectonic developed tricategorially

Few thinkers have emphasized what might be termed systems architectonic more than C.S. Peirce [10, 11]. His essentially trichotomic *classification of the sciences* (to be discussed below) represents one important facet of his architectonic thinking. The classification has been acknowledged as not only a significant contribution to the philosophy of science, but as anticipating contemporary cross-disciplinarity, especially regarding the sharing of methods[2] in inter-disciplinary inquiry [10]. Peirce holds that "systems ought to be constructed architectonically" [CP 6.9] and, indeed, his widely influential *philosophical pragmatism* is itself both a product of and a moment in his vast trichotomic architectonic. The very first trichotomy of his classification schema is a structural division into three grand sciences: *science of discovery* (pure, theoretical science), *science of review* (including philosophy of science and the classification itself), and practical science (that is, applied arts and sciences).

But turning now to the main focus of this section, within discovery science the third and final normative science, logic as semeiotic, itself has three divisions culminating in *methodology* (which Peirce also refers to as *methodeutic* or *pure rhetoric*). At the heart of his methodology is the marriage of the *pragmatic maxim*[3] with the tripartite structure of inquiry, namely, *abduction* of a hypothesis, *deduction* of the implications of the hypothesis for testing, and *induction* in the sense of an actual experimental testing. Thus we see the architectonic genesis of Peirce's pragmatism: *"Pragmatism was ... designed and constructed ... architectonically ... [so that] in constructing [it] . . . the properties of all indecomposable concepts were examined [respecting] the ways in which they could be compounded"* [CP 5.5]. The grounds of these "indecomposable concepts" are *universal categories* of possible objects of thought: "*Peirce found three which he came to call Firstness, Secondness, and Thirdness ... [T]he definition of such concepts is the first step in erecting an architectonic philosophy"* [11].

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2 Peirce comments that that "which constitutes science . . . is not so much correct conclusions, as it is a correct method. But the method of science is itself a scientific result" [CP 6.428].

3 "C. S. Peirce's Pragmatic Maxim is that one best clarifies a conception by representing it in terms of conceivable experience on which the conception's truth would have some conceivable practical bearing" [26].

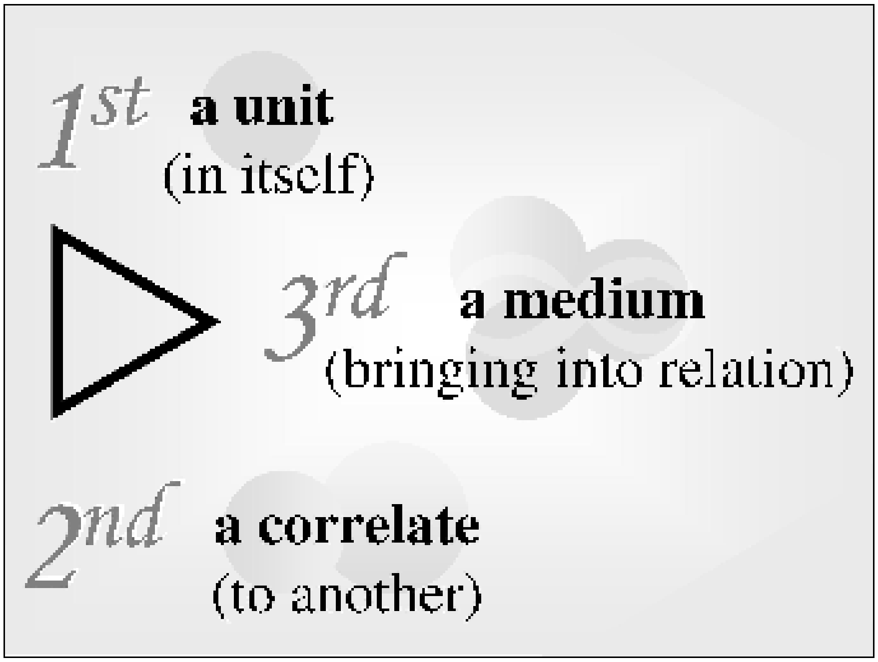

Fig. 1.

Firstness (1^{ns}) may be characterized as *qualitative possibility* (something “may be”), secondness (2^{ns}) as *actuality*, that is, existential action-reaction (“something exists”), and thirdness (3^{ns}) as *mediation* bringing the other two into ‘lawful’ relationship; and it is by its ‘lawfulness’—that is, by the tendency to take regular habits which can express themselves intelligibly *in futuro*—that 3^{ns} is able to mediate between 1^{ns} and 2^{ns} (see Fig. 1).

Models built on such simple and essentially mathematical ideas could have significant implications for intellectual/cultural evolution as providing templates which might persist, ’reproduce’, and then be combined and recombined, modified and ‘manipulated’ in ways potentially contributing to the generation of emergent phenomena such as creative solutions to significant institutional and organizational problems. This is so because such models allow us to “look for the same phenomena in different contexts [in order to] separate features that are always present from features that are tied to context” [8]. Peirce constructs his entire systems architectonic (including his vast semeiotic) upon his three categories, admittedly “conceptions so very broad and consequently indefinite that they are hard to seize and may be easily overlooked” [CP 6.32]. In his view science is essentially trichotomic: ‘First science’ in science of discovery, *mathematics,* has three divisions (finite collections, infinite collections, true continua); 'second science', *cenoscopic philosophy*[4], involves three sciences (trichotomic *phenomenology*, the three *normative sciences* of theoretical esthetics, practics, and logic as semeiotic, and lastly a scientific *metaphysics*); 'third science' includes all the physical and psychical *special sciences*, themselves arranged trichotomically (as descriptive, classificatory or nomonological) All the above trichotomies represent *tricategorial relations* and not mere triadic groupings. Retrospectively, a trichotomic structure can be seen at the very beginning of science in the mathematics of logic as a kind of *mathematical valency theory* in consideration of "the simplest mathematics" viewed in light of Peirce *reduction thesis*[5]. However, the three categories are first *observed* in phenomenology where the character of each is experienced *as such*, that is, in its firstness. Significantly, Peirce's vast trichotomic classification is arrived at through a kind of diagram observation, a topic we turn to next.

3. Trikonic is "more iconic" than Trichotomic

Stjernfelt [23] distinguishes two complementary notions of *iconicity* in Peirce's analysis, the *operational* and the *optimal*. These ideas are tied to Peirce's movement towards an *extreme realism* which includes 'real possibilities', what he calls 'would-bes' in the sense that they would be realized in the future if certain conditions were brought about favoring their emergence. The *operational criterion* involves not only the idea that an icon resembles its object in any given diagram, but also the somewhat surprising notion that the construction of a kind of diagram is involved in virtually *all* reasoning. Most important for the thesis of this paper is the principle that through a certain kind of diagram observation and manipulation we may obtain *new* information.

As valuable as this operational conception is, Peirce concludes that it results in too broad a definition of iconicity for certain purposes. For example, in logic the alpha and beta parts of Peirce's *existential graphs* (EGs) are strictly equivalent to propositional logic and first order predicate logic respectively. Yet Peirce, who in fact earlier invented the linear version of these logics[6], found his graphical form, EGs, to be "more iconic" than the linear one. The concept of *optimal iconicity* emphasizes the observation of *graphical diagrams* optimally suited to visually displaying pertinent relationships. Exercising "careful probing, moving back and forth between conditions and phenomena," through diagram observation we can see existent patterns, and through diagram manipulation may even begin to provoke emergent patterns of relationship [8].

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[4] Cenoscopy is "philosophy, which deals with positive truth . . . yet contents itself with observations such as come within the range of every man's normal experience" [CP 1.241n1].

[5] The reduction thesis holds "that all higher order polyads can be reduced to triads; conversely, all higher order polyads can be constructed from triads" [11]. It has been given a strict mathematical proof in [2].

[6] Peirce was the first to invent a 'symbolic logic" although he is rarely credited with it [20].

According to Peirce one of the essential things one needs to observe in considering the construction of a scientific architectonic is the relations of the various disciplines to each other. For Peirce this is developed as a classification of the sciences, something which he worked on over several decades as a *natural classification* in which the various sciences are observed as "the actual living occupation" of groups of people following some particular research goal and using unique methods, procedures, manners and devices of observation [10]. Beyond domain specific problems, Peirce held that one field can stimulate another toward solving its own seemingly intractable problems. Indeed entire branches of science can participate in this mutual stimulation as when, for example, *pure research science* lends its principles to the *special* and *applied sciences* which, in turn, "incessantly egg on researches into theory" [CP 7.72].

Following Comte, Peirce organizes the sciences so that those earlier in the classification offer *principles* for those which follow, while those occurring later in the schema provide *examples and cases* for the former [CP 1.180]. The so-called "perennial classification" represents Peirce's final view as to the structure of the scientific enterprise taken as a whole [9]. While in some ways linear outlines of the classification[7] articulate the most general features of Peirce's systematic architectonic, they are of somewhat limited value in offering but an abstract and, as it were, static view of the structure of science. Trikonic diagrams can reveal significant tricategorial relations such as those obtaining in this diagram string of one thread of science of discovery culminating in Peirce's 10-adic classification of signs (see Fig. 2).

[7] See, for example [1].

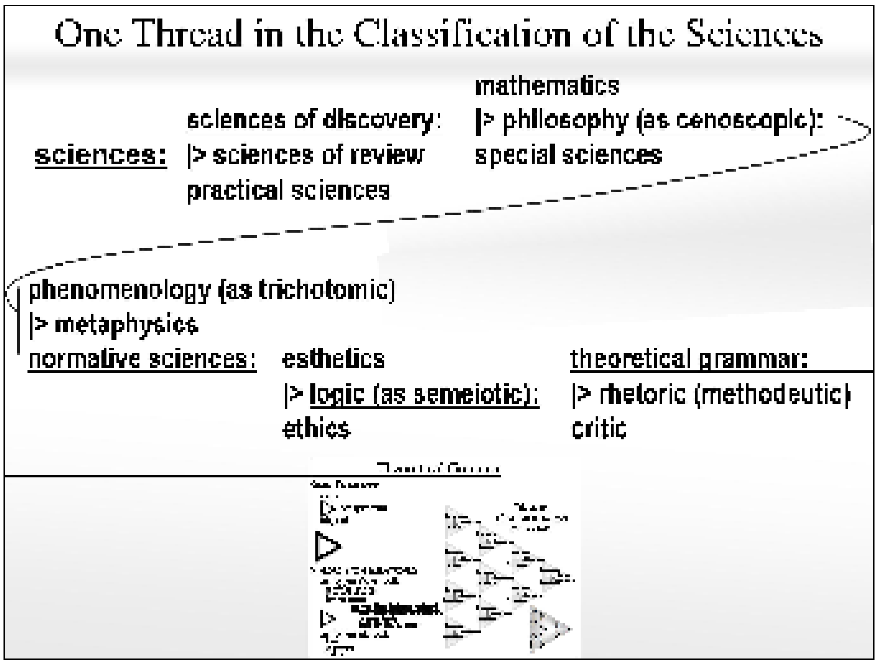

Fig. 2.

4. Trikonic Inter-Enterprise Architecture (|>*k I-EA)

“More iconic” approaches to knowledge representation such as Existential Graphs (EGs), Conceptual Graphs (CGs), and *Trikonic* (|>*k) may prove especially helpful in offering ‘relational perspicuity’ in that one *directly observes* the relationship. Contemporary technology has the capability of building tools for distributed diagram creation, observation and manipulation (in conjunction with consensus seeking and report authoring tools) which could lead to rich and, as it were, ‘fractal-like’ analysis of the categorial relationships important within an enterprise or research project. Observing and manipulating genuine tricategorial relations important to the structure and function of collaborative projects could influence the very evolution of the systems involved.

Since they articulate the ways in which the various components of a system are organized and integrated, all large scale enterprises have implicit and typically explicit architectures representing structures and processes important to successful functioning and growth. What appears to be increasingly needed is architecture capable of catalyzing rapid modification of the system for addressing emergent goals and requirements. Our networked era requires subtle and complex (but also ‘user-friendly’) architectures modeling overarching design for cohesion and coherence of all systems as these relate to users. New architectures might help guide the conception, design, and assemblage of all components of an enterprise's superstructure. Some have even suggested that it may be that the success of complex inter-enterprise operations will increasingly depend on robust architectures being efficiently and effectively envisioned, designed, and strategically employed [24]. Ultimately architecture should be able to fully analyze the fundamental structures, components, roles and significant relationships involved in enterprise systems. This structural knowledge can then assist in redesigning and reintegrating systems to meet—and "on the fly" as it were—new goals and requirements, becoming a kind of 'evolutionary architectonic' catalyzing the growth of emerging technologies, processes, business strategies, and so forth.

To create, develop, test, and implement such an architectonic will undoubtedly require leadership willing to communicate the vision of a common framework encapsulating the processes of all domains yet focusing on the goals of the enterprise as a whole [24]. It would seem especially important to achieve a balance between the vision of those leading such a paradigm shift and the design specialists working creatively from their individual and domain expertise. This is but one of the many challenges to developing and deploying an I-EA capable of integrating complex systems in an evolving inter-enterprise context. Yet whether we consider an individual enterprise or an inter-enterprise system-of-systems, the evolution of any overarching system will require understanding the principles governing the architecture of *all* its systems and those to which it stands in relation. While even the analysis of this is clearly no small task, the creation and deployment of the requisite design and development tools presents an even greater challenge.

Trikonic I-EA represents a conceptual structure with the potential for developing methodologies and integrated artifacts for modeling critical enterprise and inter-enterprise activities analyzed in terms of their significant tricategorial relationships. Relative to the needs outlined above, representations of conceptual knowledge tending to foster inter-enterprise development will connect conceptual modeling, knowledge management, information and web technologies and much else. The task is to develop elegant and effective approaches to integrating the power and efficiency of computers with the creativity and resourcefulness of people, what Douglas Engelbart calls *intelligence augmentation* (IA) [6]. *Trikonic architectonic* is designed so that these two aspects—the human and the computational—may interpenetrate in mutually productive ways. It is thus closely aligned with the conception of an emergent Pragmatic Web [3, 13].

Trikonic diagrammatically explicates and vectorially expands *Trichotomic*, Peirce's applied science of tricategorial analysis. While it was originally conceived in the interest of facilitating scientific inquiry and philosophical discourse, it is here directed towards the creation, observation, and manipulation of diagrams of significant relational structures and patterns in complex organizational systems. Yet, however it is employed such diagram observation ought to occasion a moment of applied *critical commonsense*, an idea at the heart of Peirce's theory of inquiry and by which is meant that kind of thinking which finds critical analysis and the development of a thorough going 'reasonableness' essential for real learning—including organizational learning—to occur [5]. Pragmatism strongly suggests that we are more likely to reach agreement when we employ a group observational method, when we "look together" at the same data, related patterns, etc., creating and manipulating diagrams of the relationships of the component elements. Naturally diagram observation needs to be accompanied by critical discussions of what participants say can be *objectively* seen there.

A more iconic and thoroughly architectonic approach would also tend to encourage the introduction of new ideas and hypotheses by individuals and teams. It has been suggested [8] that we need models which use if → then rules to assist in creating and designing possible scenarios for emergent phenomena. We need to be able to better "see and manipulate the mechanisms and interactions *underlying* … models, using [our] intuition to move the models into plausible regimes," what Peirce called abduction (or, retroduction to a plausible hypothesis). Diagram manipulation allows participants to explore new, even risky territory and, like a flight simulator, lets them 'push the envelope' without committing themselves to dangerous overt actions. It is certain that introducing such a novel architectural style will require new rules clearly and unambiguously stated as standards for effecting enterprise/inter-enterprise collaboration. Although it is impossible to fully define these standards in advance, SOA-centric companies are tending towards open-standards, portable components, and increased interoperability [13].

5. The Telic Vector Cycle for Systems Architecture

In [15] six *trikonic vectors* were introduced representing movement through possible trichotomic relations[8], especially as groups and threads of linked tricategorial structure/process relationships. Diagramming patterns involved in processes of potential importance to researchers and organizations is potentially one of the most promising applications of trikonic. This paper introduces the *telic cycle* for modeling enterprise and, in particular, I-E processes. The leading idea here is to bring about "a framework that uses a simple set of architectural artifacts to address the needs of enterprise architecture" [24]. Developing the architecture needed in this complex landscape is non-trivial when one looks at all the aspects and artifacts of analysis, synthesis, design and implementation which need to be considered "all together one after another," such architectures becoming decisive in the sense that the "models become the requirements" [27].

Fingar [7] outlines the inter-enterprise development cycle in a richly imagined scenario from which the following diagrams abstract the key concepts and relationships. There is no way to here represent any of the details which would need to be considered in an actual inter-enterprise development cycle, so that even were they highly abstracted and abbreviated, the elements/activities addressed in each of the six vectorial moments are too multitudinous and too complex to include in a short paper. Therefore the ensuing discussion merely introduces the telic cycle *as such* (the interested reader is referred to the elaborated scenario just mentioned.)

[8] Trikonic makes much of vectorial permutations of the three categorial relations; there are, of course, six possible paths of movement [12].

The *telic cycle* involves two complementary 'wings' organized in relation to the categorial position at which each of the six trichotomic vectors in the cycle arrives: in a word, the vectors are structured *teleologically*, that is, as to ends (Fig. 3). The first three vectors represent the *problem* side of the cycle, while the remaining three represent the *solution* side. Further, the whole cycle (or parts of it) may and typically would iterate over the life of an inter-enterprise endeavor. Individual trikonic analyses, trikonic group and string analyses, as well as the employment of other vector cycles (such as the *chiral cycle*[9]) could be employed at appropriate moments in an actual I-E development cycle. Certain activities (such as quality control) should be seen as occurring at many or even every stage of the cycle. The goal of the I-E teleological cycle model is to encapsulate each of the six phases of a development cycle in architectural diagrams observed and manipulated by members of the development team. Only a bare bones framework can be presented here[10].

[9] The *chiral vector cycle* is introduced in [15] and was employed in the analysis of a software engineering problem in [21].

[10] Elements of the kinds of content to be expected in perhaps most inter-enterprise component-based development cycles following the telic cycle are briefly outlined below [see 7, chapter 7]. It is necessary here to abstract and simplify the important considerations at each phase. In addition, the actual tricategorial relations occurring in each of the six phases must be completely passed over because of limitations of space and the complexity of the topic. Yet, when one considers that, say, **Phase 5**, for example, represents the equivalent of the three categorially distinct stages of a complete inquiry (hypothesis formation, deduction of implications for testing, inductive testing) one may begin to imagine just how much has here been omitted.

Phase 1—Requirements gathering: In the requirements gathering stage, some important considerations are: What are the roles of and who are the intended users of the proposed system? What access privileges are needed? What are the points of integration between I-E systems and how are these to be integrated? For example, which I-E business processes need to be mapped and for whom in real time? Also, what is to be placed in a repository of use cases binding system development? Finally, the development life cycle steps for quality assurance and testing purposes need to be considered at this phase.

Phase 2—Analysis: The most important question of the analysis phase is: What are the functional requirements? In addition there are considerations of the ways in which context level use cases may be elaborated as well as how to best detail specific systems requirements. Another key question is how the logical applications are to be developed.

Phase 3—Design: The design phase represents the core of the I-E design process. Its central problem is how to best move from a *problem space* to a *solution space* for both business objects and user interface design. Specific questions include: What functional modules will be most effective? What is the projected flow of operations between functional modules? How do we map analysis models to target platforms? How should deployment models be packaged as reusable components in an I-E environment? What are the possible effects of user task requirements on the applications flow? Graphics and usability groups need to create prototypes relating to user experience. When can the object model and design be finalized and the

Beginning at the **Problem** side of the *telic cycle* with 1) a determination of the requirements which leads logically to 2) a functional analysis of these requirements in relation to the project needs, this wing culminates in 3) a translation of these needs into the design of the I-E system. Then in the **Solution** side 4) the ordering of the phases of project development is followed by 5) testing and piloting culminating in the actual 6) launching of the project. Here, as at other points in the process, vectors, vector pairs, and other vector cycles may also be employed and iterated.

6. Summary and Prospects

An architectonic capable of relating all systems at all stages of inter-enterprise activity could have a significant impact on the ways enterprises would tend to operate in the future. Providing a coherent framework for managing inter-organizational complexity, it has been argued that *Trikonic* could catalyze the creation, development and deployment of new architectures which will almost certainly be needed for I-E analysis, creative synthesis and collaboration, as well as providing a basis for negotiations and decision making at all stages of inter-enterprise development. For example, distributed 'inter-team' diagram observation and manipulation could facilitate negotiations in difficult but crucial decision making processes such as selecting and integrating tools and procedures for increasing interoperability and security in partnered operations [13]. It is anticipated that both systems development and maintenance could be enhanced using appropriate vector cycle diagram

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component repository yield reuse objects? Finally, it is important to consider how the system design document will be updated and how and when the specifications are to be distributed to the development team.
Phase 4—Development: While in one sense the design phase melds into the solution side of the cycle, the particular challenge for developers is how best to order the component assembly. The crucial consideration is how the glue code built to assemble components is to be tested (both unit and integrated testing) in the interest of interoperability. It is only at this stage that the application begins, as it were, "to come to life".
Phase 5—Testing: While various forms of quality assurance will necessarily have been involved from the very beginning, the question of how to ensure that functionality in the application meets the requirements needs becomes paramount at the testing level. Here quality assurance is central to the development process. Inevitably this includes consideration of how bugs and system change requests are to be tracked.
Phase 6—Piloting and Launching: In the concluding piloting and launching phase we are concerned with what form and when the integration templates will be shipped out. In piloting, the most important questions concern what I-E pilots ought to be initiated. Finally, towards launching, critical questions include when and in what form the new I-E system will be extended to partners.

observation and manipulation. The creation of reusable, 'evolving' templates of significant vectorial patterns could catalyze the development process.

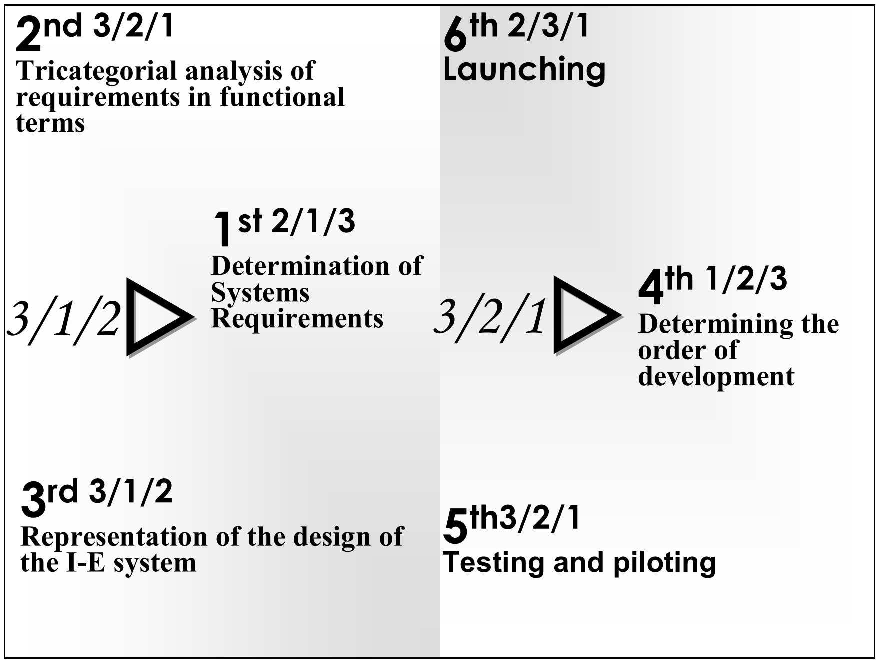

Fig. 3.

At the heart of this approach is the esthetic of a *shared reasonableness* being seen as of intrinsic value by all parties involved in a given inter-enterprise activity. This in turn implies an ethics of fairness (involving the idea of *critical commonsense*) to complement the logics needed to help structure the required architectures. Critical commonsense, pragmatic semeiotic, and tripartite inquiry are applied to organizational/inter-organizational development through a methodology which respects both individuals and the enterprises involved. As challenging as the development of such an architectonic framework may in fact be, yet the potential increase in social/business value would seem to make it worth taking up the challenge. It is through the ability to better model patterns and processes that we can have a realistic hope of gaining a modicum of control in the evolution of the new environment since it is "by inferring lawlike connections between salient, repeating features [that] we can bring past observations to bear on current conditions [and so] anticipate and control future occurrences" [8].

The view that an inter-enterprise architectonic could possibly be developed to optimize the way enterprises develop and operate internally and in relation to each other can be made attractive to leaders and decision makers to the extent that they become convinced that it has the potential for significantly benefiting their organizations should they choose to embrace it. A promising sign is that e-commerce has already begun to address some of the issues discussed here, and such organizations as Oracle and SAP seem dedicated to furthering the development of the requisite architectures. In any event, the expansion of business technology has resulted in a distributed, inter-enterprise, user and consumer-driven landscape which is both novel and ubiquitous, vast both in size and complexity, offering challenges and creative opportunities to those who would act boldly and creatively. In a global environment as unpredictable as is ours, good models can provide “a way of compensating for the perpetual novelty of the world” [8].

It has been argued here that the emerging landscape requires a new paradigm, a veritable inter-enterprise architectonic which is itself capable of evolving. This may prove to be decisive as “ultimately, significant innovation depends on the ‘long line’: the ability to go beyond cut-and-try recombinations . . . to the more distant combinatorial horizon” [8]. Peirce’s category theory and architectonic, especially as diagrammatically represented in *trikonic vector cycle diagram analysis-synthesis,* may prove to be of some considerable heuristic value in evolving a new collaborative paradigm.

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