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MODELLING REALITY: CONTEXT, SYSTEM AND MEANING

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Abstract

The paper draws on Italo Calvino's acclaimed novel Invisible Cities to describe a few recurrent issues associated with the tasks of describing and modelling reality intrinsic to the use and development of IS. The analysis initially confronts the intrinsic ambiguity that haunts any effort to transform experiential knowledge to a formal representational system. It then moves on to capturing the puzzles created by the establishment of such system as manifested in its potent capacity to describe and model reality, on the one hand, and its inescapable limitations and rigidities, on the other hand. Though these issues have variously been discussed in IS research, the literary analysis pursued here casts them in new light that shows the double-edged nature of the task of modelling reality..

Keywords: Modelling, Information, Reality, Systems

1 Introduction

The present work brings fiction to bear on the central issues of modelling reality and acting upon it on the basis of mediations such modelling affords. Due to its dense associative verbal texture, fictional narrative can considerably enrich our understanding of the world and how we deal with it. It is thus I respond to the call of the *Alternatives Genres* track for "spanning or reframing the boundaries of IS scholarship and practice." The paper brackets a tiny part of Italo Calvino's acclaimed novel *Invisible Cities* that captures a decisive turn in the relationship of its two principal figures, the Mongolian emperor Kublai Khan and the Venetian merchant Marco Polo, whereby Kublai Khan invites Marco Polo to shift the description of Kublai Khan's empire hitherto accomplished by samples of wares the merchant uses as carriers of his experience of the empire, and convey the impressions of his travels across the empire by playing games of chess with the emperor. It becomes evident as we move on that the game of chess is intended as a metaphor of a standardized system with strong potential of mediating reality thanks to the large variety of rule-based combinations of the chessmen. The central issues are those of describing and modelling reality by means of a standardized language (Kallinikos, 2009; Weinberger, 2007) and the challenges this posits.

The history of programming, system analysis and IS shows that modelling reality is a promising and elusive venture at the same time (Boland, 1987; Bowker and Star, 1999; Dreyfus 2001; Dreyfus and Dreyfus, 1986; Hayles, 2005; Simon, 1969; Winograd and Flores, 1986). My purpose, however, is neither one of confronting prior IS research nor of challenging philosophical scholarship on the nature of experiential knowledge, coding and artificial intelligence. This cannot be accomplished by analyzing a work of fiction anyway. In using fictional narrative, I merely wish to provide another interpretive context into which these slippery issues can be aired. My analysis, I suggest, has implications for how we understand the relationship between information and reality (Hayles, 2005) and, hence, between IS and the contexts into which it is brought to bear upon (Boland, 1987; Bowker and Star, 1999). It also has implications for IS design and architecture and, crucially, for the epistemological outlooks we carry in studying IS and human practice (Kallinikos, 2011; Rajao and Hayes, 2009). These implications are however not straightforward but have to be extracted from the dense texture of the narrative and the cues my interpretation of it provides. To some degree the paper transcends the dominant interpretive understanding of IS and technology. Its contribution notwithstanding, interpretivism (e.g. Orlikowski, 2000; Suchman, 2007) has tended to overlook the greater scheme of things within which both technological design and use are embedded (Feenberg, 2005; Kallinikos, 1995, 2006, 2011) that this paper seeks to bring forward.

My method is simple. It is based on the piecemeal and sequential quotation of excerpts of the part of the narrative I focus which I attempt to interpret by reinserting them within the relevant problematics of social science, namely, those of symbol and reality, abstraction and context, experience, action and communication. At the same time, I seek to suspend received understandings by remaining open to the evocative language and allusions of Calvino's masterly fiction. The unfolding of the narrative itself provides the central interpretive path. It would become evident as I proceed that the narrative themes converge around the issue of representing reality by formal means and the problems such a project confronts. In the final part of the paper I draw the various themes together and reflect on the lessons to be learnt.

2 Communication and Context-Embeddedness

Invisible Cities is a complex, non-linear narrative that unfolds at two levels. One level involves the serial description of fictional cities (55 in number) that grouped in eleven thematic units (such as *cities and memory*, *city and signs*) follow one after the other. Each thematic

group is introduced and followed by the encounters, in italicised writing, of the two major figures of the novel, Kublai Khan and Marco Polo. Wandering across the vast expanses of the empire, encountering cities and peoples, peace and wars, affluence or scarcity, Marco Polo returns periodically to the palace to report to the emperor on the state of his empire. Yet, his reports are not verbal descriptions, for the two initially lack a common verbal medium. In the absence of a common language, the will to communicate cannot but pass through the signifying capacity of things and gestures:

> From the foot of the Great Kahn's throne a majolica pavement extended. Marco Polo, mute informant, spread out on it the samples of the wares he had brought back from his journeys to the ends of the empire: a helmet, a seashell, a coconut, a fan. Arranging the objects in a certain order on the black and white tiles, and occasionally shifting them with studied moves, the ambassador tried to depict for the monarch's eyes the vicissitudes of his travels, the conditions of the empire, the prerogatives of the distant provincial seats.

The lack of common language and the recourse to objects as the only means of communication is surely amenable to many interpretations. However, it becomes evident as the novel unfolds that communication by objects is intended as a metaphor for apprehending those modes of acting and signifying which with strong bonds to reality. Calvino construes an imaginary, evolutionary trajectory whereby communication initially bears the heavy traces of contextual involvement. For all its clumsiness or limitations, object mediated signification is powerful and suggestive. It is the very physicality of things (e.g. a coconut, a seashell) and the particular function they embody (e.g. helmet, arrow) which becomes the carrier of semantic content. Signification by objects is inexorably tied to immediacy, the contexts in which objects have been encountered. For, though detached and removed from these contexts (after all, the things Marco Polo carries are just samples of wares), the meaning and the world that objects *qua* signs are supposed to communicate cannot emerge unless the *object itself possesses the characteristics which it purports to convey* (Goodman, 1976). A coconut may exemplify agriculture and the helmet an army but not the other way around. It is this intrinsic relationship to the contexts in which they have been encountered that empowers objects *qua* signs to convey or relate to aspects of these contexts.

I return to this issue many times throughout this paper. Let me meanwhile draw attention to what seems to me another crucial point in the passage, i.e. Marco Polo's attempt to reconstruct his experience and convey his knowledge by arranging the objects in a *certain pattern*. It is not simply individual objects that signify but also their shifting combinations. This elementary *ars combinatoria* of the objects *qua* signs considerably expands what can be signified by each one of them separately. The emperor does not fail to observe this:

> Kublai Khan was a keen chess-player; following Marco's movements, he observed that certain pieces implied or excluded the vicinity of other pieces and were shifted along certain lines. Ignoring the object's variety of form, he could grasp the system of arranging one with respect to others on the majolica floor. He thought ‘if each city is like a game of chess, the day when I have learned the rules, I shall finally possess my empire, even if I shall never succeed in knowing all the cities it contains.’

In a web of metaphors (i.e. the game of chess, signifying systems, and rules and connections), this passage reveals the increasing complexity of human communication as it proceeds from individual items to the construction of greater signifying blocks and systems. Sense, namely the construction of meaning, has traditionally been connected with the transition from reference (reality) to structure, from the external world to which a text or a composite semiotic construction makes references towards its interior (Barthes, 1967; Eco, 1976; Ricoeur, 1977). In any complex system of communication, there is always a tension between sense (the meaning of particular items or combinations of items) and reference (the things these items stand for). Words or individual items in general combine into sentences and greater semiotic blocks whose meaningful content is driven away from the meaning and reference of individual items.

The individuality of single items is reframed and at times overshadowed as their signifying content fuses and gradually dissolves into the totality of meaning constructed and conveyed by greater signifying blocks (Ricoeur, 1977). Beyond the signification of individual items, it is the very logic, the structure or the system through which individual elements bear upon one another which opens up the space of meaning and reveals how a particular system and the artefacts it helps to produce signify. Kublai Khan, a connoisseur of the workings of such systems (a keen chess player), did not fail to observe that 'certain pieces implied or excluded the vicinity of other pieces and were shifted along certain lines'.

Kublai Khan accordingly shifts his attention from individual objects and their separate significations towards the greater system formed by their combinations. But it is not particular combinations either which are the main interest of his concern, but the generative rules, i.e. the *ars combinatoria*, which lead to the object-made relationships and combinations manifested on each occasion. Individual objects and their instantiated combinations are no more than cues or means for grasping the rules which lead to the essential knowledge of the empire. The very image of the empire that results from the knowledge and application of the generative rules gains precedence over what such an image is supposed to refer to. Knowledge of the rules represents, it would seem, a special kind of knowledge, for it is concerned with mastery and control rather than disinterested reconstruction for the sake of knowing: 'the day when I have learned the rules, I shall finally possess my empire, even if I shall never succeed in knowing all the cities it contains.' Taken together the passages above seem to imply the following:

- Objects are signs or symbols used as elements in a signifying system that conveys the experiences of the merchant.
- Objects signify thanks to the intrinsic relationship they have to the contexts to which they refer.
- Objects *qua* signs can be related to one another and combined into chains that exemplify, communicate and represent diverse states of the empire.
- Combinations of objects follow a *system* which, though relying on the signifying appearance and individuality of these objects, goes beyond them.
- The system is generated and dissolved according to certain rules; it is these *generative rules*, neither the objects nor even the system, that constitute the essential knowledge of the empire.

The picture of signification and communication that emerges from the first two passages is one whereby discrete, individual *elements* can be *combined* into greater units according to certain *rules*. It is a view that in essential points re-echoes the fundamentals of signification and communication, including technical models of meaning generation and transmission. Meaning can be traced back to a certain number of single or elementary units (symbol tokens) which can be related and combined following certain rules (algorithms) to form larger signifying structures. However, two fundamental tensions lurk behind that view of communication that Calvino conveys in these two passages. The first is the tension between individual elements versus the combinations to which they can enter. The second is the contrast between the instantiation produced by any combination of elements versus the generativity of the rules through which the elements are combined and the in-exhaustive capacity of the rules to produce new combinations. The picture therefore gradually becomes subtler, more complex and elusive, and it is therefore important to follow its slippery path.

3 From Reality to Representation

Relying on his observation of Polo's arrangements, Kublai Khan ponders over whether to replace the merchant's idiosyncratic system of representation with the ready-made and standardized world of the game of chess.

> Actually, it was useless for Marco's speeches to employ all this bric-a-brac: a chessboard would have sufficed, with its specific pieces. To each piece, in turn, they could give an appropriate meaning: a knight could stand for a real horseman, or for a procession of coaches, an army on the march, an equestrian monument; a queen could be a lady looking down from her balcony, a fountain, a church with a pointed dome, a quince tree.

Kublai Khan's comparison of Marco Polo's object-mediated and idiosyncratic discourse with the standardized world of the chessboard and the chessmen can be read, I suggest, as a figurative way of describing the tension between context-embedded and abstract signification, between, on the one hand, the concrete and particular and, on the other hand, the general and universal. In the eyes of the leader, far removed from the action contexts of the empire, Polo's discourse appears as useless bric-a-brac, too much mired in detail and specificity and all the constraints these last carry. It is on the contrary the standardized world of the game of chess and the designations of chessmen (yet to be agreed upon) that could provide the possibility of reconstructing the facts and states of the empire.

However, the potential designations of the signifying elements (the chessmen) remain ambiguous in a fashion that differs from the silent ambiguity of Polo's objects. For, whereas the latter could be thought as indicators, samples of the contexts in which they had been encountered, the chessmen's potential signifying ability extends over and embraces a multitude of phenomena: e.g. a ‘queen’ could signify everything from a lady looking down from her balcony to a quince tree. And whereas the connection of ‘queen’ and ‘lady’ might be looked upon as alluding to an intrinsic (feminine) relationship between sign and referent, the affinities become more vague and distant in the other designations. In contrast to signification by things-objects, standardized embodiments of meaning break with similarity as a signifying principle. Intrinsic relationships between the sign and the referent are too much tied to immediate contexts and must therefore be redeemed from the heavy traces of reality they carry to assume their standardized signifying function.

The transition to the standardized character of the game of chess suggests that the replacement of experiential knowledge (here Marco Polo’s ways of signifying through objects) and the means by which it is conveyed by a formalized and decontextualized system of signification does not necessarily follow the logic of empirical incrementalism. Even though the homologies between Polo's object-made discourse and the game of chess are obvious, the latter involves a transition to a standardized system already in use. Actually, it is by means of the game of chess that Kublai Khan perceives and understands the peculiar combinations of the objects, rather than the other way around. Experiential knowledge is not simply transcribed or translated into another system but rather disregarded. The transition to the game of chess implies that the initial objects that bear the traces of the merchant's adventures, and have literally been involved in the contexts and sequences they attempt to reconstruct, are abandoned and replaced by the standardized character of chessmen, and their rule-based combinations.

The game of chess could thus be seen as an overarching metaphor that exemplifies the puzzling questions involved in the ascent from the concrete and individual to the abstract, from context-embedded actions and meanings to standardized and decontextualized representations. Standardization always implies a disregard for the singular and contingent and a corresponding concern for the common and recurrent. Though the evolutionary path from immediacy to abstraction might be said to involve the entire history of mankind (Cassirer, 1955), awareness of the questions involved sheds new light on the cognitive and communication issues that are associated technological mediation (Bowker and Star, 1999; Zuboff, 1988). Modern societies witness the social and epistemological steps and consequences of such a radical transition, on each occasion a novel empirical domain is lifted from the edges of social life and the informal relations it is embedded to become visible and institutionalized.

Following the trajectory of the whole narrative and drawing on what has been said so far, I would like to suggest that the passages referred to so far provide a nexus of metaphors that

recaptures part of the issues and questions related to *the transition from an immediate system of signification still tied to sensations and objects qua signs to an abstract and disembodied language*. Selective objectification distances itself from worldly references and creates skew relationships with aspects of reality which attempts either to account for or create. Representation breaks with similarity as a basic form of designation. Or to put it otherwise, designation by similarity or any other kind of intrinsic relationship is over-constraining, by being always tied to immediacy and the exterior world. The controlling and surveying attitude of representation needs to and does dispense with these constraints. The intrinsic relationships of similarity or affinity are traded off for a worked-out and stipulated system of designations and combinatorial rules. But the challenge persists. Such a representing system must first demonstrate its ability to capture and reconstitute the diversity of the empire:

> Returning from his last mission, Marco Polo found the Khan awaiting him, seated at a chessboard. With a gesture he invited the Venetian to sit opposite him and describe, with the help only of the chessmen, the cities he had visited. Marco did not lose heart. The Great Khan's chessmen were huge pieces of polished ivory: arranging on the board looming rooks and sulky knights, assembling swarms of pawns, drawing straight or oblique avenues like a queen's progress, Marco re-created the perspectives and the spaces of black and white cities on moonlit nights.

The way to standardized representation captured by the metaphor of the game of chess as a signifying medium is prepared and decided by the leader, for it would seem to fit better his detached position and his controlling preoccupations. The agent, on the other hand, seems to have no choice but to rely on it (the game of chess) to recount his knowledge and experience of the empire. The task is not easy but 'Marco did not lose heart.' Employing the standardized significations of the chessmen and relying on the rules of the game he 're-created' the subtle states of the empire. 'The Great Khan's chessmen were huge pieces of polished ivory' which seems again to suggest a complex maze of metaphors and allusions. For, in contrast to objects or natural signs, the pieces of polished ivory are elaborate human constructions. Both 'polished' and 'ivory' hint at the precious -- and reflecting? -- character of these elements and, perhaps, at the fact that they are the cumulative product of long and enduring human effort. As 'huge' they are imposing and probably not easily manipulable. Standardized systems of signification and the institutions into which they are embedded constrain expression with the same means by which they enable it (Bateson, 1972). Standardization is both a valuable resource and a powerful constraint (Bowker and Star, 1999). Bereft of his objects-signs, Marco Polo's knowledge has no other way of reaching beyond himself, except through the deployment of the common and standardized world of the game of chess the emperor offers him.

For Kublai Khan, the leader, the situation is different. It is precisely the road away from the contingent and particular towards the enduring and systemic that gives his detached position the ability to control his empire. As Calvino's penetrating prose makes clear, control and knowledge do not necessarily coincide. Put differently, they constitute different breeds of human knowing geared to different projects and purposes. For that reason, the mediation of details and local situations that detract from the task of compiling the bigger picture must give way to regularities that cut across particular contexts, helping the emperor to oversee his empire. In the different perspectives, interests and experiences of the novel's two principal figures one could perhaps recognize the fundamental tension between, on the one hand, the requirements of decontextualized knowledge and representation and, on the other hand, the characteristics of context-embedded modes of involvement and signification (Zuboff, 1988). Communication that relies on the principles of similarity and proximity are too immersed in details to be able to capture the wider picture and they have accordingly to give way to the superior signifying ability of distancing representation (Goodman, 1976, 1978). However, such a transition is not an unambiguous leap forward. Trading off detail and contingency for standardization does not come without a cost. Various complications begin already to emerge:

> Contemplating these essential landscapes, Kublai reflected on the invisible order that sustains cities, on the rules that decreed how they rise, take shape and prosper, adapting

> themselves to the seasons, and then how they sadden and fall in ruins. At times he thought he was on the verge of discovering a coherent, harmonious system underlying the infinite deformities and discords, but no model could stand up to the comparison with the game of chess. Perhaps, instead of racking one's brain to suggest with the ivory pieces' scant help visions which were anyway destined to oblivion, it would suffice to play a game according to the rules and to consider each successive state of the board as one of the countless forms that the system of forms assembles and destroys.

I have earlier drawn attention to the difference between systemic relationships and the specific application of rules by means of which such relationships are produced. The *ars combinatoria* of the representational elements and the vast number of signifying options that can thus be generated, are explicitly contrasted with the notion of system and the model by which it can be conveyed: 'no model could stand up to the comparison with the game of chess.' For, whereas a system or a model could be looked upon as a fixed and frozen arrangement of elements, the effectuation of a possibility, rules provide a wide space of possibilities whose realization seems to unfold along distinct but not determinate paths. Rules are, so to speak, constitutive but not determinative of the game (Searle, 1995) and in being so they are generative by definition.[1] They are not exhausted by their particular applications. As a metaphor for representation, the standardized world of the game of chess reveals the resilient character and the almost unlimited capacity of representational systems to produce a vast number of versions that capture or can be used to refer to the incessantly shifting state of the world.

Game rules, however, concern relationships between the representational elements themselves, not the particular designations, the worldly references of individual elements. They are combinatorial principles that prescribe the conditions under which certain elements can be combined with others and are thus far removed from the tangible world. Rules have meaning but are obviously devoid of denotative content. They do not stand for something 'out there'. Rules are about the game, they concern the game itself. The application of rules, then, implies that individual elements signify -- mean and refer -- by entering into networks of fabricated, i.e. conceived and established, relationships. Objectified and institutionalized principles of combination (rules) are by this oblique route involved in the construction of the world. Fascinated by the possibilities opened by the game of chess, Kublai Khan takes a further step into the disembodied yet promising, as he thinks, world of standardized representation:

> Now Kublai Khan no longer had to send Marco Polo on distant expeditions: he kept him playing endless games of chess. Knowledge of the empire was hidden in the pattern drawn by the angular shifts of the knight, by the diagonal passages opened by the bishop's incursions, by the lumbering, cautious tread of the king and the humble pawn, by the inexorable ups and downs of every game.

The transition from Polo's object-mediated discourse to the standardized world of the game of chess, from context-embedded knowledge to decontextualized representation is thus brought to its conclusion. Polo does not have to visit the empire any longer. For, ironically perhaps, the knowledge of the empire is implicated in the finite number of representational elements and the set of rules that govern their combinations. The metaphor recaptures the epistemological steps which the transition from the concrete to the abstract, the irreversible turning away from immediacy and context-embeddedness imply. It also recounts, in the suggestive language of fiction, I feel, the debate surrounding the developmental trajectory of information and communication technologies from its early stages to the internet (Benedikt, 1991; Borgmann, 1999, 2010; Dreyfus, 2001; Kallinikos, 2006, 2009).

The knowledge once gained by the agent's expeditions, his direct confrontation with facts and situations is no longer relevant for the emperor. Either has it to be transcribed and codified into a finite number of disjoint elements whose combinations are governed by a pre-given

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[1] It is perhaps worth relating Calvino's portrayal of the game of the chess and the metaphors he spins out around it with Zittrain's (2008) account of the generative nature of the internet.

repertoire of rules or completely abandoned. The fact that knowledge of the empire is implicated in the combinatorial rules of the representational elements suggests again an intrinsic tension between sense and reference. For, whereas sense is definitively dependent on the direct application of rules and is therefore drawn towards the interior, as it were, of representation, reference obeys a centrifugal movement and demands reality anchorage.

4 The Limits of Representation

The radical step implied by Kublai Khan's decision to make a chess player out of an explorer can be interpreted to suggest that standardized representation cannot exist except by turning its back to the concrete and tangible world. Such a remarkable shift is, however, not free of problems and perplexities. The gains are not acquired for nothing:

> The Great Khan tried to concentrate on the game: but now it was the game's reason that eluded him. The end of every game is a gain or a loss: but of what? What were the real stakes? At checkmate beneath the foot of the king, knocked aside by the winner's hand, nothingness remains: a black square, or a white one. By disembodying his conquests to reduce them to the essential, Kublai had arrived at the extreme operation: the definitive conquest, of which the empire's multiform treasures were illusory envelopes; it was reduced to a square of planed wood.

The urge for an essential world that drives the transition from the concrete to the abstract is also a leap into a void and disembodied world. The *other* of the bulky, concrete and refractory state of things is an elusive and empty being. Calvino captures here the paradoxical relationship between sense and reference, experience and formal knowledge. The game's reason eludes the Emperor. Sense and meaning cannot totally dispense with reference. Even if sense is a question to be answered by the interior texture of a symbol system, a fuller appreciation of what is posited in representation creates a centrifugal movement towards reference to reality. Such a problem would, of course, have never appeared had the representational elements maintained unambiguous and demarcated references to reality. But the road, as we have seen, from things to words and vice versa is a long and crooked one. Neither individual elements nor representation as a system (or discourse) recaptures and refers to tangible totalities. Had that being the case, the disembodied world of representation would have then had a definitive anchoring into the solidity of things, and meaning would have been clear and transparent but also bound and to some degree truncated. Representation gains its communicative force by dispensing with similarity and intrinsic relations as signifying conventions. As suggested earlier, the powerful signifying capacity of standardized elements result from them having being redeemed from any vestiges of reality and attuned to the other signifying elements in ways that enable the application of rules through which they are assembled to greater signifying units. Such a step proves now ambiguous. The distancing from the plenitude of reality runs the risk of hollowing out purpose and meaning from the inside.

The liberation thus of representation from the bonds of refractory reality seems to be bought at the price of emptiness. The *nothingness* confronting Kublai Khan 'beneath the foot of the king, knocked aside by the winner's hand,' is the result of successive abstractions conveyed by elements whose materiality cannot coincide with that of the referent. The question of reference cannot be exhausted and fully grasped by falling back to individual elements. For these last are not any longer tied to reality as object *qua* signs do. They are just elements of a complex signifying machine. Rather than having simple and unambiguous one-to-one correspondences to reality, representational elements gain their signifying space through a complex and ramifying network of relationships with other representational elements.

As it turns out, Kublai Khan becomes the cognitive victim of his own quest to control and the disembodied signification that he has helped establish. The same leader that conceived and initiated the transition to an abstract and decontextualized system stands bewildered in front of the relationship of representation to the things it refers, and cannot rediscover the connection between the representing elements and the reality to which they are supposed to refer.

The effacement of the tangible world, consequent upon its reduction to a standardized system of signification and its foundations (just 'a square of planed wood') impinges upon sense and meaning and calls for re-establishing the connections between symbol tokens and reality, sign and referent. It is Marco Polo's experiential knowledge that provides the means for re-establishing such a connection and breathing life back into the disembodied world of representation:

> Then Marco Polo spoke: 'Your chessboard, sir, is inlaid with two woods: ebony and maple. The square on which your enlightened gaze is fixed was cut from the ring of a trunk that grew in a year of drought: you see how its fibres are arranged? Here a barely hinted knot can be made out: a bud tried to burgeon on a premature spring day, but the night's frost forced it to desist.'
> Until then the Great Khan had not realized that the foreigner knew how to express himself fluently in his languages, but it was not this fluency that amazed him.
> 'Here is a thicker pore: perhaps it was a larvum's nest; not a woodworm, because, once born, it would have begun to dig, but a caterpillar that gnawed the leaves and was the cause of the tree's being chosen for chopping down ... This edge was scored by the wood-carver with his gouge so that it would adhere to the next square, more protruding ...'

Such is the plenitude of 'refractory' reality for those that can read it. A small number of signs, imprinted upon the material constitution of the wood, can provide the starting point for a semantic journey that allows an entire (absent) world to reappear. Here, sense and reference seem to reinforce one another. For, upon the apparent simplicity of the wood, the nothingness which puzzles and bewilders Kublai Khan, are left the traces of a multitude of events, ranging from natural conditions to human practices. All those minutiae of life that standardized representation overlooks, obscures or relegates to trivia can be summoned to support purpose and meaning. Lost no wonder in the compactness of wood texture, these details can be brought to the fore and deciphered only by the sharp and experienced eye. The road back to reality passes, then, through the labyrinthine structure of signs engraved upon the very materiality of the elements and conventions that constitute standardized representation.

In the metaphor of the game of chess, the apparent nothingness of the black and white tiles of the chessboard nonetheless supports the chessmen, i.e. the signifying elements, and allows for the realization of rules through which these elements are combined. The disembodied gaze of representation is haunted by past actions and foregone events, disregarded details, overlooked facts and contingencies that Derrida once construed as the alterity and absence essential to meaning that *prima facie* presents itself as clear and self-sufficient (Derrida, 1978, 1982). All this foregone reality can be vicariously restituted but not grasped. In Calvino's imaginative literary accomplishment, the limits of representation appear as the limits not of a copy view of knowledge (see e.g. Barad, 2003) but of a worldview that conceives, posits and acts upon the world by means of its distancing and fabricated categories, and the elements that convey them. Representation and abstraction seem ready to dissolve into the succession of events by means of which they have been constituted and the reassertion of those details once crossed out as irrelevant by the tidy logic of standardization. Sense and reference here reinforce one another as the traces of an expelled reality are summoned to breath life back to the imminent hollowness of standardized representation (Kallinikos, 2009).

It is Marco Polo and not Kublai Kahn who knows how to find the crooked path that leads back from the abstract to the concrete, from standardization to reality and from representation to reference. Deciphering the signs, Polo is able to retrace the sequence of events lying silent and hidden behind the simplicity and muteness of the wood. In contrast to the detached leader, his remarkable ability to discern the texture of events that resulted in the making of the chessboard is connected with his substantial knowledge of human dealings, gained through confrontation with facts and situations and long experiential involvement (his travels to the empire). For, the details he is able to summon are the details which only engagement, experience and practice can support. It seems paradoxical, yet abstract forms of knowing both ne-

gate and rely on situated knowledge. A fuller interpretation of abstract statements or systems seems possible only in the background of local, experiential knowledge.

All this can be done however thanks to the signifying medium of verbal language by which the Venetian merchant is able to disclose to the emperor the rich and semantically dense world of real life. Language is here given the central role it has in human life and practice, a potent medium and system able to embrace and translate any other system of signification into its own terms, a carrier but also constitutive force of reality (Barthes, 1967; Eco, 1976; Searle, 2010). For, while an adversary to reality, in the sense of ultimately been a system of signs and rules, language is at the same time the offspring of the human confrontation with reality and the miraculous artifice by means of which reality is sensed, known, expanded and acted upon. Neither logic nor measurement is possible without the semantics of language. It is out of that semantics that all other human techniques and conventions of signifying and representing are born and towards which they converge. Not surprisingly, the road back to the world is and cannot but be but a *verbal* one:

> The quantity of things that could be read in a little piece of smooth and empty wood overwhelmed Kublai; Polo was already talking about ebony forests, about rafts laden with logs that come down the rivers, of docks, of women at the windows ...

5 Final Remarks

I have in this paper used Italo Calvino's imaginative prose from *Invisible Cities* and the metaphor of the game of chess to convey some of the issues raised by standardized representation. Standardization in meaning production and communication emerges out of the inescapable disregard of the particular any formal system seem to imply, and through subsuming the diversity and variability of reality to recurring types and categories. In this process, an inevitable friction is generated between the signifying potency of standardized representation and its frail connection to the reality to which it seeks to refer, construct or control.

This friction, I suggest, haunts IS usage as shown repeatedly by innumerable studies of particular contexts into which the introduction of IS confronts a social practice. But it also haunts IS development, all the way from requirements engineering to system specification and coding. Requirements engineering and to a certain degree the development of specifications are verbal descriptions that essentially seek to simplify a social practice by striking a balance between the particularity of that practice and the abstract and formal ways by which this practice can be mediated by coding and the development of a system. Part of this friction certainly transcends the different logics which abstract representation versus experiential knowledge epitomize and is associated with the social question of control. Any formal system seems ultimately to serve those in power (Kublai Khan). Formal organizations are extremely socially stratified social entities.

The problematics Calvino's prose and our analysis of it disclose could be brought to bear as well on the study of the internet and the mediation of reality it compels through detached information tokens (Kallinikos, 2006, 2009). The internet is, of course, anything else than a tidy and standardized system of representation. Extended regions of the deep internet are undeniably composed of software-based techniques for organizing and tidying data and information. Much of what we are able to experience through the internet would have been impossible without the far reaching standardization through which data records and fields are organized, processed and transmitted. And yet, at some other level, the internet is a transient, incessantly shifting, digital disorder (Weinberger, 2007) of unprecedented dimensions, a jumble of nearly everything that Michael Benedikt (1991) prophetically described, two decades ago at its very onset, as a world of data and lies, knowledge and memories of nature. But like the world of the game of chess, the promises and deceptions of which Calvino's prose nicely captures, the internet is made possible through the radical disconnection from reality, hidden behind the many systems and standardized processes by which it is made possible in the first place. It is that disconnection from real and embedded forms of life that the plenitude of reality repeat-

edly challenges, providing at the same time a strong reminiscence of the limits of that venture and, ultimately, the illusion underlying it. Something is irredeemably lost behind 'the glamorous fog of cyberspace', as Borgmann poignantly (2010) refers to it.

Many IS and media scholars and practitioners may raise their eyebrow to what they may see as a sweeping generalization of what IS and the internet are and do. For, as I have suggested myself and the analysis of Calvino's imaginative prose shows, much hinges on how such systems are appropriated and used by social agents. But this incontestable condition is only part of a bigger picture. The possibilities of re-appropriating and recontextualizing information and relations conveyed by information are heavily conditioned by the signifying output, the rules and conventions that govern standardized representation. In the case of IS and the internet, the opportunity of re-appropriation of contextual reality is furthermore diminished, rather radically, by the fact that the cognitive output that is presented at the human interface is the outcome of long driven automation from which humans are, in one way or another, excluded.

In this respect, the analysis presented in this paper stands as an open invitation to interpretive research to engage with both sides of the coin that make up the contemporary development and usage of IS and the growing involvement of the internet in socio-economic life. Not everything is or can be negotiated *in situ* by performing, as the current fad wants it, reality (e.g. Barad, 2003: Orlikowski, 2007). Embedded and embodied performances do not occur in a social and historical vacuum. Technological development is complex, time-ridden and stratified socio-economic practice with many actors, layers and constituents (Hanseth and Lyytinen, 2010; Mathiassen and Sorensen, 2009; Pollock and Williams, 2009; Yoo et al., 2010). The development of information systems, information infrastructures and the internet) need to accommodate the principles by which they are made and their internal dependencies and compatibilities (path dependence) (Bowker and Star, 1999).

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