Towards a relational approach to design process

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ABSTRACT: This research aims to develop an approach to technology design that will support relational nature of human agency, i.e. the human capacity for action. Supporting relationality requires a different approach from the ways in which we have hitherto performed design practice. Rather than trying to control, predict or prescribe actions and relations of users, designers may design for actions more emergent and relations more fluid. In this paper, we suggest six qualities to characterize a more relational design approach referred to as Agency Sensitive Design (ASD): relationality, visibility, multiplicity, accountability, duality and configurability. We demonstrate how recent design cases and approaches in the broad field of interaction design deal with the relational character of human agency. We conclude with some possible ways of employing ASD qualities in the field of architecture. Although our study focuses on design cases drawn from interaction design field mostly, we nonetheless see broader relevance to other design domains.

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1. INTRODUCTION

Human agency has been at the hub of discussions centring upon philosophical enquiry over a long period of time. The concept of agency is defined in its simplest sense as the "capacity for action" or "transformative capacity" (Giddens, 1984). Yet, there has been ongoing debate surrounding definition, emergence and possession of agency in artificial intelligence, cognitive science, philosophy and many other disciplines. One particular point of controversy is related to the attribution of agency to entities. The three main views on agency can be separated according to their consideration of attribution of agency. Whereas technological determinism advocates the existence of material or technological agency and its highly influential role in shaping human agency, social determinism maintains that only humans can possess agency (Rose & Jones, 2005). And, while technological determinism largely ignores the different ways of appropriation of technology by humans, social determinism underestimates the role and impact of technologies shaping human intentions and social structures. A third perspective stemming from feminist Science and Technology Studies (STS) and Actor-Network Theory (ANT) (Latour, 2005) advocates a relational view of agency, i.e., relational agency. According to the relational view, agency is neither an attribute of subjects nor of objects. Rather, it is "the ongoing reconfigurations of the world" (Barad, 2003), an effect of a heterogeneous network of human and non-human actors (Latour, 2005). Throughout the paper, we will use the term "non-human actors" to refer to artefacts, tools, objects or things in general, in order to acknowledge their roles as powerful actors in shaping relational agency.

Although there have been cases where a traditional view of agency worked very well, distributed cognition, extended mind, relational sociology and situated perspectives ask for a change in technology design (Boehner et al, 2007). By adopting a relational understanding, technology design may facilitate responsible and ethical design practices, more emergent and improvised actions, and flexible and prolonged relations between humans and technologies.

In this paper, focus is upon ways of embodying a relational view of agency in design of interactive technologies. The aim is not to replace existing design methodologies but rather to complement them by developing sensitivities in the form of design qualities. Qualities are used in a similar way in the study of Bardzell (2010). Bardzell developed a "constellation" of design qualities as a part of a feminist interaction design program focusing on values like agency, empowerment, diversity and social justice. The qualities we propose are similar to those which Bardzell has developed. However, different from the Bardzell's approach, our qualities primarily focus on ways of promoting relational agency: more in the nature of process-oriented qualities characterizing how a design process might embody a relational view of agency, these qualities provide conceptual lenses through which to gain a relational understanding of the situation. As well, they aim to increase the designers' awareness of relationality, i.e. the relational, embodied and situated characteristics of human action, allow them to *tune* their practices to accommodate the diversity and richness involved in human agency and to perform more responsible and ethical design practices.

In the paper, we will first talk about the relations between agency and interaction design. Then we will introduce our design approach, which we refer to as Agency Sensitive Design (ASD), along with its principles and qualities. We will explain how ASD qualities can be integrated into the design process by using cases from the broad field of interaction design. Then, we will present some possible translations of ASD qualities to the field of architecture.

2. DESIGN AND AGENCY

Design activities, in varying degrees, ultimately aim to create, modify, enable and/or constrain some capacities of action through designed artefacts. Designers inscribe values, visions, programs of actions and modalities of perception into technology design. Akrich (1991) explains the notion of inscriptions in technology design in the following way:

> Designers thus define actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, … A large part of the work of innovators is that of "inscribing" this vision of (or prediction about) the world in the technical content of the new object. To be sure, it may be that no actors will come forward to play the roles envisaged by the designer. Or users may define quite different roles of their own (Akrich, 1991:208).

The strength of an inscription may vary from very strong, that is, imposing one particular inflexible program of action, to very weak, offering many flexible programs of action. Increasing the strength of an inscription can also be considered as an attempt to confine the relational character of human agency. Strong inscriptions belong to a perspective of design that aims to predict, prescribe and control the kind of relations between humans and technologies and the ways in which their interaction unfolds. Repeatability, consistency and reliability are particular kinds of qualities that characterize the human-technology interactions shaped by strong inscriptions. Although these are definitely desirable qualities for some settings such as legal, medical and educational, they may not be very suitable for some other situations where appropriation, personalization, adaptation, entertainment and exploration are needed (Chalmers & Galani, 2004). In practice, the human-technology interactions may happen in unexpected ways. Thus, rather than assuming agency as a predictable and fully controllable phenomenon, we may acknowledge its relational character and develop sensitivities to manage relationality in the design and use of technologies. In this way, we can see relationality with its ambiguities and contingencies as a resource for design (Chalmers & Galani, 2004; Gaver et al, 2003;) and formulate design solutions to deal with unexpected situations that may happen during the use of technologies.

In the following sub-sections, we will explain how agency as a phenomenon may play different roles in shaping design problem, design process and design artefact in the technology design process.

2.1. Different conceptions of agency

Different conceptions of agency may result in very different design artefacts, which strongly affect the roles of both humans and design artefacts and their relations. For example, an anthropomorphic conception of agency such as a metaphor of computers as humans, can result in a dialogical interface whereas a non-anthropomorphic conception of agency like a metaphor of tool can lead to a direct manipulation-based interface (Friedman & Kahn, 1992). A dialogical interface is designed to support the interactions between humans and machines as if the interaction process was happening between two humans. However, a direct manipulation based interface allows humans to "operate directly *on* the objects in the computer rather than carrying a dialogue *about* them" (Jacob, 1989). Different conceptions of agency of human and non-human actors may radically change the design artefact and relations between humans and the artefact.

2.2. Different configurations of human and non-human actors

Different configurations of human and non-human actors involved in the design process may bring about different roles, relations and capacities for action. For instance, Kocaballi et al. (2010) conducted a series of workshops, in which pairs of participants engaged in game-like activities, each using a simple wearable device to communicate with the other in non-verbal ways, using only the device, which provides sonic and tactile feedback. By changing the position of wearable device at each activity, the configuration between participants, technology and environment changed as well. The same participants, using the same technology, performed the same activities; but, the participants, technology and their relations were re-created in different ways through their re-arrangement. These arrangements enabled or constrained participants to: move together or separately; be more active or passive; be a guide or a follower; sense by using one or multiple modalities; and act in accordance with a single script or in a larger space of negotiation. The above study demonstrates how capacities of action are highly relational and strongly tied with the changing configurations of human and non-human actors.

2.3. The extent of consideration of relational aspects of agency

While some designers tend in the main to address the concerns about the relational aspects of agency such as the effect of different configurations of actors, others may consider very little or none. While a lack of consideration may give rise to problems related to accountability, responsibility, ethics and misattribution of agency, an excess amount of consideration could lead to problems related to over-amplification of differences, unceasing value conflicts, privacy and surveillance (Star & Strauss, 1999; Van der Velden, 2009). Moreover, a careful consideration of agency-related qualities has the potential to result in responsible and ethical design practices and artful integrations between human and non-human actors (Suchman, 2002).

Agency in technology design manifests itself in various relational ways, which may radically change the design problem, design process and design artefact. There is a need to consider or develop sensitivities to relationality in the design process. In the next section, we will introduce a relational design approach referred to as Agency Sensitive Design, which consists of a set of qualities built on our analysis of recent developments with situated and embodied perspectives in interaction design field. The list of qualities is neither complete nor extensive but a preliminary step towards developing a relational design approach, which is more generous and sensitive to different forms of knowing, relating and acting.

3. TOWARDS AGENCY SENSITIVE DESIGN

Our Agency Sensitive Design approach facilitates responsible and ethical design practices; more emergent and improvised actions; and, flexible and prolonged relations between humans and technologies. The fundamental principle of ASD is *recognizing and supporting variety in the formation and exhibition of agency in the design and use of technologies*. This principle includes a large range of aspects of relationality in design. In a design process, while the formation of agency refers to the construction of a heterogeneous network or assemblage of human and non-human actors, exhibition of agency refers to the effects of that network. We need to recognize the influence of multiple sources on design problems and then find ways to consider their concerns and effects. Similarly, we need to support variations in the network's effects, i.e., the actions of actors.

The basic principle of ASD guided the development of six design qualities: relationality, visibility, multiplicity, accountability, duality and configurability. These broad categorical qualities, which may overlap and be further divided into a few other qualities, provide a useful starting point from which to articulate some of the implications of a relational view of agency for the design process.

3.1. Relationality

Wei poetically criticizes the dominant interaction design approach, which is based on an understanding of separate and isolated human agency:

> Interaction design, even in its most enlightened mood has been centered on the human (viz. human-centered design), as if we knew what a human was, and where a human being ends and the rest of the world begins. (Wei, 2007:621)

The quality of relationality refers to the connectedness and relatedness of human and non-human actors comprising heterogeneous networks (Latour, 2005) or socio-material arrangements (Suchman, 2007) in which humans and non-humans co-constitute each other through their interactions. According to Suchman, relationality emphasizes the "relational character of our capacities for action, the constructed nature of subjects and objects, resemblances and differences; and the corporeal grounds of knowing and action" (Suchman, 2005:3).

In design processes, the quality of relationality asks for three sensitivities: (i) understanding of mutual influence, shaping and co-constitution of actors and artefacts; (ii) embracing and supporting emergent and improvised action and (iii) consideration of the system as an assemblage/network of actors, artefacts or collective hybrids. In order to develop these sensitivities, we first need to stop formulating design solutions based upon the assumption of a well-defined individual with fixed characteristics and capacities of action. Design solutions should recognize and support the existence of the multiple individuals embodied in one individual and the possibility of multiple enactments of one individual within a network of other human and non-human actors interacting with each other and exhibiting different capacities for action (Callon, 2004). Rather than prescribe or control, we may design for appropriation and design-in-use, interactive systems do not impose a particular pattern of action; rather, they provide a space of negotiation in which individuals can exercise their "multiple" capacities of action in creative ways.

In addition to supporting emergent interactions, technological products should not be thought of as independent or decontextualized artefacts but as part of a heterogeneous network or assemblage of humans and non-humans. The products' capacity to be extended and combined with other technologies (Kahle, 2008) and "the extent and efficacy of one's analysis of specific environments of devices and working practices, finding a place for one's own technology within them" (Suchman, 2002) are the key to successful designs with relational perspectives. For example, open source software development projects such as Linux and Mozilla Firefox provide transparent and modifiable mechanisms to be integrated into other systems and they are further extendable by user-developers.

3.2. Visibility

Visibility, one of the most essential qualities, facilitates responsible design and the emergence of different arrangements or couplings between humans and technologies. The quality of visibility, which plays a key role in developing other sensitivities such as multiplicity and accountability in the design process, involves variously making visible invisible work, human and non-human actors, and infrastructure and interactions in both design and use of technologies. Visibility not only facilitates a heightening of the overall awareness of human actors of themselves and of others, but also helps the performance of more responsible design practices (Van der Velden, 2009; Friedman & Kahn, 1992) and discovery of new opportunities, constraints and matters of concern in design process(Latour, 2005).

Quality of visibility operates in both technology design and use. Visibility in technology design refers to recognizing every human and non-human actor and their roles in the formulation of design problem and the design process. This means that the different values, views and concerns of the human actors - and various affordances of non-human actors - need to be explicated and considered. Bødker (2009) provides an example of how we can make explicit the actors of distributed agency by using Mike Michael's notion of co(a)gents (2004) and a naming scheme. For instance, an assemblage of a student, a video camera and the pitching part of the workshop can be called "Stuvidpi". This simple naming scheme shows how we can develop sensitivity for both human and nonhuman agency by making visible the existence of various actants taking part in the design. Moreover, the term 'visibility in technology use' refers to keeping the boundaries and interactions between all humans and technologies distinct and observable. Seamful design (Chalmers & Galani, 2004) advocates the use of (beautiful) seams in interactive systems: seams can be basically gaps and breaks in functionality, and boundaries between different components or systems. Seamful design deliberately makes the seams visible and encourages system users to appropriate them as a resource for reflection and creative engagement. Seamful technologies maintain their own features and identities while interacting

with other system components. In other words, a general strategy of seamful design is "letting everything be *itself*, *with* other things" (Chalmers & Galani, 2004, original emphasis).

In their seamful game, Chalmers and Galani (ibid.) utilized deficiency of technological infrastructure, in this case the varying accuracy of the GPS signal, as a seamful resource for players to develop strategies. Rather than considering the variability of technological infrastructure something to avoid, prevent or hide, they exposed the seams in their design and used them as a feature of the game. Such seamfulness allows us to recognize the roles or working principles of these technologies, which explicitly tell us what they do but not how they should be used. In this respect, seamful design supports user appropriation by making resources publicly available. Button and Dourish's (1998) notion of "accounts" also advocates seams in design by suggesting the use of self-explanatory and transparent system components.

Similar to seams and accounts, self-disclosure (Bardzell, 2010) is another design quality related to visibility. Bardzell, who defines self-disclosure as "the extent to which the software renders visible ways in which it affects us as subjects" (2010), cites the recommendation system of Amazon.com as an example of self-disclosure. Users of Amazon can select the option - "Don't use for recommendations" - which prevents system from using the current purchase as an exemplary case to recommend other books. Here, the recommendation system allows the user to express themselves to Amazon "what kind of subject I want the application to treat me as". The case of Amazon demonstrates a highly sophisticated mode of visibility, which explicates the way in which machines view users, and provides resources for users to configure the machine's perception of user.

In general, increased awareness of self, others and systems obtained by visibility supports: i) responsible and ethical design practices; ii) the emergence of new arrangements, couplings and capacities of action between humans and technologies; and iii) the development of the further sensitivities of accountability and multiplicity.

3.3. Multiplicity

The quality of multiplicity refers to multiplicity in ways of knowing and representing, which entail participation of multiple and heterogeneous sources of influence in the design process. However, according to Van der Velden (2009), participation alone is not sufficient. Equal representation and treatment of all actors should also be ensured. Van de Velden uses the concept of cognitive justice, which covers both participation and cognitive representation. Cognitive justice allows us to overcome many traditional dichotomies such as global/local, scientific/indigenous and expert/layman and embraces knowledge diversity rather than knowledge hierarchies. Visvanathan states that idea of participation privileges the experts' definition of knowledge:

> [E]xperts' knowledge is represented as high theory and layperson's ideas as a pot-porri of practices, local ideas and raw material. Thus democratization of science should be extended to include alternative sciences. It should be possible to validate other forms of knowledge. The equal treatment of actors/actants is crucial, and identification of the ways to validate and evaluate them in a democratic way (Visvanathan, 2007:92).

Indigenous designs acknowledge diversity in knowledge production and provide us with useful accounts of designing in non-hierarchical and participatory ways (Van der Velden, 2009). Van der Velden, who analysed various classification systems in a bid to understand how different ways of knowing were accommodated in the design of these classification systems, explains that organization of information on web is based on an hierarchical tree-like structure in which relations are defined according to categories of "parent", "child" and "grandchild". According to her thesis, this hierarchical categorization reflects a western view of the world: other ways of knowing and being in the world may require different categorizations. She cites TAMI (Verran et al, 2007), a custom-made database for the Yolŋu Aboriginal Australians whose culture does not ontologically divide nature and culture. The design of TAMI aimed to accommodate the worldview of the Yolŋu. Its designers did not use any pre-set categories for - or relationships between – entities; instead, they enabled users to construct a classification system according to their worldview and understanding of relations during use. In TAMI, the quality of multiplicity is embodied in the design process by means of recognizing "the reality of partial translations in place of claims of universality" (Suchman, 2002:10).

Cartographic maps were used for the design of an e-government project called 'I, My Workplace and My Work' (Elovaara & Mörtberg, 2010). Civil servants, who participated in the design process, engaged in making maps to describe themselves, their workplace and their particular forms of practice. The maps included photos of their environments and colleagues, descriptions of their daily routines, drawings and any other material explaining their workplace. The end product was a *rich* map consisting of an assemblage of people, artefacts, environments, their relations and concerns illustrated from multiple points of view. Collaborative, generous and flexible methods and tools such as sketches, low-fi prototypes, rich pictures, and cartographic maps could prove useful in obtaining multiplicity in representation. These rich representations are particularly important vis-à-vis keeping the concerns of the different stakeholders or multiple sources of influence visible.

While the design process can embrace multiplicity by supporting participatory, democratic and open practices together with rich representations of multiple partial forms of knowledge, design artefacts can embody multiplicity by utilizing flexible, context-sensitive and adaptive mechanisms.

3.4. Accountability

The quality of accountability is applicable to both humans and technologies. Button and Dourish (1996) define accountability as the property of action being organised so as to be observable and reportable. Whereas

accountability of technological systems entails the existence of accounts that systems provide users with information about their own activities (ibid.), accountability of human actors requires them to be aware of their own position relative to other actors and taking responsibility for their own perspectives and partial knowledge (Suchman, 2002).

According to Button and Dourish (1996), accountability of technological systems refers to "computational representations which systems continuously offer of their own behaviour and activity, as a resource for improvised and contextualized action" (ibid.:23). They developed the notion of "accounts" in order to deal with the difficulties caused by system abstractions. In technology design, system abstractions are widely used to hide the details and complexities of operations that a system component performs by providing interfaces with only a limited amount of information. Button and Dourish claim that "information hiding" characteristic of interfaces prevents users from perceiving some essential operations of the systems. Users may need such information about system operations especially during breakdowns in the system's functionality. If abstractions of system operation can be made observable, users will be better equipped to deal with any breakdowns. That is, systems may provide more information about their operations. However, here, the important point is the reflexive and situated character of the accounts or information, which differentiate them from the conventional error messages provided by systems:

> So what is important about this approach is not the account itself (the explanation of the system's behaviour) but rather accountability in the way this explanation arises. In particular, the account arises reflexively in the course of action, rather than as a commentary upon it, and concerns the way in which that action is organised so that it can be made rational in particular circumstances (Button & Dourish, 1996:19).

The inseparability of human agency from the socio-material networks of which it is part is an important matter of concern for the accountability of human actors (Suchman, 2007). The problem lies in the difficulty faced in locating accountability of human actors, who do not act completely independent from their network. Suchman, following Latour (2005) deals with the issue of inseparability of agency and accountability by using a different conception of 'boundaries', which "recognizes the deeply mutual constitution of humans and artefacts, and the enacted nature of the boundaries between them, without at the same time losing distinguishing particularities within specific assemblages." (Suchman, 2007: 260). In addition, Suchman (2002) develops the notion of located accountabilities which advocates that since our views are inevitably situated and from somewhere, this makes us personally responsible for them. Her formulation of accountability in design is closely associated with responsibility. According to Suchman, responsibility is also a relational phenomenon; but, one that requires a critical awareness:

> The accountability involved is a problem of understanding the effects of particular assemblages, and assessing the distributions, for better and worse, that they engender. Responsibility on this view is met neither through control nor abdication, but in ongoing practical, critical and generative acts of engagement (Suchman, 2000: 286).

Designers may promote the quality of accountability by making visible the actors, roles, their locations and system accounts. However, an essential part of the designer's task is to provide other actors involved in the design with resources for increasing critical awareness of the notion of located accountability and its implications.

3.5. Duality

The quality of duality refers to consideration of the dual characteristics of design decisions. Van der Velden maintains that technology is never neutral; neither in use nor in non-use*"* (Van der Velden, 2009). Dual characteristics of design decisions should be considered. Duality can manifest itself in many forms, e.g., privileging/ignoring, inviting/inhibiting and amplifying/diminishing. In this paper, our discussion focuses solely upon two aspects of duality: values and actions.

First, our designs can privilege the values of some actors while ignoring the values of some other ones (Friedman & Kahn, 1992). The inscription of values into technologies is inevitable. However, the problem is less about the inscription of particular kinds of values and more about the invisible, unquestioned and taken for granted values embedded in our thinking and practices. Parallel to the quality of visibility, values shaping our thinking and design decision should be made visible and open to negotiation. In this respect, Friedmans' (1996) Value Sensitive Design (VSD) method prioritizes the role of values in design and aims to identify and explicate values stemming from the design process and make them available for questioning. VSD considers positive and negative effects of design decisions and any trade-offs between the values of actors. In order to do this, VSD employs a tripartite methodology including conceptual, empirical and technical investigations.

Second, our designs can invite particular kinds of actions while inhibiting certain others (Latour, 2005). As mentioned before, designers inscribe programs of actions into technologies. For instance, automatic door-closers afford a particular way of passing through doors: speed bumps inhibit a driver's proclivity to drive too fast (ibid.). Here the inscriptions in door-closers and speed bumps were used for prescribing, defining and controlling the interaction between humans and technology. However, it is also possible and might prove desirable to use inscriptions not for narrowing down space of possibilities or imposing a particular behaviour but for providing resources for user appropriation and opening up a space of negotiation, in which users may exercise their creative capacities for action.

The quality of duality involves consideration of both kinds of invited and inhibited actions and accounting for their implications. In addition to this basic level of sensitivity, we may prefer to expand the range of invited actions or narrow down that of inhibited actions. In this way, we can support creative appropriations of users and the emergence of new capacities of actions.

3.6. Configurability

The design process does not stop after the technology production phase but continues in the actual use of technologies. In this broader view of design, the activity of design continues in the sites of technology use and is performed by users in the role of designers (Aanestad, 2003). Aanestad describes this activity as 'design in use', a process which mainly involves continuous organization of activities and the re-configuration of relations between human and technological actors. Users may opt to reconfigure or customize technologies and tune their relationships with technologies. The quality of configurability asks for developing mechanisms of supporting *design in use* or *tuning* operations during the use of technologies. This can be achieved by designing open, modular and flexible technologies. Kahle (2008) defines "openness of technology" as "the degree to which it empowers users to take action, making technology their own, rather than imposing its own foreign and inflexible requirements and constraints." The quality of configurability, inline with other qualities, supports variety in the formation of human capacity of action. By virtue of their modular and flexible structure, technologies may become less isolated and take part in a network or ecology of other technologies and humans (Bardzell, 2010; Callon, 2004).

de Laet and Mol (2000) explain the notion of fluid technologies, which is a broader view of configurability. Fluid technologies are not only configurable: they may change their form in practice. Thus, there is no single form or boundary peculiar to the technology designed; it is a flexible technology transformed by users at every site of use. The Zimbabwe Bush Pump is considered as a highly successful fluid technology (ibid.). The success of the Bush Pump is not only related to its flexible, replaceable parts or modularity but also to the practices and relations evolving around the Bush Pump. Fluidity of Bush Pump is observable at different levels:

> The first aspect of the Pump's fluidity is that its boundaries are not solid and sharp. The Pump is a mechanical object, it is a hydraulic system, but it is also a device installed by the community, a health promoter and a nation-building apparatus. It has each of these identities – and each comes with its own different boundaries. … In each of its identities the Bush Pump contains a variant of its environment. … The second, related aspect of the Bush Pump's fluidity is that whether or not its activities are successful is not a binary matter. There are many more relevant answers to this question than a simple 'yes' or 'no'. ... It may work for a while and then break down. Good technologies, or so we submit after our encounter with the Bush Pump, may well be those which incorporate the possibility of their own break-down, which have the flexibility to deploy alternative components, and which continue to work to some extent even if some bolt falls out or the user community changes. … And then there is the actor behind the Pump, who refuses to act as such. Dr Morgan's [designer of the Pump] carefully sought dissolution, his deliberate abandonment, is not simply an asset in any man, but is especially suited to the dissemination of the Bush Pump. Pleased with what he calls the 'forgiving nature' of the Bush Pump, he has made it after his own image – infused it with a fluidity that he incorporates himself as well. It may be that to shape, reshape and implement fluid technologies, a specific kind of people is required: non-modern subjects, willing to serve and observe, able to listen, not seeking control, but rather daring to give themselves over to circumstances (de Laet & Mol, 2000:252).

As in the case of the Pump, the notion of configurability can be extended to include configurability of system components, configurability of understanding of success, configurability of actors' roles and configurability of ownership. Thus, the quality of configurability involves an understanding of the relationality of many different aspects of the design process and supporting their reconfigurations in the design and use of technologies.

4. THE RELATIONAL VIEW OF AGENCY IN ARCHITECTURE

Earlier scholars have conducted studies in the field of architecture embracing a relational view of agency (Yaneva & Latour, 2008; Yaneva, 2008; Ripley et al., 2009). Science and Technology Studies (STS) and, in particular, Actor-Network Theory (ANT) have been employed for analytical purposes to develop a relational understanding of built environments, practices and architectural and urban design processes. The ANT, which is based upon a notion of general symmetry between humans and non-humans, considers agency an effect of the network of humans and non-humans. From an ANT point of view, Yaneva and Latour (2008) criticize the Euclidian representation and understanding of buildings and the notion of buildings as static structures. They suggest a pragmatist view of architecture "generating earthly accounts of buildings and design processes" and "tracing pluralities of concrete entities in the specific spaces and times of their co-existence" (ibid. 87). A recent special issue of *Science Studies*, edited by A. Yaneva and S. Guy (2008), was dedicated to understanding the role of STS in developing our understanding of cities and architecture and aimed to answer questions such as "What does it mean to produce a socio-technical explanation for buildings, urban networks, design processes and city developments?" Similarly, a recent issue of *Footprint*, edited by I. Doucet and K. Cupers (2009), focused on the notion of agency in architecture and explored it with respect to criticality, material contingency, social and political dimensions, locus of agency, and tectonics.

The notion of affordance, which was developed by Gibson (1979), is another important concept for explaining human action in relation to the properties of an object or an environment. Maier et al. (2009) employ the concept of affordance in their attempt to develop a relational approach to architectural design. They demonstrate how affordance can be used as a conceptual device in three different areas of architecture: architectural theory, architectural design and architectural practice. However, their approach is not totally relational: it maintains the traditional dichotomies of form/function and structure/behaviour and hence loses its power to deal with the emergent characteristics and effects of socio-technical systems.

4.1. ASD Qualities in Architecture

In this section, we briefly present how ASD qualities can be employed in the field of architecture; that is, integrated either into the architectural design process or the architectural buildings. In this section, our focus is only upon

integrating some ASD qualities into architectural buildings. Our purpose is not to propose a comprehensive and absolute translation of ASD qualities into architecture; rather, we aim to demonstrate some possible translations of two of the qualities as an opening: the quality of visibility and the quality of configurability.

The quality of visibility can be translated as the visibility of structural and infrastructural elements of the buildings. In fact, much earlier the New Brutalism movement advocated this quality in the early 1950s. Reyner Banham identified three key characteristics of the movement: "1, Memorability as an Image; 2, Clear exhibition of Structure; and 3, Valuation of Material as found" (Banham, 1955: 23). In effect, the second and third characteristics directly correspond to what the quality of visibility asks for. Using Hunstanton School as an example, Banham emphasizes the importance of clear exhibition of structure. "One can see what Hunstanton is made of, and how it works, and there is not another thing to see except the play of spaces" (ibid. 22). In addition, honesty in structure and material supports Button & Dourish's (1996) notion of "accounts" and Bardzell's (2010) notion of "self-disclosure", which were explained earlier in the paper. Since no "information hiding" has occurred in the "interface", inhabitants of the buildings can relate to the environment in a more resourceful and informed way. Here, it is important to note that our aim is not to advocate New Brutalism but just to emphasize some of its valuable and relevant characteristics pertinent to the quality of visibility.

The quality of configurability can be interpreted as the degree to which an architectural building supports user appropriation and multiple uses. Buildings that are composed of small, modular and flexible components may prove useful for supporting design in use. In their project North House, Ripley et al. utilize component-based manufacturing techniques to "explore means by which a building design can be more responsive to the changing needs of its users, and to develop new reflexive and user-responsive building systems appropriate to cold environments" (2009: 11).

5. CONCLUSION

In this paper, we have elaborated ways of embodying a relational view of agency in the design process by analysing recent developments in the fields of interaction design, architecture, participatory design, feminist science and technology studies. Building on these developments, we have proposed six qualities to characterize a more relational design approach referred to as Agency Sensitive Design (ASD). The six qualities introduced here are a starting point towards developing ASD. Our aim is not to replace existing design approaches but rather to complement them by *relativising* how we think and go about design.

We allocated most of the paper to explaining the theoretical basis of the ASD approach. Elsewhere (Kocaballi et al., in press), we outlined two participatory design workshops in which we tested the viability of the ASD qualities in early phases of a design process. We constructed a design situation in which participants from different professions explored a design problem. In the workshops, various activities were undertaken in which we employed at least one of the ASD qualities. For more information on these workshop activities, see Kocaballi et al. (in press).

The qualities supporting relationality introduced here are important for the design of many interactive systems. However, sometimes only a limited or controlled level of relationality might be preferable particularly for systems wherein high performance or reliability is required. Since the success of these kinds of systems relies upon the smooth operation of strict procedures, any deviation from the procedures may not be tolerated. These systems use strong inscriptions to prevent improvised actions, emergent interactions and prolonged negotiation processes that might happen between users and systems. However, these systems may also benefit from developing sensitivities to relationality which could help both foresee possible cases of deviation from the desired flow of interaction and prevent them.

ASD qualities should be tailored very carefully. For example, too much visibility, particularly in technology use, may give rise to undesired effects like surveillance, continuous monitoring and invasion of privacy. Star and Strauss point out that "visibility can create reification of work, opportunities for surveillance, or come to increase group communication and process burdens" (Star & Strauss, 1999:10). What is needed is not to take these qualities as prescriptions or strict guidelines for action but to use them as lenses through which to see design problems and processes from a relational point of view. Finally, an important point is that developing sensitivities to relationality requires collective awareness and effort and should be performed in a *relational* way through negotiations between actors.

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