Reporting Some Marginal Discourses to Root a De-design Approach in IS Development

Federico Cabitza, Angela Locoro and Aurelio Ravarini

Abstract In this work, we challenge the concept of design in the development of information systems. Information systems are usually considered to be so complex systems that they simply cannot be developed outside of a specific activity of planning. However, in the specialized literature, some voices have also been raised saying that it is this situated and contingent complexity that always prevents information systems from having been really effectively designed. These voices have so far criticized the formal and methodical approaches in IS design, and not design itself, thus exonerating the role of the modernist designer from the current rate of failure and user dissatisfaction in IT projects. The current idea of designer has reinforced over time a divide between modeling and practicing, design and use, and the hegemony of the planning mind over that of the performer. The current convergence of networked application paradigms and the Web 2.0 infrastructure has led to agile methods, open design concepts and on the idea of a prosuming user. This paper outlines some discourses in IS research that could challenge the more traditional ones in current IT design, and argues about the importance to revamp some of the most important socio-technical principles for maintaining a critical gaze on positivistic and automation stances, mitigating the effects of the modernist over-design attitude, and make IS development more sustainable.

Keywords De-design · Socio-technical artifact · ST artifact · IT artifact · Undesign · Meta-design

F. Cabitza
Università degli Studi di Milano-Bicocca, Milan, Italy
e-mail: federico.cabitza@disco.unimib.it

A. Locoro (✉) · A. Ravarini
Università Carlo Cattaneo—LIUC, Castellanza, VA, Italy
e-mail: alocoro@liuc.it

A. Ravarini
e-mail: aravarini@liuc.it

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1 Introduction

As widely known, Information Systems (IS) research is concerned with "the design, development, implementation and use of socio-technical systems in organizational contexts" [1]. In this discipline, design as a topic of concern has been largely discussed [2]. We also will focus on design in this paper. However, as rightly noted by Fallman, design is a term that is intrinsically difficult to define, since "it can denote many different things to different people: including design as a profession, as an activity, and—when design is used as a noun—as an artifact." [3]. For instance, in an influential contribution for the IS community, Hevner states that "the design process is a sequence of *expert* activities that *produces* an innovative product." [2] (our emphasis).

This vision is mainly grounded on the rich conceptualization of Simon [4], who understood design to encompass all of the conscious activities in which artifacts are created and "existing conditions" are transformed "into preferred ones" [5]. That notwithstanding, for our aims we will follow Baskerville et al. to differentiate the actual construction of any new (IT) artifact[1] from the "working out [of its] form" [3] "the purposeful organization of resources [to build it]" [2] and "formulating hypotheses [on it]" [6], that is from its "design".[2]

Indeed, we need to create some room between the concept of design, intended as "creation of artifacts", which is so preeminent in IS research [4] and especially in the "design science" branch of it [2], and the *situated* use of those artifacts by the so called end users, which conversely is the current main object of investigation of the HCI field [7] and increasingly so of the "behavioral science" branch of IS [2], in order to accept the idea that IT artifacts are not "given" to their users but rather evolve in interaction with an organizational context.

This does not mean to simply acknowledge that design is a never-ending activity that occurs in "the long now" [8, 9] and that artifacts are "perpetually in the making" [10]. Rather, the point is to recognize the active role of users in the necessary transformation of the artifact they use over time; or, at least, of the situated ways they appropriate and accommodate the artifact [11] and work with it. These "ways" and practices are part and parcel of the Socio-Technical (ST) artifact, which should substitute that of IT artifact in IS research [12].

This work in particular focuses on the extreme consequences that can be drawn from those ST-Design (STD) principles that were originally denoted as "Minimal Critical Specification" and "Incompletion"; in so doing, we aim to build on the work where Garud et al. argue that "designing for incompleteness" is far from being an

[1] In this paper we equate the IT artifact with the software applications constituting an Information System (IS), that is the technical component(s) of an IS, and of the related ST system. For simplicity's sake then, the IT artifact definition we refer to is close to the one proposed by Hevner et al. [2], which "include[s] not only instantiations [… of] the IT artifact but also the constructs, models, and methods applied in the development and use of information systems, [while it does not include] people or elements of organizations […] nor […] the process by which such artifacts evolve over time" (p. 82).

[2] After all, OED defines design as "action of producing a plan" (2002).

oxymoron, and propose to the readers a provocative question (even in the title of a section) that they clearly left without an answer: "to design or not to design?" [10].

2 Opposing Stories of Modernist Design

This paper aims to shed light on the phenomenon of the *erosion* of a certain discourse on design, and the contextual emergence of some alternative voices. This phenomenon, on one hand, is becoming increasingly more apparent, likely due to the diffusion of the Web 2.0 and the social media; on the other hand, it has become simply more perceivable by researchers that now look with renovated attention to what happens after that a technology has been designed and built, and has been instantiated into an organizational setting, a sensitivity that has also been dubbed as the "turn to the users" [13].

To frame this phenomenon we have first to claim *what* discourse on design we refer to. We acknowledge the existence of multiple perspectives toward IT design: Johansson-Sköldberg et al. enumerate the main ones in IS research [4]. That notwithstanding, if we focus not on what differentiate these perspectives, but rather on what all these discourse have *in common*, we recognize like a common fil rouge tying these together. We then call this heterogeneous bundle the "grand narrative of the modernist design". We choose the term "modernist" after Berman, who relates that condition to "a socially progressive trend of thought that affirms the power of human beings to *create, improve and reshape their environment*" [14].

With the development of modern industrial societies, when modernism stabilized in philosophy, figurative arts and architecture, we observed the remarkable success of Taylorism in the dawning mass production industry, with its core ideas: "standardization, […] the setting of precisely defined tasks, the emphasis on efficiency and productivity, […] the sharp and permanent split between planning and doing, [the related] irreversible and complete handover of all planning, control and decision making from the workmen to the new class of scientific managers" [15] and the "scientific approach to design [itself, which] was done by specific individuals [such as industrial engineers] but not by those engaged in ongoing operations whose job was to 'do and not to think'" [10].

The same pattern can be recognized 50 years later when the discipline of software engineering was established [16] to cope with what at that time was perceived as "the software crisis" [17]. Professionals whose name (i.e., software engineers, requirement engineers, software architects, software and interaction designers) was chosen in the mold of the building industries and their successful methodologies began to spread over until this day. In this age, many accounts of the conflicting relationship between designers and users (the so called designer/user divide) in organizational context, and how the intentional design plans of the formers become thwarted by the latter ones make and *gain* sense (e.g. [13, 18–20]).

In the next section then, we will collect some of the most important approaches to design that more or less consciously challenge the main assumptions underlying the

grand narrative of modernist design. After Lyotard [21], we will collect these (still) minor discourses into a paralogy,[3] the *paralogy of de-design*. Such an idea undermines the legitimacy of the modernist design in the first place, but also the prominence of the designer as the "high priest" [22] "at the top of the solution hierarchy" [23], of which Le Corbusier represents a sort of archetype.[4] Similarly to anti-design approach [24], which programmatically conceived products not "intended as finished or closed forms", also de-design denotes a departure from the idea of design as detailed planning and envisioning of future objects and situations, to embrace the more extreme consequences of the "open design" age, which Atkinson associates with many related phenomena, among which the advent of the "cult of the amateur" (which opposes the connoisseur's one, cf. Keen), the diffusion of the Do-It-Yourself rhetorics (e.g., the scripting programming,[5] the "maker age", Arduino and the 3D Printing Industry), and the shift from "co-creation or co-design to a position where users take on the responsibility for creative and productive acts in their entirety", and also build products from scratch and tinker them until they fit their needs almost totally, since amateurs are "those who know themselves what is best for them" [26]. This loop cuts out the designer, and challenges also the need to "conceive ideas" explicitly and to "form a representation of those ideas", to build models, which are the main cognitive tasks that Cross associates inextricably to the very notion of design lying at the basis of design research [9]. To this respect the first anticipatory ideas within the Information Systems field (at large) at the basis of the de-design paralogy can be recognized in those (few) works that have so far questioned the importance and reliability of explicit representations and formal models of work and use in technology design [1, 25, 27–29].[6]

[3] In this context, a paralogy is an alternative discourse (or "little narrative") that is developed in opposition to an established way of reasoning ("grand narrative", or metanarrative).

[4] In 1923 Le Corbusier stated that houses were to be conceived (and hence designed) as "machines for living" ("une maison est une machine-à-habiter"). This resonates with the Tayloristic image of the "organisation as a machine" (actually by a Taylor's follower, Gantt). See also Evenson, N. (1969). "Le Corbusier: The Machine and the Grand Design" Studio Vista, and Morgan, G. (1997). Images of organization. SAGE Publications.

[5] As noted in [25] open design and open software development can be paralleled but present also stark contrasts: in open design instead of collectively making single uniform products, there is a collection of outputs that are built by single makers to fit their needs, possibly by exploiting (by either adoption or adaptation) products or contents of the others.

[6] In those works what it is usually questioned is either the ostensive (i.e., prescriptive) or descriptive power of models [30], while their function as an aid for introspection, reflection on practice and, most notably, communication is rightly often recognized (e.g., [31, 32]), even where IS design methodologies are depicted as a "necessary fiction to present an image of control or to provide a symbolic status" [33] in the essentially political process of IT design [34].

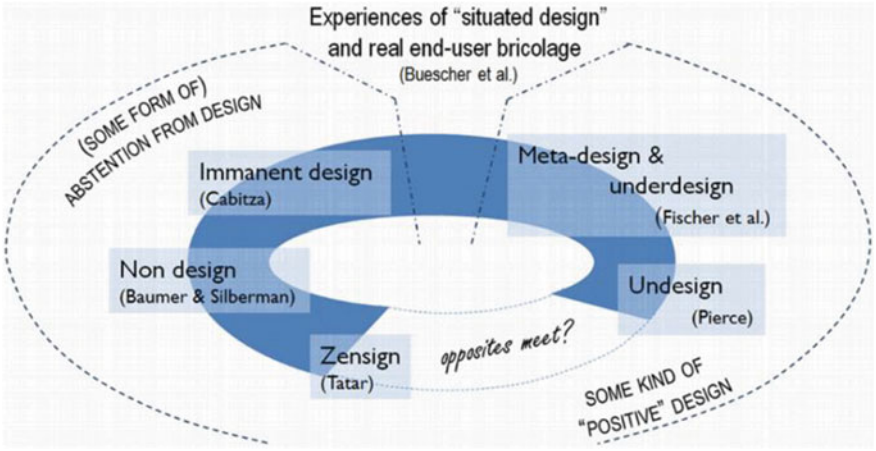

Fig. 1 The spectrum of the various stances in the de-design paralogy

3 The De-design Paralogy

The paralogy of de-design encompasses a spectrum of approaches that differ for few but important aspects and have in common the more or less explicit questioning of the grand narrative of modern(ist) design. We articulate this spectrum (see Fig. 1) in terms of the extent traditional designers and methods are still involved in the organization of activities of de-design, paradoxically as it might sound, to reduce the impact of professional design on the final artifact, or to change the nature of the relationship between the phases of problem framing, solution defining, decision making and eventually planning, and those of resource instantiation and continuous refinement of the artifact.

Thus, one extreme of this spectrum is represented by more or less programmatic stances that advocate various forms of *abstention from design*, on the basis of an explicit will to (self)-limit the scope and ambit of intervention of the designer.

3.1 Zen-Sign

The most elegant example of this stance has been suggestively denoted as "zensign": an understated attitude to design that has been proposed as a way to solve *design tensions* that may "arise in the construction of a system in relationship to a socio-technical situation" [35], for instance when the designer is stuck in-between two equally feasible but essentially irreconcilable design solutions, or even ways to frame the problem itself. This term, which Tatar has purposely avoided to explain too precisely, evokes the idea that omitting and leaving out features from a design is

just as critical to the success of a system as it is including them positively: since any feature does both afford and constrain interactions with and through the artifact, what is left out of it has the potential to be even more important than what designers put in it on purpose. Zensign is not an anti-theoretic or programmatically mindless stance [36], but rather highly "disciplined and principled omission" [37]: "a design inaction that is intentional, thoughtful, purposeful, and impactful" [38].

In this viewpoint, functional omissions do not come from the incompetence or carelessness of the designer, but rather result from a precise strategy of reduction of the risks of the unintended consequences that would (also) derive from the designer's inadequate knowledge and comprehension of the setting, and impossibility to predict all possible uses, interdependencies and effects of the designed thing in that setting. For this reason, Zensign can also be seen as an approach to design that support argumentation and meaning construction (i.e., "design" à la Krippendorff, [4]), and help users face the unpredictable in virtue of their flexibility for "absence of constraints", informed by a humble stance in regard to how to frame, comprehend and support an ever-changing context [39].

The decision "not to design" can also result from an analysis of the pros and cons that deploying a new IT artifact into a specific setting would entail. In this second case, a more proactive de-design attitude can be related to what Baumer and Silberman call implication "not to design" [40] and Pierce as "foreclosure of a potential future technology" in his review of how technology can be *undesigned* [41]. This is the case where professionals decide *not to* intervene on the basis of an analysis that recognizes that a computing technology, although being perfectly feasible and applicable, could be inappropriate or socio-technically unsuitable for a specific setting, or just potentially worse than a "equally viable low tech or no-tech" solution [40]. This resolution can be taken either on the basis of reports of earlier experiences undertaken in similar settings; on the analysis of the unintended consequences that can be traced back to the deployment of similar systems (considering whether "a technological intervention results in more trouble or harm than the situation it's meant to address"); or according to an activity of introspection by which the "critical designer" [42] comes either to "question the need for such a system in the first place", or recognizes that the "technology would solve a computationally tractable transformation of a problem rather than the problem itself". Thus the "no design" solutions that we find at one extreme of the de-design paralogy can also be seen as one of the options, indeed the most radical one, of a fully coherent Critical Design activity, that is a "design that asks carefully crafted questions and makes us think" [43] and thus opposes traditional "modern" design, which conversely focuses on solving problems and on finding (often remunerative) answers.

3.2 Immanent Design

Another form of abstention from conceptual design is advocated in [28] where we proposed an approach now dubbed as "immanent design". This proposal started

from a reflection upon the deep affinity we found between computation and human work as essentially distributed and co-ordinated "manipulations of signs" [44], on the nature of design specifications and how they "specify" the construction of new artifacts while deeply ingrained with symbolic and ritualistic content [22, 25, 34]. By affirming the legacy and link of any invention with the past (its nature of *dis*-covering, etymologically speaking), in immanent design specifications are programmatically recognized as *immanent* to the object to be digitized and automated, that is *already there,* as tangible reality of a stratified process of coevolution with practice so far, thus integrally inherent to and intimately indwelling the material "web of things" [45]. Immanent design affirms that design specifications do not need to be reconceptualized linguistically, while artifacts to be only transformed, or better yet, trans-*format*-ed, rather than recreated from scratch and "reengineered" (as in the construction of "black boxes" aimed at supporting work by "affording" [46] the routine patterns of sign manipulation that can be observed in the traditional, pre-digitization, usually paper-based artifacts). In this case, then de-design as a general principle is reached by abstaining from designing the task "around" the artifact (and hence also the social reorganization the new artifact entails [47]), but rather limiting the designer role to that of facilitating the change of format (e.g., from paper-based to electronic) in which signs-representations are handled and triggering the related local transformations of the artifact that acts as a "mere" scaffolding of practice [48].

3.3 Meta-Design and Underdesign

Walking through the above mentioned spectrum from the more radical instances of de-design to the more softer and almost blurred with traditional professional design,[7] we find what Fischer and colleagues have richly characterized and widely advocated in the last 15 years as meta-design [50–52]. Meta-design was proposed as a framework to develop Socio-Technical Systems and extend the "traditional notion of system design beyond the original development of a system to include an ongoing process in which [end users] become co-designers" but, differently from Participatory Design, not exclusively "at design time" but rather "at use time, throughout the whole existence of the system" [52]. This idea was clearly influenced by the socio-technical argument by Henderson and Kyng that "design as a process is tightly coupled to use and continues during the use of the system." [53]. Accordingly, meta-design builds on the recognition that real design problems are often wicked problems [54], that is problems that cannot be (entirely) delegated to professionals because

[7]The careful reader looking at Fig. 1 will have noticed a sort of leap between these stances, which is denoted as "situated design" [49], something we could not reflect upon for obvious page limit constraints. In very short terms it is when end users do the job of professional designers and design their own artifacts. In the process something is obviously left behind but the attitude will be more bent on the left (of the spectrum depicted in Fig. 1) or on the right, according to how conscious and purposeful end users are in their letting things "out" of the design scope (the more conscious, the more on the left, of course).

only end users as "domain experts" and "owners of the problems" have the necessary knowledge (if not skills) to "incrementally refine" their formulation and contribute local solutions over time. To this aim, the meta-design also encompasses a prescriptive model for the development of "large evolving systems" where periods of activity and unplanned evolutions, carried out mainly by end users, alternate with periods of deliberate restructuring and enhancement, which professional designers govern in more traditional manners.

Within the more general framework of meta-design, Fischer and colleagues also introduced the (indeed less articulated) concept of *underdesign*. As we said above, meta-design regards not only a painstaking design of methods, environments and communication campaigns to involve users in the construction of their tools, but also a contextual (and convergent) de-design of the resulting artifact. Accordingly, underdesign regards the intentional design of systems where some non-critical parts are left unimplemented to stimulate end-user participation and appropriation [11]: more precisely, only the structures and processes of an STS that are indispensable to meet legal norms, security requirements, and basic economic needs are specified so that the resulting system presents a "loose fit" and the necessary "slack" [55] so that unexpected uses of the artifact can be accommodated at use time [11, 53].

3.4 Undesign

At the other extreme of the de-design spectrum that we are outlining in this paper we find a framework presenting some affinities with our intent. In [41] and most recently in [38], Pierce reasons about "the intentional and explicit negation of technology, i.e., the *undesign* of technology". In the undesign theory, Pierce enumerates four kinds of "intentional actions that are each concerned with the intentional negation of technology: […] inhibiting, displacing, erasing, and foreclosing".

The first three strategies regard an increasing effectiveness in *getting rid of* some technology. Inhibition refers to design "that aims to hinder or prevent the use of technology in particular ways and contexts": this can refer to the design of technologies that hinder *other* technologies from working properly (like Web browsers or social applications in corporate LANs, or mobile phones in restaurants and theaters, or speed bumps on urban streets); or also to a sort of "design for non-use" of technologies [7, 56] that purposely try to convince *their* users "to do without them" either in particular situations or in the indeterminate future (e.g., the meetup application, cigarette packs).

Displacement regards the physical removal of technology from its typical or currently occupied position. Erasure: the "complete elimination of a technology from existence". In these latter cases, Pierce also mentions "replacement and restoration" as a design "that aims to undesign a technology by [either] replacing it with some other technology [or] (re)introducing a displaced or foreclosed technology [respectively]". The first case regards, for instance, "replacing a product with a service, like car-sharing services that replace personally owned vehicles; the second, promoting

farmers' market in an endeavor of undesigning industrial processed food". Negative and positive interventions are often coupled in the undesign framework: similarly, foreclosure is mentioned as an undesign activity that entails the (positive) "design of public policies and services [and of] communication campaigns" convincing the target population that, e.g., certain foreclosed technologies are undesirable or detrimental.[8] In analogy with an oft-cited definition of design, undesign regards "the ability to understand that-which-currently-exists, to make it disappear in concrete form as a new, purposeful subtraction from the real world" [38]. Lastly, "foreclosing (a technology)" is a kind of "degenerate case" of undesign (in the light of its positive definition), and for this reason has been subsumed earlier in the opposite extreme of the de-design paralogy: as it is to abstain from designing a technology, which nevertheless has been conceived.

Although both the de-design paralogy and the undesign theory refer to a set of common sources, we conceive the discourse on de-design as encompassing "undesign thinking". Indeed, this latter regards an *intentional* act of design that is explicitly aimed at limiting the technology's scope, scale and reach: as stated clearly in [41] undesign regards the negation of technology, not of design itself.

It builds on the Fry's notion of "elimination design", which is a design approach aimed at identifying and eliminating the unsustainable [57], and on the dyad "creative destruction and disruptive innovation" therein proposed and so undesign remains an intentional intervention *on* the world that is recognized to have both a positive (i.e., constructive) effect and a negative (i.e., destructive) one. The de-design paralogy instead, overlaps with this kind of negative design, and also encompasses more radical stances that deny both "artifact design" (i.e., meta-design, underdesign and partly zensign) *and design itself* as a professional practice: zensign again, the sort of anti-representational development of "immanent design" [28], end-user bricolage [58], situated design [49], "open design" and the "non design" by Baumer and Silberman.[9]

[8]To this respect much of the work of a requirement analyst concerns the systematic undesign of the solutions suggested by the client in the first place, and their substitution with more feasible or cost-effective solutions (personal communication with the author).

[9]To this respect, we consider refraining from designing a technology as a form of designerly action only if this results from an activity involving experts denoted as "designers" engaged in and accountable for the "conception and planning of the artificial" [54]. Pierce also makes an insightful point on the impact of design inaction (like in non-design and zensign), sustaining that such a practice must be "continually articulated in some manner [and] materialized, to be acknowledged and recognized" as such, to convince the reader that undesign is necessary also for the most extreme cases of de-design to be impactful in the long run. However, the paradoxes he calls attention to ("How do you literally sell nothing in a commercial context? Or get paid to design nothing? How does an interaction designer "undesign interaction" without actually designing an interactive technology?") are such only within a modernist grand narrative of design. If we let expectations about design finally go [59], or "if design is something else" [8], we will have gone a step further in deconstructing the modernist idea of design and in making an alternative discourse (de-designed, so to say) conceivable and, therefore, debatable.

4 Discussion

In this paper we have outlined some approaches to design that we have put under the rubric of de-design in order to stress their potential to undermine the main assumptions of the modernist idea of design mentioned in Sect. 2 and that we recognize to be still mainstream in professional practice and IS research. At this point, one could come to ask: what can the paralogy of de-design add to the strand of STD? [60] Rather than being taken in just for its provocative and iconoclastic message, reflecting on de-design can contribute to revamp the deeply democratic stances of the ST approach: not only by going beyond the models of participatory design in which users are involved in tasks of (still modernist) design (usually gamified to some extent like in card sorting and comic scenario drawing), and so to say temporarily accommodated in the "ivory tower"; but rather by taking a conscious and sensible "backward step" to leave room for the users' viewpoints and initiatives.

In particular, de-design discourses can contribute to sensitize on the importance of the principles of "minimal critical specification" and "intrinsic incompletion" defined in the STD framework [10, 60]. To this regard, also Trist noted the importance in ST theory of these principles [61], which regard that "only the essentials are decided a priori [and] as much as possible is left open to be decided [by workers] at later stages as operating experience is gained"; in so doing, he added, "the barriers between planners and implementors are reduced [and] design and operations are seen as a continuous process" (p. 41). More recently, also Kallinikos et al. [62] recognize that any technical systems is intrinsically if not necessarily incomplete and perpetually in the making, if it is embedded in the real world [63].

4.1 From Formal IS Development to Effective IS Design

This vision and the de-design discourse point both to a de-emphasis of the importance of formal, accurate and consistent a priori models and descriptions of the IT artifact, not to hinder its "growth" and evolution [64] on the basis of an *informed wariness of the capacity of the expert called designer to envision, specify and create effective solutions for someone else* (the needy). This stance is probably grounded on two main assumptions: first, "the efficacy of autonomous work groups", in its turn grounded on "the cybernetic concept of self-regulation" [61] (p. 34); second, the primacy of *performativity* in IS development.

The first assumption conceives work groups as "nonhierarchical social formations" and "learning systems" that become more and more proficient in "setting their own machines" over time by facing "day-to-day issues" (p. 34). To this respect design is relegated to posing "boundary conditions in the group's environment so that the group itself may be freed to manage its own activities" (p. 34). The latter assumption aims "to challenge the representationalist belief in the power of words to represent preexisting (and prospective) things" [65] and invites to conceive ISs

as resulting from the "socio-technical entanglement of IT artifacts, work practices, users, and the developers" involved [66] instead of being highly complicated and resource-consuming machines designed to support a neo-tayloristic program aimed at "providing [timely and] appropriate intelligence for managers at all levels, [helping them] develop [forms of] budgetary control [and enact over detailed] performance indicators and measurements of work performance" [67] on the basis of the "big data" available.

Intended to overcome the limitations and minimize the shortcomings of those closed systems that designers traditionally give to passive end users hoping in behavioral compliance and process "normality", de-design discourses rely on the idea that social creativity and collective intelligence (if not crowd wisdom) can be effectively and efficiently promoted, harvested and leveraged in organizations in face of important socio-technical challenges.

4.2 Social Implications of De-design

These regard both the technical and the social dimension. In the former case the challenge to, on one hand, devise and experiment new and more user-friendly and engaging visual tools that could exhibit a mild learning curve but nevertheless allow for even complex customizations and extensions in both the information structures and the activity flows of the organizational application [68, 69]; and on the other hand, to exploit the full potential of technologies currently available, like the Web 2.0 infrastructure (e.g., github.com, superuser.com, stackoverflow.com, myriads of geek blogs and specialized forums), the visual programming languages and design environments (e.g. Google Blockly, SketchUp), the collective repositories (e.g., Google Warehouse) to enable and empower end users in taking a more proactive attitude towards the improvement and evolution of their tools.

And the social dimension as well, where further research must address, e.g., how to tap in social and human capital in *coopetitive* settings and communities of practice; how to foster the willingness of users to engage in additional learning to become active "developers" (and acquire the related mindset), and engage in really participatory activities of co-development; how to conciliate the progressive end-user empowerment with new figures of professional IT "designers", like those of facilitators, gardeners [64], maieuta-designers [70], and community managers, just to mention a few; and also how to factor in IT consumerization, i.e., the use of privately-owned IT resources for business purposes in addition to their original private ones.

De-design narratives could support approaches to IS development where people are invited not only to open up the "black boxes"[10] with which they work and

[10]Future work could be aimed at understanding de-design as an activity of purposeful de-covering of the concealment and black boxing of traditional design: as a sort of de-de-sign, as noted recently by Storni [71], to build more appropriable artifacts.

through which they interact, and in so doing undertake more *tinkering* than conceptual thinking [72, 63]; but also to try and assemble new "glassy boxes" [69] in genuinely bottom-up and incremental manners, in order to create user-generated information systems [73]. To this aim, they could just assemble at interface level "building boxes", i.e., components and simpler services (e.g., mashup) connected to the organizational IS infrastructure as well as to external services in the cloud, which they could either define by themselves [68], or find among those provided by professional meta-designers and made freely available by peer developers, as advocated by the "open design" movement [26].

5 Conclusions

That said, what "de-designing the IT artifact" exactly means is a matter of interpretations and idiosyncratic stances on IS design and development methodologies. Surely the paralogy of de-design is not "yet another approach to IT design", lacking the necessary coherence for such a role. A paralogy, we recall, is just a collection of minority voices, in this case on IT design, that we gathered in this paper for their potential to influence the mainstream discourse, especially in the STS design arena.[11]

However, we claim that efforts in de-designing the IT artifact should be paid to create "some room" between the "IT" and the "artifact" so that the ST artifact "including" both could evolve and "grow" in a less constrained and controlled manner.

While in this contribution we focused on the de-design of IT artifacts in STSs, future work could also be aimed at framing the de-design of the "social" component of a STS (e.g., going beyond job descriptions, organigrams and the related hierarchies, as well as the institutional and "formal" definition of standard operating procedures). This would probably lead to join the performative project of the Critical Management Studies [75] to investigate phenomena like the thriving of "real" bossless organizations (like Valve and GE Aviation in the US, Semco in Brazil, Mondragon Corporation in Spain) and the bottom-up self-organization of communities of peers, like in open source development, open design and citizen science initiatives and projects, in an attempt to deconstruct the "intelligent design" myth in IS design research [76].

This new attitude can improve the resilience of socio-technical systems to the ever-changing context in which people live and work, as well as the overall capability of the "system" to cope with the unexpected. In these systems the ST artifact will be called to support—or just not hinder—the ingenuous efforts of the people, which

[11] For this reason we did not adhere to any particular methodology of literature review. Our aim is not to either "fill or address gaps in the literature", but rather to problematize modern(ist) IT design and challenge the assumptions of most of current literature [74] to advocate some STS design tenets. To this aim, recalling the most relevant works from our serendipitous readings in the last 10 years was considered sufficient to draw the spectrum in Fig. 1. In doing so, we are aware that many other voices have been probably left out of the picture, arbitrarily but unintentionally, which will be enriched in future similar works.

are tacit, deeply embodied, and situated in the wrinkles of the territory of practice, which the modelling "rational" mind will never know, both for its efficient snubbing of the irrelevant details, and the atavistic fear of the unintended consequences [12] that hide in these details even too well.

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