

Could Participation Support Sustainability in Requirements engineering ?

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Abstract—Many disciplines see a paradigm shift towards more participative processes. Requirements Engineering is a collaboratively creative process, so it entails stakeholder participation to a certain level. But how far should stakeholders be involved? Would more participation result in more sustainable systems? We draw on some studies from other disciplines to indicate that participation has indeed potential to support sustainability, if some obstacles can be handled appropriately.

Index Terms—Participation, Sustainability, Requirements Engineering.

I. INTRODUCTION

Participation refers to the involvement of several stakeholders in the process of doing something. As RE is a collaboratively creative process [1], participation is always present, in a more or less direct way. The question is thus not whether or not to use participation, but rather it is to decide on who will participate (how many different stake areas will be represented in the various discussions), how participation will be facilitated (directly or indirectly via an analyst), how far participants will be allowed to influence decisions (from bare consultation to real decision making), and on what matter(s) participation will be allowed (low level details, high level objectives, or everything that's in-between).

We may define “participative RE processes” as those where stakeholders from various areas of stakes are expected to actively work together to discover, validate, document or analyze requirements elements. A process is considered more participative if more people from more stake areas are involved, if they interact in a more direct way with each other, if their potential influence on decisions is bigger, and if they are allowed to influence on more topics. For example, an analyst interviewing stakeholders at the start of a project and then not referring back to them before the go-live is on the lower scale of participation. Agile processes with scrum meetings every morning and client demonstration every week are certainly higher. Using participative design techniques (as creative workshops) with final users and several experts will also raise the level of participation of an RE process.

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The research question is: Would an increase in the level of participation in RE processes lead to more sustainable systems? To bring a tentative answer to this question, we explore some other disciplines where participation is discussed.

II. MORE AND MORE PARTICIPATION

Virtually any discipline is seeing a participative trend growing. Health is perhaps an interesting one, where the almighty power of the specialist is slowly leaving space to online health forums, where experiences are shared, and advices come from all directions. More formal forms of participative health processes are carefully studied by researchers [2]. Learning is no longer in the hands of teachers [3], and universities have to now count with the competition of online co-learning platforms [4], let alone the ultra-famous collaborative knowledge platforms such as Wikipedia. Journalism has been strongly challenged by social networks, micro-blogging platforms and online media, changing the paradigm from broadcast to multi-directional discussion [5]. Crowd-funding has also made media more independent from private funding agencies, bringing participation to the next level in this discipline [6]. In design, participation is well known, especially in Nordic countries [7]. In engineering, the most famous examples probably belong to open source software development, and more recently the success of agile methods also shows the interest in participation. But hardware is also seeing open source striking, with the first open source cars arriving on roads [8], [9]. Participative policy making is also breathing fresh air into our democracies around the world [10], [11], [12]. Finally, social development projects have since some time now been involving local communities in the decision making process, for example allowing them to participate in environmental assessment [13], or in designing projects such as schools, garbage collection, river management schemes, and the like [14], [15].

III. DOES PARTICIPATION LEAD TO SUSTAINABILITY ?

The studies and experiments related to in the section above, along with the experience that the author has as a facilitator of participative processes in RE, lead us to think that, indeed, participation has a strong potential to lead to more sustainable systems. However, this will not be automatic, and many obstacles have to be mitigated. We develop below an initial argumentation, building on studies in the social development and journalism domains.

A. Promises

Firstly, it is worth to note that in social development projects, participation is seen as being a component of sustainable development [15]. In this discipline, participation has been seen as a way to empower people, consequently leading to a better control on their own lives in the long term [14]. A similar pattern exists when, in a company, participative innovation is fostered, leading to empowerment and more satisfaction [16]. In short, we can say that successful participation means empowerment, which obviously supports social sustainability.

Empowering people also relates to democracy, and participation efforts in this sector have shown that sustainable development indeed needs participation [10]. Both in Africa and in Belgium, participation is shown to work well and to relate to sustainable decision making from involved citizens [14], [15]. Those works also indicate that projects using successful participation have a better acceptance rate, last longer and consequently have a stronger impact. This relates to sustainability in that projects that are not accepted or short-lived represent an important waste of resources and energy.

In Belgium, cases illustrate how participation allows deconstruction and creative reconstruction of problem frames, by allowing circulation of the problem in various dimensions and spaces. Participation helps to open up the solution space and let us come to richer solutions that cope with more objectives and constraints, including sustainability constraints that were sometimes out of the initial scope, before the participation [15]. Doelle and Sinclair also advocate that a consensus making form of participation will be more efficient and lead to more sustainable outcomes than an a-posteriori assessment one [13]. Journalism also indicates promises from participation, imagining the discipline as a conversation rather than broadcasting [6], nurturing better democracy. People are ready to participatively fund independent journals, and are shown to do so for contributing to common good and social change [5]. In all these cases, however, specific actions have to be taken in order to mitigate some obstacles that we describe below.

B. Obstacles and Possible Mitigations

It is clear that participation is not automatically a success. Real participative processes may be rich, but always cost time, and are not always possible or even desirable. The first problem with participative processes concerns the possibility for the participation to be controlled by a certain type of people, more skilled or culturally stronger. The idea that participation is a discussion forum without rules must thus be rejected, at the risk of seeing the stronger impose its opinions by influencing others in a way or another [15]. Lyons et al. indicate experiences where participation failed for such reasons [14].

But even if there is no such strong person or group, the risk of seeing participants fighting for their own personal, local, short-term interests exists. In these circumstances, the process will be inefficient and lead nowhere. Lyons et al. also show such examples in African development projects: where no

democratic and transparent cultures and infrastructures were in place around the project, the participation failed to bear its promises [14]. Participative processes are indeed vulnerable to malfunctioning environments. There is sometimes a huge work to accomplish before the environment is ready for participation. The failure described above draws this conclusion, along with failures in participative journalism: Goode indicates that *people and systems, including software running at major crowd-media platforms, have to make their way* [5]. Strong facilitation may compensate for imperfect environments, to a certain extent. In a recent work [1], we have studied all factors that influence the effectiveness of groups in collaboratively creative efforts. This work indeed indicates that people have to make their way, including facilitators of such processes, and all participants. Where the culture is focused on the individual, on fighting for one's own ideas, on competition, such as in many companies, there are indeed some precautions to take when starting participation initiatives.

Another common concern is about the quality of work that can be achieved by amateurs participating, and the place that professional, or experts, should take in the process. The example of online medical forums is probably making this problem clear. Bypassing doctors and doing auto-diagnostic and auto-medication online can potentially be extremely dangerous. Similarly, information relayed by micro-blogging platforms, escaping the journalistic validation, have the potential to convey wrong information at a dangerously rapid rate [5]. Consequently, participation must not be seen as excluding professionals and experts from the process, but as reinventing the relation between them and the public/user/audience. This relation cannot be unidirectional anymore, but places experts and pro's at the centre of a discussion: they have to act as facilitators, consultant, validators. For example, the participative policy making effort led in Belgium had invited experts from the academy and industry to present state of the art and answer questions in the various areas of expertise that the 1000 selected citizens would discuss. The process was managed professionally, and employed trained facilitators [11]. Journalists using Twitter feeds and cross-checking information are another example.

Finally, we underline that, if participation is to lead to more sustainability, beyond the positive social aspect of empowering people, we need participants who care about sustainability. The various cases of urban development in Belgium showed that involving a greater public did brought environmental concerns to the front while some of these aspects had been neglected by experts. In general, participation relies on strong stakeholders analysis, which we have been used to in Requirements Engineering. In the case of sustainable systems design, we need to ensure that some stakeholders will stand up for sustainability concerns [17].

IV. CONCLUSION

Participation has the potential to lead to more sustainable systems, mainly by empowering participants and by offering the possibility to creatively use a diversity of points of view to build more adequate systems, and systems that respect more

sustainability constraints. Indeed, the involvement of more stakeholders tends to bring more sustainability concerns to the front than when experts only analyzed situations.

However, such processes are vulnerable to environments and people and, sometimes, important work is needed before participation can be a success. Facilitation will be needed too, this is the new role of experts and professionals, changing their relation to the users/public/audience.

Important questions also remain to be answered, such as how should one select stakeholders so that together they will emphasize all important sustainability aspects to account for in a system; or, how many stakeholders should one draw from a particular community to be sure that sustainability will be covered during requirement elicitation?

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From Social Development Projects (and other domains)
To Requirements Engineering:

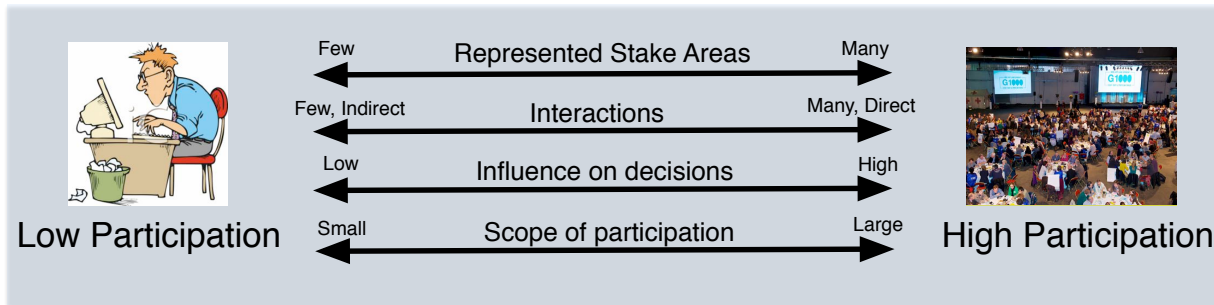


Will More Participation lead to More Sustainable Systems ?

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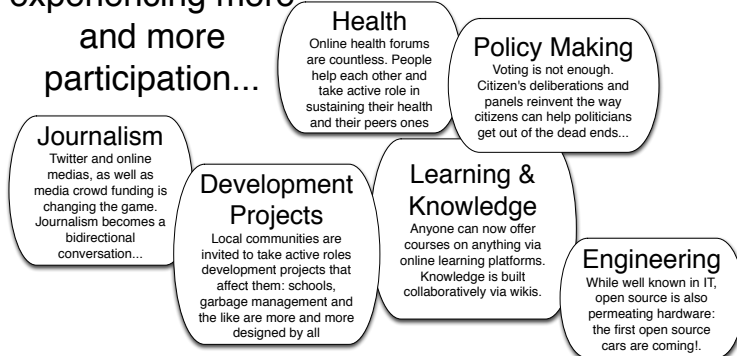


Participation is about Stakeholders involvement (of course!)



The world is experiencing more and more participation...

RE is a collaboratively creative process, so participation is required at some point. But how far should we take it ? And how does that impact sustainability ?



...from studies and experiments in those fields, we learn that participation can lead to more sustainability...

- People are empowered, so more happy, as they have more control over their lives / their work.
- The democracy is revived by this empowerment.
- Participation opens up solution spaces, entailing consensus making out of a large spectrum of points of view, allowing for a richer and more informed decision making process. Conflicts are used for nurturing creative problem solving.
- Consequently, developed solutions match more needs and constraints from more people, including social and environmental concerns, as far as these matter to stakeholders at large.
- Developed solutions are more accepted in that people feel more connected to these. Being involved in design is stronger than answering an interview or giving a vote.
- People learn from these processes, and become better at collaborative creativity. Leading to better participation.

... if obstacles can be mitigated.

Will this be restricted to a certain elite, more skilled or able to influence others ?

Can this process live in any environment? People, structures, cultures are not necessarily ready for this kind of reasoning... People will fight for their interest where local, personal and short term concerns might take over collective interest and long term challenges such as sustainability ?

Will amateurs take over experts and pro's alike, and still be able to produce quality work?

Specific facilitation is required to enable a fairly distributed network of influence.

The environment has to be specifically set up for participation. Where culture is not adequate, participation will indeed fail and there is thus an important challenge here. But examples of adequate adaptation exist. In this cases people show unexpected ability to put collective challenges above personal ones. Then if the right stakeholders are there (including sustainability stakeholders), challenges can be efficiently handled with participation.

Participation does not mean excluding experts or professionals. Their role changes from deciding to facilitating, validating sometimes. They are either facilitators or one more voice. The interaction between pros and amateurs changes.

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