

# What Are the Roles of Information, Participation and Cooperation Overload in End-User Development Support?

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**Abstract.** This paper discusses the concept of information, participation and collaboration overload in relation to end-user development support. The concept of information, participation and collaboration overload are very interesting and relevant points of view for analysing support in the context of end-user development. The end-user developer, working in an unfamiliar domain, is very likely to suffer from information overload. Solving this overload problem by contacting other people can lead to collaboration and participation overload issues. The initial lens used is a knowledge transfer and socio-technical viewpoint. An existing collaborative environment, a virtual community in the form of an on-line support forum is used as an example case. How the various overload issues are potentially interacting in this setting can give ideas for understanding the concept of cultures of participation and guide future research and practice.

**Keywords.** End-user development, End-user support, Cultures of participation, Information, participation, collaboration, overload, Virtual community.

## 1. Introduction

The number of users of computers and other computational devices is steadily increasing. It is nearing universal adoption, at least in the developed world, e.g. [1, 2]. Along with this general increase of users of computational devices, there is a growth of applications and systems that allow, or even expect, the user to take on roles of designer and/or content provider. Web design/development and related activities, like content management systems and web mash-up, are new areas where end-user developers can be found. [3-6] Also, Fischer [7] notes the importance of end-users to the so called “Web 2.0” world. The growth of cloud-computing will mean that more non-developers are putting together information systems from pre-fabricated

components using different service/infrastructure platforms like Google Apps and Amazon Web Services. While these actions may not require the user to write code, they do form a higher-level development activity if the users want to integrate the different components.

Along another axis of development, the Internet of Things and related concepts, bring technological components and software development closer to non-technical users. The current trend is that more and more appliances become “smart” and open to user-customisation. They also allow access to and the connecting together of a number of devices, in a first step it seems, primarily sensors. This means that software development, instead of being concentrated to a small number of computational devices will, quite literally, surround the user with programmable devices. The quintessential example at this point would probably be a “smart” house, with entertainment devices, household appliances, security systems and sensors monitoring the outside and inside environment, all connected together. These components share data and respond to each other and the inhabitants' requirements as defined by the inhabitants. With so many new devices and systems working closely with the user, the degree of software development support the users' need will increase correspondingly. The potential for information overload is great, but one solution for the user could be to make use of social contacts, such as virtual communities, for their support needs. A culture of participation would allow users to avoid being buried under the information overload caused by taking on all these new tasks. However, cooperating and participation can also lead to overload problems, both for knowledge seekers and knowledge providers. This paper discusses the potential impacts of information, participation and cooperation overload as they will likely impact on the process of end-user development support, from the perspective of knowledge seeker and knowledge provider respectively. Section 2 will describe how information overload applies to end-user development support. Section 3 describes information, participation and cooperation overload in the setting of a virtual community using data from a questionnaire administered to a virtual community (an on-line support forum). Section 4 discusses some lessons drawn from the case presented in this paper that we should consider in future work for investigating cultures of participation and finally Section 5 concludes the paper with a summary.

## **2. Information Overload and End-user Development Support**

The problem of information overload is fundamental to the question of supporting end-user development activities. It should be noted that information overload here is considered to be relative and not absolute. What is information overload for one person may not be so for another, and furthermore, it will take on a certain contextual aspect. I.e. the information overload a developer is trying to cope with can be made worse by a lack of contextual understanding of the information. For the end-user developer, moving outside their normal contextual (i.e. work) domain and into one of development (often in the guise of programming) means they need to understand the environment of the development effort, in addition to their own context. The

development process in principle steps away from the work process, and the process to support development is one step away from the development and thus, further removed from the work process, the one the end-user developer is normally best versed in.

The natural solution for many developers to cope with information overload seems to be to reach out to those whom they hope know more. In one study a set of real world users (19 respondents including small-business owners and employees in small municipal organisations) were asked about their support use, see [8] for more about that study. Some of the comments given about support use would be around themes like “I don’t really know how to use the Internet/manuals for support”, “I can’t find the right words” and “it takes so much time”, and often followed up by stating “asking XXX is easier”. A user who was savvier in the computer domain instead noted “there’s always someone who has had the same problem before on-line”. This is where such problems as syntax and vocabulary appear [9, 10] and help explain why information/knowledge sources are often inadequate to solve the problem. [11]

Asking someone else can potentially lighten the burden of finding and applying information, easing information overload, since much of the information seeking and attention investment costs will then be borne by the information provider. It is not always possible to directly ask someone for help. In this case, one solution is to take the question further, going from strong social links to weaker ones, e.g. a virtual community. [11]

### **3. Information, Participation and Cooperation Overload and Virtual Communities**

The example case this discussion is based on, is taken from a dataset of answers from a population of knowledge providers on an unofficial Microsoft Excel support on-line forum. The questionnaire was not designed with information, participation and cooperation overload in mind. However, as the questions were based on knowledge transfer and socio-technical theories (e.g. [12, 13]), they examine aspects of information/knowledge, participation and collaboration in a virtual community. This is closely related to, and often directly applicable to information, participation and cooperation overload issues. The questionnaire used a number of items where respondents were asked to rate on a Likert scale (1 [Strongly disagree] – 7 [Strongly agree]) a number of statements about their activities and knowledge contributions in the community. The number of respondents was 36, though a small sample of the total number of community members (in the hundreds of thousands), they represent a correspondingly larger part of the small pool of experts providing the bulk of the replies to questions posted. E.g. the top 90 posters generated 30% of all messages in the community. A more thorough description of the study can be found in chapter 8 and the survey instrument in Appendix C in [11].

While taking your question public may solve the information overload issue, it may instead cause issues by introducing participation and collaboration overloads. In one sense, virtual communities mediate between the information overload (normally

of the developer) and (potential) participation and collaboration overload (most likely in information/knowledge contributors). I would argue that the nature of asynchronous indirect communication reduces the risks of causing participation and/or collaboration overload, primarily due to the weakness of social ties and the ability to control one's engagement in the community.

The virtual community is often characterised by fairly weak social ties. Each community will be unique of course, but the case examined here is a fairly typical question/answer site. You rarely know more than a few persons well, most people are strangers, and privacy tends to be fairly high. There is a relatively high membership turnover on the fringes of the community. These people tend to make up the bulk of the knowledge seeking activities. A smaller more tightly knit group are the ones who provide the bulk of the replies. The collaboration tasks themselves (i.e. support requests) are often of a rather limited nature, requiring few long-term interactions. Even when they are not, there is little recourse for an information seeker to push or force a resolution to a question. Basically, both question asking and answering are done according to the terms of the knowledge seeker/provider respectively. The community system provides a degree of separation between the two parties. Both parties have a fairly strong control over the level of cooperation they are willing to engage in and can withdraw from the process with very little recourse. The voluntarism of the knowledge providing is very strong in this type of community.

Interestingly, despite this, when asking some knowledge providers the question a fairly strong sense of “obligation” to answer and follow up questions was shown. At the same time the social ties were not considered that important. The social ties were more community oriented for the site as a whole, rather than for specific social ties between specific people.

Naturally, in an environment like this, questions of trust, empathy, altruism and reciprocity become central. What are the motivations to participate for knowledge seekers/contributors and what are their pay-offs? How do we avoid “predatory behaviour” and how can one trust in the community and the answers given?

One of the customary explanations is the various aspect of reciprocity, e.g. [12, 14-16], in essence the idea of “I give and will get something in return”. However, in an environment with mainly weak social ties and a marked difference between those that ask (novices) and answer (experts) questions, reciprocity itself loses explanatory power. And in this case reciprocity takes on a more general aspect. In essence, instead of helping specific people you are helping the community at large, on the basis that, while you may not need the support yourself, you trust in the general concept of providing support.

This could be seen as an expression of empathy and altruism, as the experts know how it was to not know as much and want to help. And indeed, for many experts this is part of the motivation and they may well have made the journey from novice to expert with the support of the community. However, the concept of altruism must to some degree be tempered with the rewards associated with the support process. In this virtual community the rewards are intrinsic, mainly in the form of enjoyment. The experts clearly enjoy participating in the support process, both the problem solving aspects and the chance to learn new things. Extrinsic motivators are largely absent.

The community does not support them and the experts did not seem interested in the concept. The ideals that guide the community could perhaps be summarised as “freely and publicly sharing good knowledge about the subject”. Admittedly, there is a strong self-selected bias towards this position, in that those who do not share this view would not be present nor engage in the community.

#### **4. Lessons to Learn from Virtual Communities**

What are then some of the lessons we can draw from an existing virtual community vis-à-vis information, participation and cooperation overload? With the weak social ties and the fairly limited form of cooperative development the risks for collaboration and participation overload does seem fairly low. Indeed, one could argue that the problems in this environment are more often reversed, in that there is a bigger likelihood of too little cooperation and participation than the reverse.

We can however, tentatively draw some ideas from this weaker form of participation. One suggestion is that providing an outlet for intrinsic motivations such as learning and problem solving leads to enjoyment, which probably reduces overload scenarios. If something is fun and enjoyable we are less likely to consider it arduous. Extrinsic motivators are best avoided as they often ruin intrinsic motivators and would necessitate the construction of some kind of checks and balances system. Continuing that thought, allowing participation and cooperation to be more open and less strictly controlled should reduce overload risks. As a consequence, we must then consider the potential risk of no participation/cooperation. Where possible, a “gentle slope” approach is advisable. Enabling and not coercion should be the watchword, letting people engage on their own terms. For example, by ensuring that reciprocity is aggregated on a community level and not only on a personal level. Trust, altruism and empathy cannot be created, only grown and fostered in a community. Community leaders (whatever form they take) need to lead by example. Consistency and transparency in enforcing rules and community dealings helps support trust in the community. The ideal being “just enough management” where leaders are seen as facilitating the interactions and not hindering them, by always being present, yet not interfering until needed.

#### **5. Conclusion**

This paper has briefly discussed the concept of information, participation and collaboration overload in relation to end-user development support, starting from a knowledge transfer and socio-technical viewpoint. Using an existing collaborative environment, a virtual community in the form of an on-line support forum as a case, it is discussed how the overload issues are potentially interacting in this setting. Some lessons are taken from this limited form of cooperation that can be useful when looking deeper into the subject in the future.

The concept of information, participation and collaboration overload are very interesting and relevant points of view for analysing support in the context of end-user

development. The end-user developer, working in an unfamiliar domain, is very likely to suffer from information overload. The natural inclination of the end-user developer seems to be to reach out to other parties. This can in turn lead to participation and cooperation overload problems from both the knowledge seeker and provider side, especially since the future brings ample opportunity for end-user development in various settings.

The socio-technical aspects of the type virtual community considered here most likely reduces participation and collaboration overload risks. Primarily, by allowing weak social links to flourish and enabling members to interact on their own terms. But also by supporting an indirect reciprocity, i.e. it is directed towards the community as a whole rather than individuals. Supporting intrinsic motivation rather than extrinsic is probably the road to success. The success of such communities, even though they seemingly run counter to established wisdom, suggests that it would be fruitful to analyse them deeper and draw lessons when considering future cultures of participation.

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