

Report

Social software for co-creation in Living Labs – lessons learnt

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ABSTRACT

In this report we summarize the results from our work on requirements and design of social software for co-creation in Living Labs, conducted within the SocialLL project.

Social design feedback is proposed as an approach to utilize social software for such co-creation. We discuss tools for social design feedback. Tools to be used within this approach are discussed. In particular, we describe and discuss the RECORD Living Lab tool, for which new designs and functionality have been developed within SocialLL.

Furthermore, we present two case studies that provide insight in the kind of feedback that is generated in social design feedback studies, as well as lessons learnt concerning the design of tools for social design feedback.

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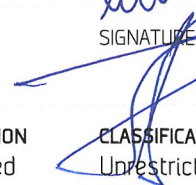
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1 Introduction

The Living Lab approach is a novel way of involving users in innovation and development processes (Schumacher & Niitamo, 2008). In the field of Information and communication technologies (ICT), Living Labs can be understood as environments for innovation and development where users are exposed to new ICT solutions in (semi)-realistic contexts, as part of medium- or long-term studies (Følstad, 2008a). The Living Lab approach to user innovation has received much interest the last years, as is seen in the growth of the European Network of Living Labs which now includes more than two hundred Living Labs (www.openlivinglabs.eu).

An emerging trend, particularly within European Living Labs, is to see the Living Lab approach as a way to engage users and user communities in co-creation activities including interaction between developers and users. Living Lab researchers use a wide range of methods for user involvement in general, and co-creation in particular, as for example is seen by the methods presented in the Living Lab toolbox (www.lltoolbox.eu), an online guide to Living Lab methods.

The methods used by Living Lab researchers for user-involvement typically seem to require face-to-face access to users. Methods utilizing Internet applications and social software¹ for co-creation are remarkably absent. Outside the partners of the SocialLL project², we are only aware of the Finnish Open Web Lab as a Living Lab systematically using social software for co-creation (Näkki & Antikainen, 2008). This is surprising given the potential of the Internet as a platform for co-creation. In 2011, more than half (58%) of the population of Europe was online (www.internetworldstats.com) and about a quarter (27%) of the same population was present on Facebook, the world's most popular social network (www.socialbakers.com). For North America, similar figures were 78% and 41% (Madden & Zickuhr, 2011). Clearly, the Internet holds a great potential for accessing Living Lab user participants; participants that will be accustomed to provide input in an online social context.

This report summarizes results of the first of two research iterations in the SocialLL project (www.socialproject.origo.no) on requirements and design of social software for co-creation in Living Labs. We present *social design feedback* as an approach where social software is used to gather design feedback in innovation and development processes.

First we provide some background on the concept of social design feedback and present existing web-based tools that may be employed for social design feedback. Then we present details on one particular tool for social design feedback that has been further developed in the SocialLL project. Finally we present lessons learnt from the implementation of this tool in two industrial cases.

2 Background

2.1 What is social design feedback?

Asking users for design feedback has its roots in the tradition of human-centred design (ISO, 2008). In this tradition it is seen as valuable that users provide design feedback, preferably at an earliest possible stage. A range of methods are offered that involve user feedback gathering, such as post experience interviews, questionnaires, participatory evaluation, and usability testing (Maguire, 2001). Even usability testing, which mainly is oriented towards observation of users' behaviour, typically involve design feedback by asking for users opinions on usability problems or redesign (Følstad, Law, Hornbæk, 2012) or by post task or post test questionnaires (Ozok, 2008).

¹ Social software is understood as "*internet-based solutions supporting mutual sharing and open dialogue between users*" (Følstad, Ebbesson, Hammer-Jakobsen, & Bergvall-Kåreborn, 2011).

² The SocialLL partners include SINTEF (RECORD online Living Lab), Halmstad University (Halmstad Living Lab), Copenhagen Living Lab, and Luleå University of Technology (Botnia Living Lab).

In parallel with the evolution of design feedback within human-centred design, social software for design feedback is emerging; for example Notable (www.notableapp.com) and Notebox (www.noteboxapp.com). Such tools allow participants asynchronously to provide their feedback within an online group. Design feedback tools can be used inside an existing design team, or to involve larger ad-hoc groups of users in the design process. From the Living Lab perspective, the latter use is particularly relevant as design feedback from users is an important aspect of user involvement in co-creation (Følstad, Ebbesson, Hammer-Jakobsen, & Bergvall-Kåreborn, 2011).

We use the term *social design feedback* to refer to the use of social software to gather design feedback from users in ad-hoc groups.

2.2 Existing design feedback tools – and their relevance for social design feedback

Current design feedback tools may coarsely be grouped in two categories: (a) tools for design feedback as annotations to an image, and (b) tools for design feedback in a separate discussion thread.

2.2.1 Social design feedback as annotations on visual presentations

Some commercially available tools support design feedback as on-screen annotations, where the annotations are located on top of a picture of the design. Example tools include Notable and Notebox (Figure 1), Cage (www.cageapp.com), and Conceptshare (www.conceptshare.com).

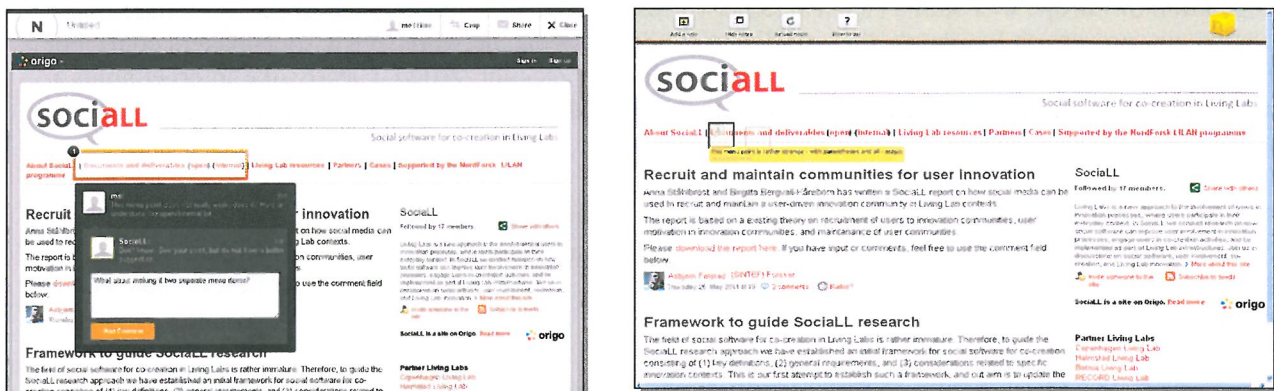


Figure 1: Example tools for design feedback as annotations; *Notable* to the left and *Notebox* to the right.

The starting point for the design feedback in these tools is a visual presentation of the object of evaluation; in Figure 1 the visual presentation is an image of the main page of the SocialLL project website. Participants are invited to add design feedback by locating a marker on the visual presentation and enter a comment that is associated with this marker. In some tools, such as Notable, replies to existing comments are presented in a thread together with the parent comment, which seems useful for supporting structured discussions on each separate design issue. Comments are only presented when focus is on their associated marker, to reduce visual clutter. All comments are associated with their contributor’s profile; participants need to establish a profile, or log in with an existing profile, in order to comment.

The presentation of all comments on top of the visual presentation implies some limitations. First, the objects of evaluation must be presented as images, documents and videos³ rather than interactive designs. Second, since the feedback needs to be located at a particular point in the visual presentation, it may be difficult to address feedback concerning (a) the entire design, rather than a specific on-screen design element, and (b) missing on-screen elements, that is elements that would have been good to include but that are currently not included. Third, there may be a scaling problem if large numbers of participants are give

³ Conceptshare also support design feedback as annotations on a video.

feedback as this may potentially lead to visual clutter. The latter limitation is reflected in that these tools typically are framed as being for a design team or for a designer-client relationship rather than tools dedicated to user involvement.

It seems feasible to use this type of tools for social design feedback. However, due to the potential scaling issues mentioned above, this type of design feedback tool may better support social design feedback with small ad-hoc groups of user participants (groups the size of a design team), rather than larger groups of user participants.

2.2.2 Social design feedback in adjacent discussion threads

Design feedback may also be given as comments in a discussion thread that is not associated with annotations on the visual presentation. This approach is to our knowledge used in one commercially available tool, critiquesthe site.com in addition to in the online Living Lab environments provided by OWELA - Open Web Lab (Näkki and Antikainen, 2008) and RECORD Living Lab (Følstad, 2008b)

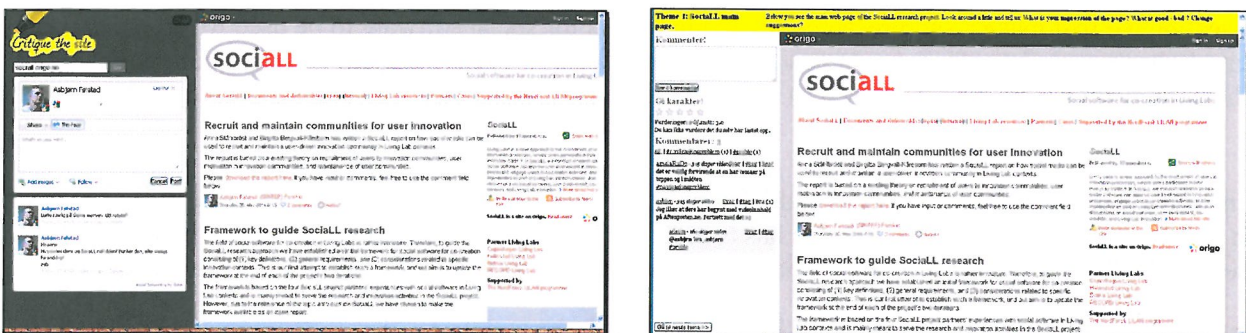


Figure 1: Example tools for design feedback in discussion threads; *Critique the site* to the left and *Record Living Lab* to the right.

The starting point for the design feedback, also in these tools, is the object of feedback defined by the project owner. As opposed to tools for design feedback by annotations, the tools with user feedback in an adjacent thread allow any web content to be displayed, for example a fully functional web site, not just images or videos.

Participants give their feedback in a comment field. The comment field is located in a separate pane or area of the screen, together with the discussion thread. All design feedback is displayed in the same discussion thread. However, some solutions, such as RECORD Living Lab, support multiple discussion threads, that is, the participants may be invited to contribute in a series of related discussions (for example discussions on different aspects of the same design).

All comments are available to all participants at all times. The participants may comment on each others comments, or provide feedback not related to other comments. Also for these tools, each comment is associated with its contributor's profile.

Having design feedback in adjacent discussion threads rather than in association with annotations also implies some limitations. In particular, it may be difficult for participants to quickly see which parts of the design that has already been commented, as comments related to the same part of the design may be located at different places in the discussion thread. Also, it may be difficult to understand which aspects of the design a particular comment addresses; the lack of a visual connection between the comment and the design may require the participants to be more precise and detailed in their feedback in order to avoid such confusion.

It seems feasible to use this type of tools for social design feedback. This type of feedback tools seems not to be prone to scaling issues to the same degree as tools with design feedback as annotations. That is, these tools seem to be able to handle a larger amount of comments before it starts being difficult to get an overview of the existing feedback. It may consequently be possible to use these tools for social design feedback with relatively larger ad-hoc groups of user participants. Even so, at some point a discussion thread also becomes too long for easy overview. Such lack in overview may be challenging both for participants that want to provide design feedback, as it may be difficult to know whether a particular issue has been treated in earlier comments, and for analysts wanting to get an overview of the comments in order to summarize the design feedback.

3 A social design feedback tool

In the SocialLL project we have taken the RECORD Living Lab environment (see section 2.2.2) as a starting point and developed it further as a tool for social design feedback. However, the tool is still at a prototype stage.

In this section we first make a short recap of key requirements for social software to be used for co-creation in Living Labs (section 3.1). Then we present key functionality in the tool for social design feedback as seen from the participant perspective (section 3.2) as well as the administrator and client perspective (section 3.3).

The functionality presented in section 3.2 and 3.3 was part of the tool prior to the SocialLL project. In section 3.4 we present new functionality that has been added to the tool in SocialLL. After this, in the next main section (section 4), we present experiences from two cases in which we try out the new functionality.

3.1 Requirements for tools supporting co-creation in Living Labs

In SocialLL we have previously suggested a set of requirements for tools supporting co-creation in Living Labs (Følstad et al., 2011). The requirements, listed in Table 1, are given from the perspective of user participants, Living Lab administrators and Living Lab clients.

Participant perspective	Administrator perspective	Client perspective
1. Easy signup	9. Easy set-up and piloting of studies	20. Varied degree of openness
2. Easy access	10. Easy recruitment of relevant users	21. Availability of data
3. One point of entry	11. Easy user management	
4. Clear communication of purpose	12. Easy real time overview of participant contributions	
5. Shared areas for communication	13. Easy participant follow-up	
6. Easy to contribute	14. Editor rights	
7. Clear presentation of other participants contributions	15. Easy real time analysis	
8. Cross-platform	16. Flexible export of data	
	17. Minimization of privacy issues	
	18. Flexible access control	
	19. Support for ethnographic analysis	

Table 1: Requirements for tools supporting co-creation in Living Labs. (see Følstad et al., 2011 for details)

3.2 Existing functionality of the social design feedback tool – the participant perspective

From a participant perspective, the functionality of the social design feedback tool can be grouped under five headings: (1) signing up, (2) receiving instructions (3) reviewing the design, (4) providing feedback, and (5) interacting with others.

Signing up

The sign-up process is designed to be fast and easy. The participants join a Living Lab study in four steps:

1. Receive an invitation in an e-mail, a post on a web site, or similar.
2. Read introduction web-page with a description of the study and the Living Lab privacy policy.
3. Input user name and e-mail address as profile information.
4. Input background data in a questionnaire (optional)

The participant is then signed in to the Living Lab study with a personal profile. The process is designed to allow for profile registration with as little input and interaction as possible. The minimum input needed is a user name and an e-mail address for subsequent notifications⁴.

Receiving instructions and presentations

Instructions are provided for (1) the study and its purpose and (2) the use of the social design feedback tool (optional).

1. The study and its purpose is presented on the introductory web page in the sign up process (above)
2. The use of the social design feedback tool may be explained on a separate page, immediately after completing sign up, or as part of the feedback pages. The choice of explanation method depends on the layout restrictions on the feedback pages. See Figure 1 and Figure 2.

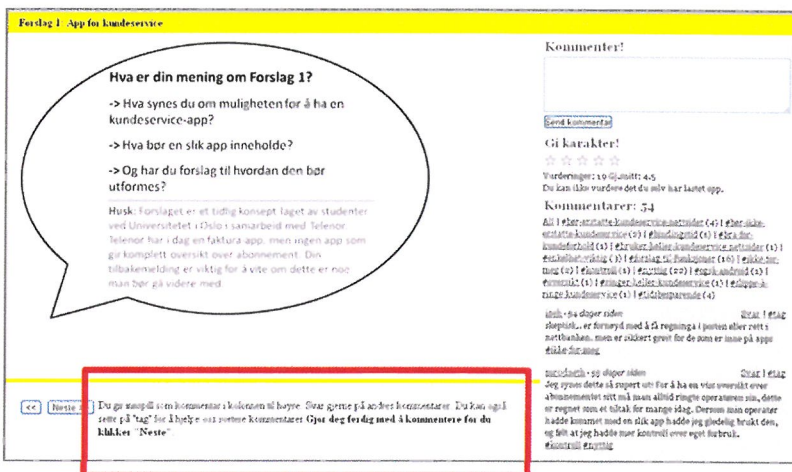


Figure 1: Example explanations for the social design feedback tool, as part of feedback webpage (Case 1). Explanations on how to contribute design feedback is given in the text highlighted by the red frame. In addition, the page includes discussion topics (above the red frame) and comment field / discussion thread (right)

⁴ The tool may also be set up to generate user names automatically, only requiring the input of an email address. However, it is assumed that having the users decide on a user name will make it easier for the participants to recognize their own input throughout the study.

Slik gir du dine innspill

- 1: Les tema ->
 - 2: Kommenter ->
 - 3: Gi karakter ->
- Du kan lese og kommentere det andre har skrevet
- 4: Gå til neste ->



Figure 2: Example explanations for the social design feedback tool, as separate webpage (Case 2)

Reviewing the design

The design is made available to the participants in the same screens as the feedback is to be given in. The designs may be visualisations (images or videos), or interactive prototypes (interactive flash presentations or web services).

The presentation of the design may differ from case to case. Below are examples from Case 1 (video presentation of concept; Figure 3) and Case 2 (interactive web-site; Figure 4).

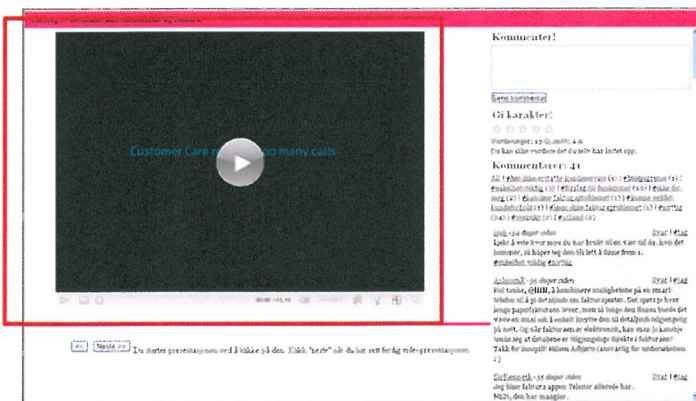


Figure 3: Design presented as video in separate frame (Case 1)

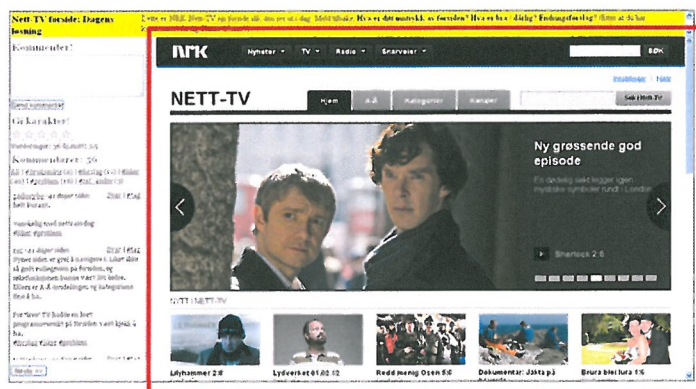


Figure 4: Design presented as interactive web-page in separate frame (Case 2)

Providing feedback

Participants may provide two kinds of feedback: Ratings and free text comments. The participants provide ratings as one to five stars (five is best). Only after making their own rating are the participants given information on the average rating for the design. The participants make their comments as free text in a dedicated field. Submitted comments are included in the adjacent discussion thread. See Figure 5. The panel with the comment field, rating scale, and discussion thread was presented to the left of the object of evaluation in Case 2 (Figure 5) and to the right in Case 1 (Figure 3), a design choice made on basis of an esthetical judgment only.

The participants give their ratings and free text comments in response to a discussion topic presented near the comment field. See Figure 4 for an example location of the discussion topic; the upper field with yellow background.

The discussion topic should be short and easy to read. Example discussion topic from Case 2: *“This is the Web-TV front page as it looks today. Please tell us: What is your impression of the front page? What is good / bad? Change suggestions?”*



Figure 5: Comment field (top), rating mechanism (middle), and discussion thread (bottom), Case 2.

Interacting with others

A key feature of social design feedback is the participants’ ability to interact with other participants, a moderator or representatives for the design team. This interaction is assumed to be valuable as it should allow participants to build on each others insights, as well as it allows for follow-up questions to get more detailed or nuanced insight from the individual participant.

A number of features are provided to drive such interaction:

- The participants can see each others comments in the adjacent discussion thread⁵
- The participants can “reply” directly on other participants comments
- The participants can “refer” to other participants by adding @ in front of their user name when writing the comment
- The participants can “like” other participants comments

Since the communication in social design feedback is asynchronous, the interaction between the participants depends on the participants being notified when someone replies or refers to them. For this purpose, notification emails are sent to participants in the event that someone replies to one of their comment or refers to them.

Notification emails include the comment that replies or refers to the participant, as well as a direct login link leading the participant to the correct discussion thread, logged in. An example notification email is presented in Figure 6.



Figure 6: Notification email sent out when another participant replies or refers to a participant’s comment.

⁵ In some studies it may be desirable not to allow the participants to see the others comments before making their own first comment to a particular thread. In particular, this may be relevant to avoid social biases in the responses. For such cases, there is a feature to hide the discussion thread until the participant has made an initial comment.

Reviewing the requirements from a participant perspective

The social design feedback tool may be reviewed on basis of the requirements for tools for co-creation in Living Labs (Section 3.1). Requirements that are satisfied in the version of the social design feedback tool available prior to SocialLL are presented in regular fonts (R1, 2, 3, 5, 6). Requirements not clearly satisfied in the prior version are presented in in bold (R4, 7, 8).

- R1. *Easy signup*. OK - the participant profile is generated upon the participant's submission of an e-mail address and a user name.
- R2. *Easy access*. OK – the participant get immediate access by a direct log-in link provided in notification e-mails.
- R3. *One point of entry*. OK – repeated entry by the same direct log-in link.
- R4. Clear communication of purpose**. Unclear – the communication of purpose depends on the introductory description. No support is provided for the design of introductory descriptions.
- R5. *Shared areas for communication*. OK – all communication related to a given discussion topic is conducted on one dedicated screen.
- R6. *Easy to contribute*. OK – contributions are made as free texts in a comment field and ratings.
- R7. Clear presentation of other participants' contributions**. Unclear – other participants' contributions are presented in an adjacent discussion thread but may be easily overlooked since the comment field is presented above these.
- R8. Cross-platform**. No – the tool currently is designed for use on a desktop/laptop computer, not for use on mobile devices. However, multiple major desktop browsers (Internet Explorer, Chrome, Opera, Firefox).

3.3 Existing functionality of the social design feedback tool – the administrator and client perspective

The administrator perspective

The prototype nature of the social design feedback tool is clearly noticeable from the administrator perspective. In particular setting up studies requires detail insight in the tool in order to do it efficiently; the admin support for study design is not set up as to be intuitive to first time users.

Setting up and piloting studies will therefore not be described in detail. Other key administrator functionality is described below. This functionality corresponds to a list of requirements for tools for co-creation in Living Labs (Section 3.1) that were satisfied by the existing functionality.

- *Recruitment of users (R10)*. User recruitment is conducted by using a third party market research panel. This implies that there is a direct cost on recruitment for each study, but the recruitment is easy.
- *User management (R11)*. A list of all participating users is provided in the admin section. Individual users may be deleted from the study in case, for example, users leave the study or behave improperly.
- *Overview of participant contributions (R12)*. Administrators use the same study interface as the participants, and thereby get adequate real time overview of participant contributions (cf. R7).
- *Participant follow-up (R13)*. Administrators use the same features for replying and referring to participants as the other participants (See Section 3.2).
- *Editor rights (R14)*. Administrators can delete participants' comments and modify their own comments in the admin section.

- *Data export (R16)*. All comments and ratings in the study may be exported as comma separated files, including data on associated discussion topic, location in discussion thread, and reply comments.
- *Flexible access control (R18)*. Any user can be given administrator or moderator rights, which is useful for example when involving clients as moderators.

Administrator requirements that were not supported in the version of the tool prior to SocialLL include:

- **Easy real time analysis (R15)**. There was no functionality to support qualitative analysis of comments as they came in.
- **Minimization of privacy issues (R17)**. Privacy issues are prioritized in the social design feedback tools and the only person data collected from the participants are e-mail addresses, which is done upon informed consent. However, prior to SocialLL there was no functionality to support deletion of all email addresses for a study without either deleting the entire study set-up (keeping only the data file) or deleting one and one e-mail address in the social design feedback tool.
- **Support for ethnographic analysis (R19)**. Not supported as such analyses are not assumed to be relevant for social design feedback in relatively short-term studies.

The client perspective

The client is the recipient of the study results. The role of the client in social design feedback studies is thought to be either that of an observer, or that of an active participant. In both cases, the client will participate in the same manner as a user participant – with a profile associated with a user name and an e-mail address.

Client requirements to tools for co-creation in Living Labs include *Varied degree of openness (R20)* and *Availability of data (R21)*.

Varied degree of openness is supported by the login feature, and three degrees of openness exist:

- Closed: Only invited participants are allowed to see the presented designs and feedback, and to give feedback.
- Open for viewing: Only invited participants are allowed to give feedback, but anyone can see the designs and feedback.
- Open: Anyone can give feedback (provided they establish a profile first).

Availability of data is supported by the administrator data export feature described above (cf. R16).

3.4 New designs and functionality in the social feedback tool, developed in SocialLL

In a cooperative effort between SocialLL and the Norwegian research project R2D2 Networks (www.r2d2networks.origo.no), new designs and functionality have been developed for the social design feedback tool. The goal with these was to support previously unsupported requirements to tools for co-creation in Living Labs, in particular:

- Clear presentation of other participants' contributions (R7)
- Easy real time analysis (R15).
- Minimization of privacy issues (R17).

Improving the presentation of others' contributions (R7) by changing the discussion thread layout.

Previous cases with the social design feedback tool indicate that only a small minority of participants make explicit reference to other participants' comments.

A possible explanation for this lack of explicit reference, and thereby lack of full-fledged interaction, is that participants do not read other participants' comments thoroughly, even though the comments are available

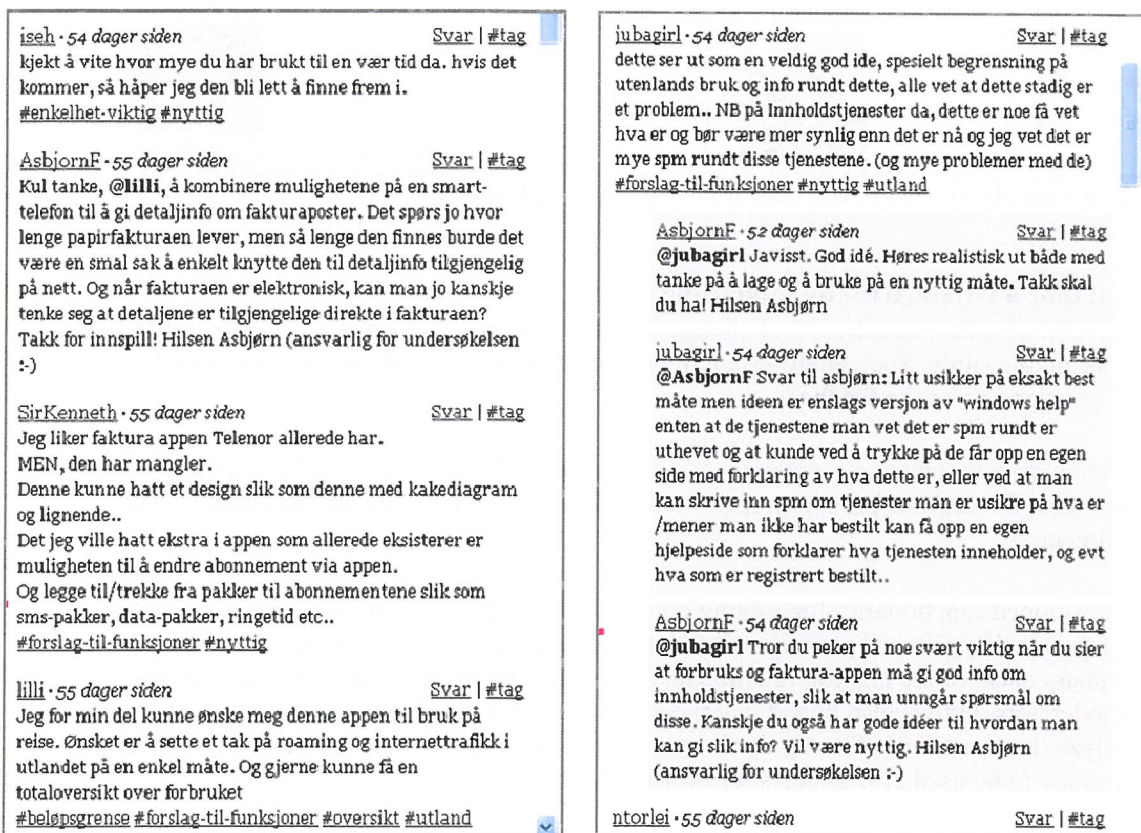
in a discussion thread immediately below the comment and rating fields. An alternative design for discussion threads, much used in blogs, is to have the comment field at the bottom of the discussion thread instead of at the top. This way the participants' need to scroll down previous comments to reach the comment field, which is likely to increase the tendency to read other comments.

Another possible explanation for the lack of explicit reference is that a discussion thread without levels does not support grouping of comments that are made in response to each other; all comments are listed by chronological order. An alternative design for discussion threads, used for example in blogs and online newspapers, is to allow more than one level of comments, where comments-on-comments are listed immediately following the parent comment.

We wanted to see if we could improve user interaction by trying out different configurations of (a) comment field location and (b) discussion thread levels. A feature was included to make these configurations independently of each other, allowing four combinations of discussion thread lay out:

- Comment field above or below discussion thread and ...
- One or two levels of comments

Examples of different configurations from Case 1 are presented in Figure 7 Figure 8. Our experiences from trying out the different discussion thread layout configurations are presented in section 4.3.



The figure consists of two side-by-side screenshots of a discussion thread interface. Each screenshot shows a main comment and several replies.

Left Screenshot (One level of comments):

- Comment 1:** *iseh* · 54 dager siden. "kjekt å vite hvor mye du har brukt til en vær tid da. hvis det kommer, så håper jeg den bli lett å finne frem i. #enkelhet-viktig #nyttig".
- Reply 1:** *AsbjornE* · 55 dager siden. "Kul tanke, @lilli, å kombinere mulighetene på en smart-telefon til å gi detaljinfo om fakturaposter. Det spørs jo hvor lenge papirfakturaen lever, men så lenge den finnes burde det være en smal sak å enkelt knytte den til detaljinfo tilgjengelig på nett. Og når fakturaen er elektronisk, kan man jo kanskje tenke seg at detaljene er tilgjengelige direkte i fakturaen? Takk for innspill! Hilsen Asbjørn (ansvarlig for undersøkelsen :-)".
- Reply 2:** *SirKenneth* · 55 dager siden. "Jeg liker faktura appen Telenor allerede har. MEN, den har mangler. Denne kunne hatt et design slik som denne med kakediagram og lignende.. Det jeg ville hatt ekstra i appen som allerede eksisterer er muligheten til å endre abonnement via appen. Og legge til/trekke fra pakker til abonnementene slik som sms-pakker, data-pakker, ringetid etc.. #forslag-til-funksjoner #nyttig".
- Reply 3:** *lilli* · 55 dager siden. "Jeg for min del kunne ønske meg denne appen til bruk på reise. Ønsket er å sette et tak på roaming og internettrafikk i utlandet på en enkel måte. Og gjerne kunne få en totaloversikt over forbruket #beløpsgrense #forslag-til-funksjoner #oversikt #utland".

Right Screenshot (Two levels of comments):

- Comment 1:** *jubagirl* · 54 dager siden. "dette ser ut som en veldig god ide, spesielt begrensning på utenlands bruk og info rundt dette, alle vet at dette stadig er et problem.. NB på Innholdstjenester da, dette er noe få vet hva er og bør være mer synlig enn det er nå og jeg vet det er mye spm rundt disse tjenestene. (og mye problemer med de) #forslag-til-funksjoner #nyttig #utland".
- Reply 1:** *AsbjornE* · 52 dager siden. "@jubagirl Javisst. God idé. Høres realistisk ut både med tanke på å lage og å bruke på en nyttig måte. Takk skal du ha! Hilsen Asbjørn".
- Reply 2:** *jubagirl* · 54 dager siden. "@AsbjornE Svar til asbjørn: Litt usikker på eksakt best måte men ideen er en slags versjon av "windows help" enten at de tjenestene man vet det er spm rundt er uthevet og at kunde ved å trykke på de får opp en egen side med forklaring av hva dette er, eller ved at man kan skrive inn spm om tjenester man er usikre på hva er /mener man ikke har bestilt kan få opp en egen hjelpeside som forklarer hva tjenesten inneholder, og evt hva som er registrert bestilt..".
- Reply 3:** *AsbjornE* · 54 dager siden. "@jubagirl Tror du peker på noe svært viktig når du sier at forbruks og faktura-appen må gi god info om innholdstjenester, slik at man unngår spørsmål om disse. Kanskje du også har gode idéer til hvordan man kan gi slik info? Vil være nyttig. Hilsen Asbjørn (ansvarlig for undersøkelsen :-)".
- Reply 4:** *ntorlei* · 55 dager siden. (No text visible).

Figure 7: One level of comments (left) or two levels of comments (right)

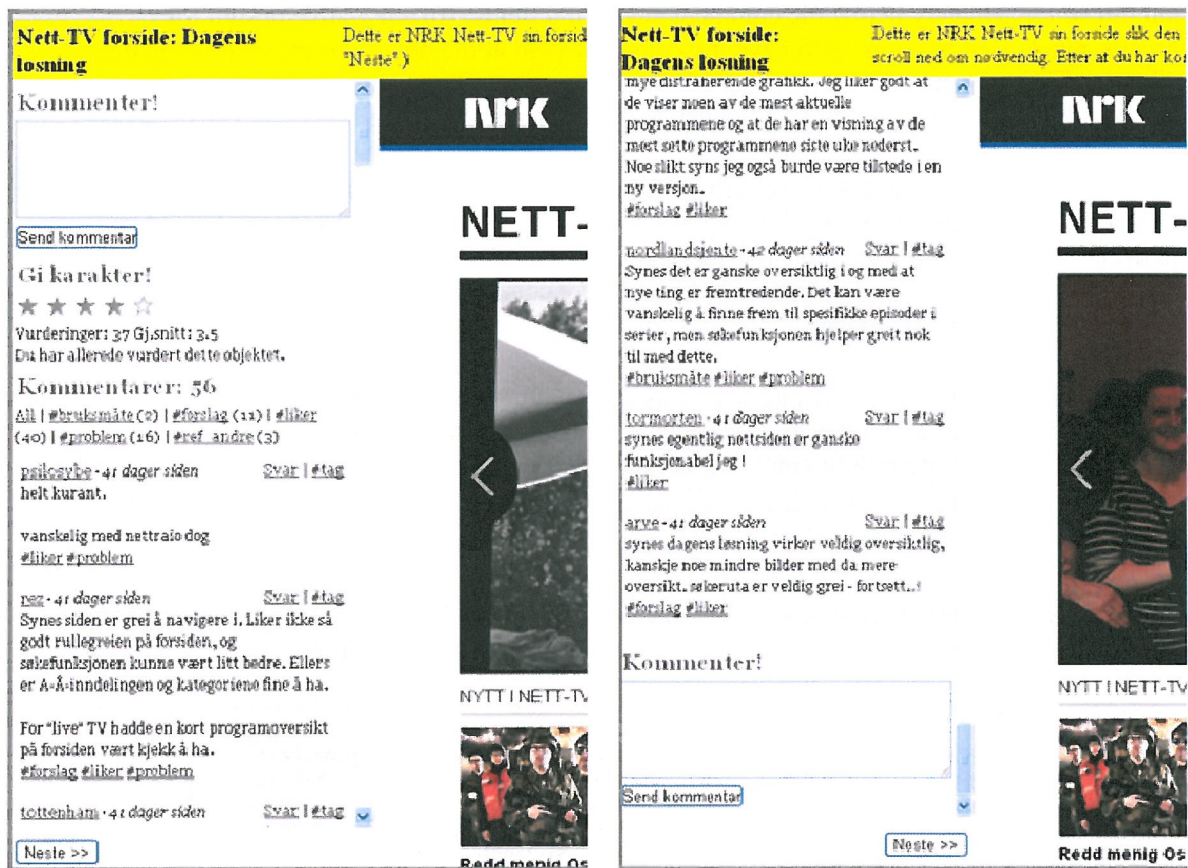


Figure 8: Comment field above the thread (left) or below the thread (right)

Enabling easy real time analysis (R15) by supporting tags

For the Living Lab administrator, a particular challenge in social design feedback is to analyze the content of the comments during the study. Such analyses are important in order for moderators, clients, and participants to get an overview of the feedback.

Tagging is a well known approach to categorizing and sorting qualitative content. We thought tagging therefore could be useful for analysis purposes, in particular if moderators as well as participants were allowed to tag comments.

Consequently we developed functionality for tagging comments, and filtering comments on basis of the tags. The tagging functionality allowed participants and moderators alike to tag both own and others comments. The primary users of the tagging functionality were thought to be Living Lab administrators serving as study moderators, but we also hoped that the participants would pick up on the use of tags as a way to help us analyze the comments. The tag data are made available in the data export, allowing the tags entered during the study to be used also as basis for post-study analysis.

The links to the tagging function ([#tag](#)) are seen for each comment in the Figure 7Figure 8. The tags associated with each comment are presented immediately below each comment. In the screen to the left in Figure 8, the listing of tags is displayed above the discussion thread.

To make tagging easy, and to avoid many similar tags, functionality for tag suggestions was included; as the participants starts entering the characters in a tag, suggestions of existing tags are automatically made on basis of the entered characters. Tag entry with auto-suggestions is displayed in Figure 9.

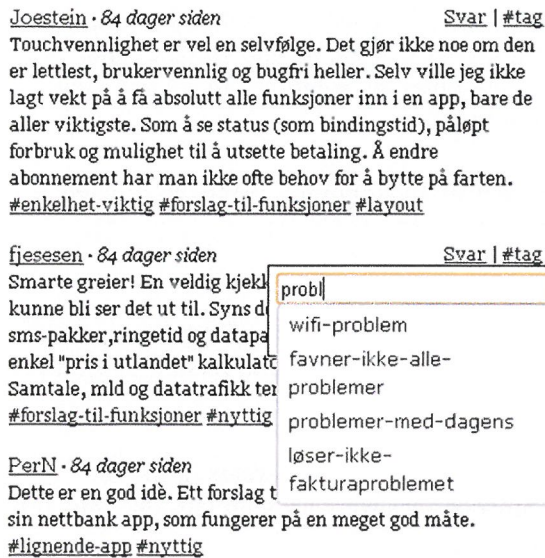


Figure 9: Tag entry with auto-suggestions. Suggestions are updates as new characters are added to the tag.

Minimization of privacy issues (R17) by batch erase of participant email addresses.

Privacy is an important concern when involving user participants in Living Labs. To support notifications to participants during a Living Lab study, we need to register their e-mail addresses. Registered e-mail addresses are only available to Living Lab personnel, and not to other participants or clients. Even so, the e-mail addresses should not be registered for longer time than necessary as these are regarded as person identifying data.

When finishing a study, it is therefore necessary to delete all e-mail addresses. However, it is at the same time desirable to keep all other data unchanged. To support this, functionality for batch erasing of e-mail addresses was developed by which all e-mail addresses not being admin or moderator addresses are erased. After such an erase, the social design feedback tool contains no person data whatsoever.

4 Case trials and lessons learnt

The social design feedback tool was tried out in two cases in November-December 2011. In the case trials we in particular wanted to:

- Get knowledge on which types of feedback that are provided by user participants in social design feedback
- Try out different configurations of the discussion thread layout affect the participants' tendency to interact with each other, based on the new functionality for discussion thread layout (section 3.4)
- Try out the new tagging functionality to support real time analysis (section 3.4)

In the following we first briefly present the two cases. Then we provide results and findings on (a) the types of feedback provided by the participants, (b) the effects of different discussion thread layouts and (c) experiences with the tagging function. Finally we present our lessons learnt and suggestions for revised requirements for social software for co-creation in Living Labs.

4.1 The two cases

The two cases of social design feedback both concerned user feedback in a development process intended to lead to product or service innovations. However, the two cases were complimentary in that they concerned different phases of the development process.

Case 1 – a new Web-TV solution

Case 1 was the development of a new web-TV solution for a Norwegian broadcaster. In this case, the user participants were invited to provide feedback on both the existing web-TV solution, and sketches showing a suggested new solution. Sketches were used to present the new solution as the solution had not yet been sufficiently populated with content to be tested as an interactive website.

The users were invited to provide feedback on three aspects of the web-TV solutions: (a) the front page, (b) the program overview page, and (c) the page for playing media content player. The new version of the web-TV was in the phase of late development.

As basis for making their feedback, the participants had immediate access to (a) the running version of the current web-TV solution and (b) images showing screen dumps from the suggested new version of the web-TV.

In total 254 participants provided social design feedback in Case 1. Mean age was 44 years (min=18; max=79); 33% were female. All participants were users of the broadcaster's web-TV solutions on a monthly basis or more.

Case 2 – new concepts for customer service on mobile devices

Case 2 was the development of new concepts for customer service on mobile devices, developed for a Norwegian telecom provider. In total, three concepts were included for social design feedback. Two of these were developed by interaction design students at the University of Oslo, one were developed by design researchers at the Oslo School of Architecture and Design. The concepts were all in a phase of pre-development.

Two of the concepts were presented as a series of images showing the user interface of the customer service concepts. The third concept was presented as a 3 minute long video.

In total 207 participants provided social design feedback in Case 2. Mean age was 27 years (min=18; max=50); 58% were female. All participants were subscribers of the telecom provider in question and were also owners of touch screen smart phones.

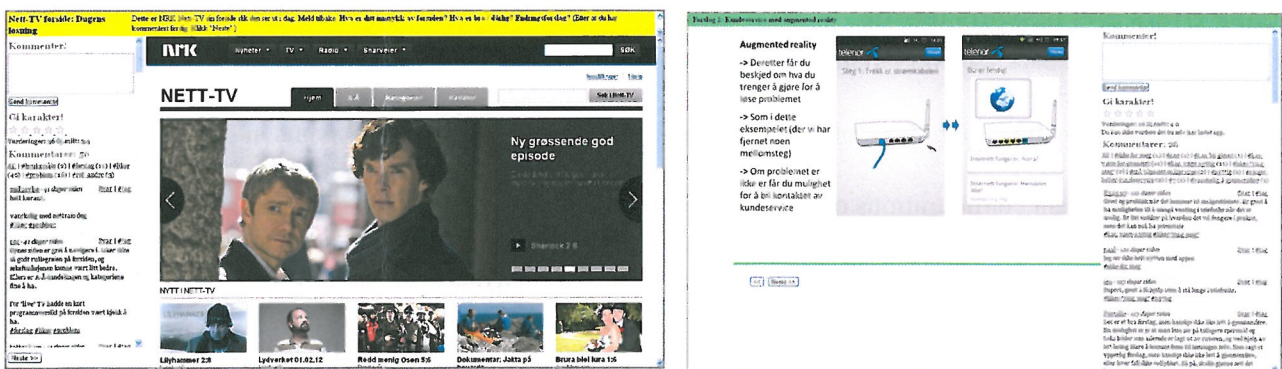


Figure 10: Screen shots from Case 1 (left) and 2 (right)

Participant recruitment and motivation

In both cases the participants were recruited from a web-panel hosted by the market research company NorStat (www.panel.no). As incentives, the participants were accredited points to their panel account equalling the value of approx. 2.5 Euro. They were in addition included in a lottery of 10 gift cards of approx. 40 Euro.

4.2 The feedback provided by the participants

In Case 1 the participants were invited to provide comments in a total of 6 discussion threads. In total 254 participants registered and 189 of these (74%) provided one or more comments. The participants provided 882 comments and gave 643 ratings. In addition, a moderator interacting with the participants provided 116 comments. Average comment length 107 characters.

In Case 2 the participants were invited to provide comments in 3 discussion threads; one for each of the presented concepts. In total 207 participants registered and 131 of these (63%) provided one or more comments. The participants provided 371 comments and 164 ratings. In addition, the moderator provided 86 comments. Average comment length 200 characters.

Previous research by Følstad and Knutsen (2010) indicates that the designers and developers of the new concepts or solutions find feedback containing change or redesign suggestions to be most useful, followed by feedback pointing out problems. Comments containing only positive comments are hardly seen as useful as these provide little guidance for future development. Even so, the social design feedback in previous research has tended mainly to consist of positive comments, with a relatively small proportion of participant comments containing problem descriptions or change suggestions.

Also in Case 1 and 2, the positive comments outnumbered the comments contributing problem descriptions or change suggestions. For both cases there were approximately three times as many comments making positive statements as there were comments providing change suggestions. Details are provided in Table 1.

	Positive		Problem / dislike		Suggestions	
	Freq.	%	Freq.	%	Freq.	%
Case 1 (882 com.)	606	69 %	314	36 %	211	24 %
Case 2 (371 com.)	296	80 %	111	30 %	111	30 %
Total (1253 com.)	902	72 %	425	34 %	322	26 %

Table 1: Distribution of comments in Case 1 and 2.

Positive comments

Comments can contain both positive statements, problems statements, and change suggestions. However most comments containing positive statements do not in addition contain problem statements or change suggestions.

Positive comments express a general positive attitude towards the design or solution, or highlight a particular aspect of the design, as seen in these three example comments on the new Web-TV solutions presented for feedback in Case 1 (translated from Norwegian):

"This one was much better!!"

"Like the layout, it is tidy with a lot of space...easy to find stuff and get an overview by the looks of it. Few and good menu items. all in all very well arranged and appealing"

"This one is much more pleasant to the eye. It just looks more professional. I very much like that more information about the program is made available. Very handy that the latest episodes are most easily available, because these are the ones you typically want. Then there is a neat button for 'tweet' and 'Facebook', which absolutely is not a bad idea. The top menus are as before, and in my opinion they are not in need of improvement. I also like the lower pane much better. This because it only contains the information you need. And I often miss concise information. Which this one has, as email and phone. THIS I often miss on pages (this goes for most pages), and is something I hate spending time on finding."

Even though positive comments are pleasant, they typically seem to have little practical use as they may be difficult to transform into guidance for future design work. The exception to this may be comparative studies where several possible solutions to the same challenge are presented for feedback. In such studies, positive comments may possibly support decisions on which of the competing solutions that are to be pursued.

Comments on problems and dislikes

Statements on problems and dislikes may be useful to developers as these may indicate potential areas of improvement. Such statements may be made in response to the concept or solution in general, or to a specific aspect.

In the two cases the design feedback contained problem statements covering a wide range of issues. High frequent issues were addressed by 20-30 participants; most issues were mentioned by less than five. A substantial number of issues were raised by one participant only.

One example problem, raised by 16 of the user participants in Case 2, was related to a highly innovative concept for customer services utilizing augmented reality on smart phones to support technical setup and trouble shooting; the example provided in the concept was setup of a wireless router. The user participants expressed enthusiasm for this concept, but also concern that the concept possibly would be seen as attractive mainly by tech savvy users, that is those in least need of additional support for technical setup and trouble shooting.

"If you have this much problems installing a modem, you might be to afraid of technology to dear using such an app."

"I like the idea very much. It is likely to be a good help for people that can use an app, and not other things. But, as said by the others, I agree that those that can use this kind of app in general also will be able to put in some cables on their own. Those that are not able to put in a cable on their own will typically call customer service and may have more use and support from this. [...]"

For this example, the problem raised by the user participants served to highlight the importance of developing and packaging an augmented reality solution for customer support in way that makes it attractive and easy to use also for those that are not tech savvy.

Problems and dislikes may be useful in a design or development process, as these may help developers to see weaknesses or potential for improvement in current concepts or solutions. However, in most cases it would be beneficial if the user participants can be motivated or empowered to provide change suggestions in addition to, or instead of, problem statements as these may be even more useful in subsequent development.

Comments containing change suggestions

Hornbæk and Frøkjær (2005) found that redesign suggestions are perceived by system developers to be highly useful outcome of evaluations with users. Similarly, Følstad, Law, and Hornbæk (2012) found that usability practitioners typically ask users for advice on redesign suggestions during evaluations. This corresponds well to previous research on social design feedback, where constructive feedback containing change suggestions were seen as the most useful feedback from user participants (Følstad and Knutsen, 2010).

In the present study, a wide range of wants and change suggestions were given by the user participants. High frequency wants and suggestions for a feedback topic were typically mentioned by 10-20 participants,

whereas most wants and suggestions were proposed by less than five and a significant amount by one participant only.

To exemplify the variation in contributed wants and suggestions, one of the six discussion topics in Case 1 - concerning the front page of the current web-TV solution - generated 18 different suggestions, including the following (with example citations in parentheses):

- Browse programs by categories - *"I would group the programs in separate categories – for example news, debate programs, programs for youth, and entertainment."*
- Personal notification on new programs - *"[...] There could have been an opportunity for notifications on you favorite programs and a personal setup for favorite categories."*
- Filter or search programs by date for broadcast - *"[...] Is it possible to search on date? Often I forget what the program is called, but I know which day it was broadcasted for regular TV. [...]"*
- Promotion of classical programs, not only the newest or most popular – *"I like the varied content on the front page, and the fact that the programs I like tend to be presented here. However, it could possibly be an idea to promote also some of the older programs on the front page from time to time. As for example old documentaries."*
- Program playlists – *"The only thing I miss is to be able to make playlists."*

Even though a substantial amount of the wants and change suggestions are likely to be familiar to the design or development team, such a broad variety of change suggestions is likely to trigger useful insights and inspiration for subsequent design and development.

4.3 Discussion thread configurations and effects on participant interaction

As seen above, the participant feedback received in social design feedback is typically brief. The average comment length in Case 1 was 107 characters and 200 characters in Case 2 – not much more than a Twitter update. So even though the longest comment across the two cases was 1559 characters long (equivalent to approximately 1/3 of one of the pages in this report), only 3% of the comments were more than 500 characters long (slightly longer than this paragraph).

The brevity of the participant comments most likely implies that the participants do not contribute as much as they would be able to if they were prompted some more. This highlights the need to have the participants engage in interaction with other participants and moderators, to provide an opportunity to build on each others insights and to ask follow up questions motivating more in-depth answers. Initially we assumed that one reason for the lack of participant interaction observed in previous studies was that the participants tended to overlook each others comments; that is, the lack of interaction was assumed to be caused by a lack of awareness on others contributions.

Assumptions and hypotheses

We assumed that participants were prone to overlook other participants' statements for two reasons: (1) The comment field being placed above the discussion thread, making it easy to access the comment field but also easy to overlook the discussion thread, and (2) all comments being on the same level in the discussions thread, making it difficult to find budding discussions as all comments are presented in chronological order rather than being grouped in sub-threads.

Placing the comment field above the discussions thread is common in online newspapers. The immediacy of the comment field is assumed to trigger more comments. However, the obvious alternative solution, placing the comment field below the discussion thread - as is often seen in blogs, may increase the likelihood that participants actually read others' comments prior to making their own as they have to scroll past the previous comments before making their own.

Having all comments on the same level in the discussion thread is a much used design, but the use of more levels is growing more common. More levels of comments, where participants can respond directly to others comments and have their comment posted immediately following the parent comment, serve to group related comments and make it easier to spot sub-discussions within the thread.

Prior to starting our study we held it likely that the layout of the discussion thread would affect the participants' perception of the comments in the discussion thread and thereby affect the frequency of interaction between the participants. In particular we hypothesized:

- **H1:** Comment fields below the discussion thread will increase the participants' tendency to interact with each other.
- **H2:** Two levels of comments, where comments on comments are presented immediately following the parent comment, will increase the participants' tendency to interact with each other.

However, presenting the comment field below the discussion thread makes the comment field less visually prominent. This may in turn lead participants to disregard the opportunity to make comments. In consequence, we also hypothesized:

- **H3:** Comment fields below the discussion thread will decrease the participants overall tendency to provide feedback.

Research setup and findings

In order to test our hypotheses, we set up the social design feedback in Case 1 and 2 as a 2x2 factorial experiment. We had to predictor variables which we assumed would affect the participants' interaction and contributions: (a) **Location** (comment field above vs. below the discussion thread) and (b) **Levels** (one level vs. two levels of comments in the discussion thread). The dependent variable for H1 and H2 was **Interaction**, that is, the proportion of a given participant's comments explicitly referring to other participants'. The dependent variable for H3 was **Contribution**, that is, the number of comments contributed by each participant.

Effects concerning commenting participants: We first investigated the effect of the different discussion thread layouts by analysing the results from those participants that actually provided comments (Case 1: 189 participants; Case 2: 148 participants). The purpose of this was to be able to separate effects on participants tendency to contribute at all (treated below) from effects on the participants' volume of contributions and tendencies to interact with each other. An overview of the results is given in Table 1.

Condition	Case 1		Case 2	
	Interaction	Contribution	Interaction	Contribution
A: <i>Location</i> : Above <i>Levels</i> : One	0.2	4.6	0.2	2.8
B: <i>Location</i> : Above <i>Levels</i> : Two	0.3	5.1	0.2	2.9
C: <i>Location</i> : Below <i>Levels</i> : One	0.2	4.5	0.5	2.7
D: <i>Location</i> : Below <i>Levels</i> : Two	0.5	4.4	0.3	2.8
Overall	0.3	4.7	0.3	2.8

Table 2: Results for *Interaction* (the proportion of a given participant's comments explicitly referring to other participants') and *Contribution* (the number of comments contributed by each participant) across the four experimental conditions.

We ran a two-way ANOVA⁶ to analyse the effects of the two predictor variables. In Case 1 there were no significant effects of any of the predictor variables, neither on *Interaction* nor *Contribution*. This means that in Case 1, the layout of the discussion thread did not affect the commenting participants' frequency of commenting or frequency of interacting with each other.

In Case 2 there was no effect of any of the predictor variables on *Contribution*. However, for *Interaction* there was a significant effect of *Location*, $F(1,127)=4.65$, $p<0.05$, but no significant effect of *Levels*. This means that in Case 2, the only significant effect of varying the discussion thread layout was that the participants tended to refer more to each other when the comment field was located below the discussion thread, which is line with H1.

Effects on the participants' tendency to comment at all: We also investigated the effect of the discussion thread layout on the participants' tendency to comment at all. We only did this for the predictor variable *Location*, as this was the only variable hypothesized to affect the participants' tendency to contribute.

We ran a Fischer Exact analysis. In Case 1 we found the expected effect; a significantly larger proportion of the participants made at least one comment when the comment field was above the discussion thread (79%) rather than below (69%), $p<0.05$. However, for Case 2 we did not find a significant effect. In this case, 61% of the participants commented when the comment field was on top of the discussion thread, and 66% commented when the comment field was below the discussion thread, $p(\text{one-tailed})=0.24$. We interpret this as discussion thread layout may have some effect on participants' tendency to comment at all, but that this effect is not likely to be large and robust.

4.4 Experiences with real time analysis by tagging

The sheer volume of feedback gathered in Case 1 and 2, a total of 1253 free text comments, clearly implies an analysis challenge. How should Living Lab administrators, in an efficient manner, get an adequate overview and understanding of such volumes of qualitative data? This challenge is accentuated by analysis typically being required to be made fast and efficiently in order to be useful in the innovation process. Also, it may be desirable to conduct analysis as the comments are coming in, in order to serve as a moderator and trigger useful follow up responses from the participants.

To find out whether real time analysis by tagging can help mitigate the analysis challenge, we employed the tagging functionality in Case 1 and 2. This functionality was set up so that both a study moderator as well as participants can tag comments, and comments could be tagged either (a) as they were made (by adding # before a word meant to be a tag) or (b) by other participants and moderators (by clicking a tag-link in the comment to be tagged).

Two approaches to tagging were tried, to get practical experiences:

Case 1: Adding tags after all participants have submitted their comments. In Case 1, we wanted to try out tagging on a real dataset only after the participants had made their contributions; this to gain initial experience with this analysis approach. Such post-data-collection tagging allowed for highly efficient tagging activity, where we used a few high level predefined tags (for example "problem", "design suggestion", accessibility issue"). This approach also made it easy to utilize the tags in a subsequent detail analysis on the exported dataset. It should however be noted that the tags we used had a more abstract and analytical character than tags typically found in folksonomies. Consequently this set of tags would hardly be the tag set to emerge if the tags were to be developed in real time in cooperation with the study participants.

⁶ ANOVA was used even though the assumption of normality was violated in both Case 1 and 2. According to Field (2009, p.360) the ANOVA F-statistic is quite robust to violations of normality as long as group sizes are equal).

Case 2: Adding tags continuously as the participants submitted comments in the discussion thread.

In Case 2 we tried out the tagging function in real time, that is, when as the participants' comments came in. This real time tagging was found to be beneficial for the moderator activities as it made it easy to get an overview of the discussion threads, and it also was helpful in order for the moderator to summarize the emerging feedback to others. The tagging function was mainly used by the moderator. Only seldom did the user participants tag their own comments, and it was rare for user participants to tag other's comments. Even though the tags were useful for getting an overview of the discussion threads during the data collection period, the same tags were not found equally useful in the subsequent detail analysis on the exported data set. For the latter analysis it was necessary to recode the data with higher level codes (such as "problem", "design suggestion", etc.). In future cases it will be useful to have a list of predefined high-level codes to use as tags also for real time analysis, to make sure that the real time analysis also is useful for the subsequent analysis. Such a list could be:

- Problem (mention of a problem)
- Suggestion (mention of a want or suggestion)
- Like (mention of a like)
- Dislike (mention of a dislike)
- Refer (reference to a participant or topic)
- Example (reference to an example)

Such high level codes may also be used as prefixes when doing real time coding, in order to get more detail in the tags, such as "problem_inputfield", "like_menustructure", "refer_ideaX", "example_spotify".

5 Lessons learnt and suggestions for updated requirements

Our case trials of the social design feedback tool generated new knowledge on this feedback method, as well as practical experiences with the new designs and functionality in the tool aimed to strengthen interaction between participants and real time analysis of the feedback data.

5.1 Lessons learnt on the participant contributions

The contributed comments were to an overwhelming degree characterized by being positive feedback, which is pleasant but not very useful for practical redesign or development purposes. This finding is in line with previous experiences on social design feedback.

In the two cases we made an effort to make the participants understand that what we wanted from them was feedback on how they (a) experienced the current concepts and solutions and (b) how these could be improved. Even so, only one fourth of the comments contain statements on wants or change suggestions.

Possibly, we could have stressed even more our request for feedback on how the presented solutions and concepts could be improved. In future cases, in particular cases conducted in the second project iteration of SocialL, we will try out different approaches to inform and remind the participants that we really would like to have more change suggestions.

5.2 Lessons learnt on the effect of the discussion thread layout

Our hypotheses on the effects of (a) locating the comment field at the bottom of the discussion thread, and (b) introducing two levels of comments, were only partially supported and the effects were not large.

Clearly, our findings indicate that discussion thread layout indeed has some effect on the participant feedback, but not to a large degree. Placing the comment field at the bottom may to a small degree improve interaction between participants (H1), and may also to a small degree make participants less prone to contribute (H3).

Allowing for two level comments was not found to have any effect on neither the tendency to comment nor the tendency to interact with others. However, a benefit of the two level comments from a moderator point of view is that moderator comments, such as follow up questions, may be clustered with the participant comment on which the moderator wants to follow up on.

As discussion thread layout was only found to have small effects on participant interaction, it is important to explore other avenues to this end. In particular, it will be interesting to try out approaches to remind and motivate the participants to interact with each other as part of the cases to be run in the second iteration of SocialL.

5.3 Lessons learnt on the use of tagging for real time analysis

On basis of the informal experiences gathered in Case 1 and 2, tagging seems to hold good potential to support real time analysis. However, a relevant challenge will be to make the tags useful both as real time support for moderators and others that want to get an overview of the feedback as it comes in as well as to support analysis after all the feedback has been gathered.

Real time support seems to require higher degree of contextual detail, whereas post factum analysis seems to require more abstract and analytical tags. A venue to explore may be to combine these two requirements by having a list of high level codes that may be used as tag prefixes in real time analysis, as suggested at the end of Section 4.4.

5.4 Updated requirements

On basis of our experiences from Case 1 and 2 in the first iteration of the SocialL project, we would like to suggest two updates to the requirements for social software to support co-creation in Living Labs. The initial set of requirements was presented in a previous SocialL report (Følstad et al., 2011).

Updated requirement 1: Motivate participants to interact with each other.

Access to other participants' comments does not seem to be sufficient motivation for participant interaction. Consequently, it may be necessary to specify participant interaction as a separate requirement – as such interaction may not be assumed to be established just because some of the enablers for such interaction are in place. Future work is needed to find good ways to establish and sustain social software solutions, and study setups, motivating such interaction in Living Lab co-creation processes.

Updated requirement 2: Motivate feedback containing change suggestions.

Change suggestions are important for the recipients of social design feedback, as this is particularly suited to motivate design change in subsequent development, and possibly even generate inspiration and creativity. However, motivating participants to contribute such comments is challenging. Future work is needed to establish good ways of explaining the function of the design feedback to the participants, as well as to remind the participants to provide change suggestions throughout the study.

5.5 Final words

We have presented social design feedback tools as well as experiences from two cases of social design feedback. We hope that the presentation may motivate to the uptake of social software for user involvement in innovation processes; in particular for co-creation in Living Labs.

The work and findings presented in this report will be used as basis for the work of the second research iteration of SocialL, which will be finished during 2012.

6 References

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