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REVEALing hidden concepts in Social Media

Deliverable D7.1
User evaluation plan

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Abstract:	The main purpose of this deliverable (D7.1) is to define the user evaluation plan for the REVEAL project. The plan will support a user-centric evaluation of the REVEAL toolbox, including activities to support (a) studies of user behaviour and experience to investigate the evolving context of use for the REVEAL framework and applications (b) formative evaluation to support the development of the REVEAL framework and applications during the project period, and (c) summative evaluation to assess the final version of the REVEAL framework and applications from a user perspective. Finally, there will be a legal/regulatory requirements evaluation.
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DEFINITIONS, ACRONYMS AND ABBREVIATIONS

Concepts	Definitions
Living Lab	Online Living Lab refers to an online environment for <i>social design feedback</i> . A usability evaluation approach where user participants are asked to comment on designs asynchronously in online ad-hoc groups.
Formative evaluation	Formative evaluation refers to the assessment with users along the system development that will provide ongoing feedback on the preliminary applications.
Social media	Social media is understood as various forms of user-generated content sites such as blogs, virtual communities, wikis, social networks, collaborative tagging, and media files shared on sites like YouTube and Flickr.
Summative evaluation	Summative evaluation refers to the assessment on the outcome of the system at the end of the project.
User experience	User experience is typically seen as depending on the subjective aspects of system use, such as fun and excitement, and perceptions of privacy and trust.
User behaviour	User behaviour is in this context understood as general working and verification practices in the domain of journalism and enterprises.
User evaluation	User evaluation refers to the quality of a design from the perspective of its intended users, to detect potential problems and change suggestions, and to support design decisions.
User-generate content (UGC)	User-generated content (UGC) is defined as any form of content such as blogs, wikis, discussion forums, posts, chats, tweets, podcasting, pins, digital images, video, audio files, and other forms of media that was created by users of an online system or service.

1 Executive Summary

The main purpose of this deliverable (D7.1) is to define the user evaluation plan for the REVEAL project. The plan will support a user-centric evaluation of the REVEAL toolbox, including activities to support (a) *user insight* investigate the evolving context of use for the REVEAL framework and applications (b) *formative evaluation* to support the development of the REVEAL framework and applications during the project period, (c) and *summative evaluation* to assess the final version of the REVEAL framework and applications from a user perspective. Finally, there will be a legal/regulatory requirements evaluation.

The objective of the evaluation is to support the technical development activities in bringing forward solutions that are seen as useful and usable by their intended users, and that are associated with a positive user experience. The output of the evaluations will be (a) insight in users' perceptions of the usefulness of the designs, (b) identification of usability issues, and (c) assessments of user experience with concrete implications in terms of suggested updates to user requirements, suggestions for redesign, and assessments of societal impact, as well as legal and regulatory recommendations.

User insight will be gathered throughout the project design and evaluation phases, building on the user interviews conducted in the requirements phase. The purpose of the user insight will be to continuously update our knowledge and understanding of the context of use for the REVEAL framework and applications. The user insight will be gathered by social media analysis, where user generated content from key user groups are identified and analysed. The body of knowledge resulting from this insight work will be used to inform the formative and summative evaluations.

Formative evaluations will be conducted on the preliminary applications (M24), to support the development of the final prototype and applications. The formative evaluations will be detailed on the basis of the current version of user requirements, and input from studies of user behaviour and experience. For early input in the development of the preliminary applications, initial formative evaluations may also be conducted on early design representations of these (concept descriptions and sketches). Evaluation methods will include online Living Lab and cooperative usability testing with extended debriefing interviews. The internal report from the formative evaluation will be available in M29, but evaluation results will be fed back to the relevant project partners as soon as possible to maximise their downstream utility in the development process.

Summative evaluations will be conducted on the final applications, to support assessments of the societal impact of the REVEAL framework and applications. The summative evaluations will be detailed and conducted on the basis of the revisiting of requirements at the end of the second project period (M24), the formative evaluation report (M29), and input from studies of user behaviour and experience. The summative evaluation methods will include online Living Labs and cooperative usability testing, as do the formative evaluations, but with a different configuration. The report from the summative evaluations (D7.2) will be available in M36, but results from the summative evaluations will be circulated to the consortium as soon as possible to support the completion of other project tasks.

Specifications of both the formative and summative evaluations will be conducted as a collaborative process in two workshops. Specification workshops will facilitate alignment and easy information transfer and efficient communications between the relevant project participants, such as testers, users and developers; the projects participants related to WP7 and User evaluations. This will help us to provide the needs of the development team and the testers before the formative and summative evaluations, and to secure recruitment of relevant end-users.

Legal/regulatory requirements evaluation is a continuous task that will last until the end of the project. This evaluation will be strictly linked to the legal research performed in WP1. Legal activities in WP1 are focused on the impact that existing rules may have on the REVEAL applications; task 7.3

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looks at a relation between law and technology from the opposite perspective. Namely, it examines the impact of the new technologies on the existing rules. As a result of this task, policy recommendations will be provided (M36, D7.2) that will help influencing the future shape of the EU regulation in the areas of privacy and data protection, intermediary liability, media law and protection of freedom of expression.

This deliverable contains an introduction describing the overall purpose and vision for evaluations in REVEAL (what is to be evaluated, why, and how). Then we provide an overview of the planned evaluation activities. Moreover, we provide the details on each of the evaluation activities, that is, the studies of user behaviour and experience, the formative evaluations, and the summative evaluations. To end with, the legal and regulatory activities will be described.

2 Introduction

The success of the REVEAL framework and applications depends upon its uptake among the intended users. To achieve this, the framework and applications should be perceived as useful, usable, and providing a good user experience. The identified REVEAL user requirements serve as an excellent starting point for the REVEAL development, but as it is inherently difficult (if not impossible) to establish a complete set of user requirements for solutions to be applied in complex work domains (Suchman, 1995), user evaluations are needed throughout the development process both to ensure the completeness of the requirements and to investigate the REVEAL applications in terms of usefulness, usability and user experience.

The evaluation activities of REVEAL are planned with the purpose of providing relevant input to the development of the REVEAL applications, and to determine the efficacy of the ensuing REVEAL architecture design with regard to the objectives. Ultimately, the evaluation activities should provide answers to the extent to which the REVEAL applications will enable journalists and enterprise users to reveal the hidden modalities of social media, and as such the potential impact of REVEAL.

In this document, we present the user evaluation plan for REVEAL. We first provide an overall introduction to user evaluations and evaluation objectives. Then we present the overall evaluation plan, before detailing each of the three key evaluation activities: User insight, formative evaluation and summative evaluation.

The user evaluation plan is the first step towards reaching the objectives of WP7, as it outlines how we are to:

- Provide and further develop a set of methods for capturing user behavior and experience
- Establish a testbed and evaluating the REVEAL toolbox in an iterative and user-centred manner throughout the whole project
- Identify behaviour patterns of communities of users and their requirements
- Identify the legal/regulatory requirements evaluation

User evaluations should provide a best possible match to the needs of the development team and the testers. To achieve this, the evaluation plan is designed to allow for high levels of flexibility, where the detail specification for the formative and summative evaluations activities are conducted on the basis of two *specifications workshops* at the start-up of each of these sets of evaluation activities. The specification workshops will also support the alignment and easy information transfer between the relevant project participants, such as testers, users and developers. Nevertheless, as there might be needs for changes in the evaluation plan not foreseen at this point in time, the document should be seen as a living document in the sense that it may be updated as needed throughout the project.

2.1 User evaluation approaches

REVEAL applies a user-centred design approach (ISO, 2010), and user evaluations are planned accordingly. For a comprehensive user evaluation of the REVEAL framework and applications, three complementary evaluation approaches have been chosen: User insight studies, formative evaluations and summative evaluations.

User insight studies will provide knowledge on the evolving context of user for the REVEAL framework and applications. This evaluation activity will build on the user insight gathered in the requirements phase in WP1, and will serve to continuously update and strengthen our understanding of what the end-users need. To achieve this, we will aim to utilize available social media content from users or user communities that are within the target group of the REVEAL applications. The findings from the user insight studies will inform the formative and summative evaluations. Furthermore, the user insight may provide knowledge of relevance for the user requirements.

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Formative evaluations are evaluations intended to generate input to the subsequent development process (Hartson, Andre, & Williges, 2003; Stone et al., 2005). We will systematically collect data that informs designers about how to improve the system for the particular user-groups in the two target domains. The formative evaluations will serve to generate feedback of relevance for the user acceptance and experience, and identify issues and change suggestions for the applications and, possibly, also the user requirements. The findings from the formative evaluations will inform the summative evaluations. Furthermore, the formative evaluations may provide knowledge of relevance for the user requirements.

Summative evaluations are evaluations intended to assess the efficacy of the final design (Hartson, Andre, & Williges, 2003). The summative evaluations will be designed to assess how well the REVEAL framework and applications meets user-needs, requirements and preferred experiences, and to what extent, the framework and applications impacts the two target domains (journalism domain / enterprise domain). The findings from the summative evaluations will serve as the projects own assessment of the extent to which the final applications could help end-users reveal the hidden modalities of social media content (connecting with the user-requirements scenarios), as well as the overall usability and user experience of the REVEAL framework and applications, and will be a key part of the final delivery of the evaluation work package.

2.2 User evaluation constructs

The key constructs in the REVEAL user evaluations are usefulness, usability, and user experience. In the following we will describe these, including high-level presentations of their theoretical basis.

Based in the technology-acceptance model (e.g. Davis, 1989; Venkatesh & Davis, 1996), perceived usefulness and perceived ease-of-use have been shown to be effective predictors of whether or not information systems are accepted by users in work place contexts; this has also been demonstrated for assessments at pre-deployment stages of development (Venkatesh & Davis, 2000). For technologies which users may freely choose to use (or not), perceived usefulness and ease-of-use is particularly critical. As perceived use is dependent on usability as explicated in the field of user-centred design (ISO, 2010), we will in the REVEAL evaluations target usability, in addition to usefulness, as our utilitarian-oriented evaluation criterion.

As a more recent development in the field of user-centred design, the uptake of new technologies also are argued to depend on their non-utilitarian characteristics, that is the user experience they induce (Law & van Schaik 2010; Vermeeren et al., 2010). User experience is typically seen as dynamic and contextual (Buchenau & Suri, 2000) depending on the subjective aspects of system use, such as fun and excitement, and perceptions of privacy and trust. To capture such non-utilitarian aspects of the REVEAL framework and applications, we also include user experience among our user evaluation constructs. Hence, the REVEAL user evaluation construct may be explicated as follows.

Usefulness concerns whether the REVEAL framework and applications are perceived by its users to increase their job performance, given that the framework and application has satisfactory usability. In other words, usefulness concerns whether the REVEAL framework and applications are perceived as needed by its users. When evaluating usefulness, it will be important to assess (a) whether the proposed designs comply with the user requirements, and (b) whether the user requirements correspond to the evolving needs of the users. Evaluating utility can generate both design issues (the design not meeting user requirements) and requirements issues (the requirements not adequately reflecting the evolving needs of the users).

Usability concerns whether users are able to use the REVEAL framework and applications achieve specified goals in an effective and efficient manner. The satisfaction component of standard usability definitions is handled as part of the user experience construct (see below). When evaluating usability, it will be important to assess whether the users are able to complete their intended tasks when using the REVEAL applications, and whether their task completion is sufficiently efficient in

terms of time spent and problems encountered. Evaluating usability can serve to identify usability problems, that is, design issues preventing the users to complete their tasks in an efficient manner.

User experience concerns the users' subjective experiences with the REVEAL framework and applications. In particular, we see it as important to address the users' perceptions of privacy and trust as these have emerged as critical issues in the context of online social networks (Donath, 2007). However, also other emotional or affective aspects may be identified as relevant. Evaluating user experience can serve to identify design issues and suggestions for redesign.

2.3 Evaluations in response to user requirements

Following from the user-centred design approach of REVEAL, all evaluation activities are firmly grounded in identified user requirements. The user requirements have been defined and reported in D1.1 in the form of simple user stories linked to scenarios.

Due to complex and dynamic character of the REVEAL application domains (journalism and enterprise), eliciting user requirements is highly challenging (Suchman, 1995). Acknowledging the potential incompleteness of identified user requirements, iterative development processes are applied to allow for revisiting and updating of the requirements.

Following the user-centred design process applied in REVEAL, both user insight studies and formative evaluations may be used as basis for updating user requirements. The relation between the three evaluation approaches and the user requirements are visualized in Figure 1. Here it is illustrated how all the evaluation approaches are grounded in the user requirements while, at the same time, the user insight studies and the formative evaluation potentially can serve to refine the same requirements.

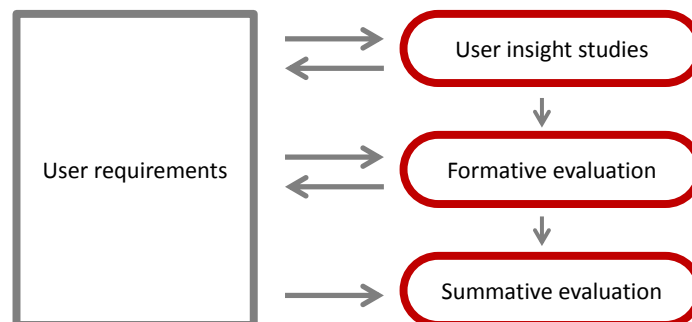


Figure 1: Relation between the user requirements and the three evaluation approaches.

2.4 Evaluations in response to legal requirements

The legal/ regulatory requirements evaluation (T7.3) is conducted by the REVEAL legal partner, ICRI –KU Leuven. This task is a continuation of the work done in WP1, T1.3. Whereas legal activities in WP1 are focused on the impact that existing rules may have on the technologies to be developed in the context of REVEAL, task T7.3 takes the opposite stance. The goal of this task is to answer the following question: what could be the impact of the new technologies on the existing rules, and how should these rules be modified accordingly to remain fair and effective? The purpose of this task is to help shaping the future regulations that would be capable of better addressing the problems posed by the current (and future) technical developments. We plan to answer this question for three areas of law: 1) data protection law, 2) media law, and 3) intermediary liability law, and through two activities: 1) an assessment of the impact of new technologies on existing rules; and 2) formulation of policy recommendations. The two activities will consist of several steps (*infra*), rely on a variety of legal methods (doctrinal study, critical analysis of case law, comparative analysis...), and build on the research performed in WP1.

3 Overview of evaluation activities

In this section we will provide a general overview of the timing and relations between the three types of user evaluation activities, that is, user insight studies, formative evaluations, and summative evaluations. The details on each of the three types of user evaluation activities are provided in the following sections. In addition, to these user evaluations, there will be a legal evaluation activity.

3.1 Timing of the evaluation activities

The evaluation activities will be conducted on the basis of results from the requirements and design activities, as well as the results from previous evaluation activities.

User insight will be gathered throughout the project design and evaluation phases, terminating in M36. This insight will supplement and extend the user interviews of the requirements phase. The findings from the studies of user behaviour and experience will be used as input in formative and summative evaluations.

Formative evaluations will mainly be conducted on the preliminary applications (M24), implemented on the interim prototype. However, for early input in the development of the preliminary applications, initial formative evaluations may also be conducted on concept descriptions, sketches or other design representations leading up to the preliminary applications (available approximately from M18). The formative evaluations will be specified in detail on the basis the current version of user requirements, and input from studies of user behaviour and experience. The findings from the formative evaluations will be used as input in the summative evaluations.

Summative evaluations will be conducted on the final applications (M34). The summative evaluations will be specified in detail on the basis of the revisiting of requirements at the end of the second project period (M24), the formative evaluation report (M29), and input from studies of user behaviour and experience.

An overview of the evaluation activities, with their inputs and outputs, are provided in Figure 2.

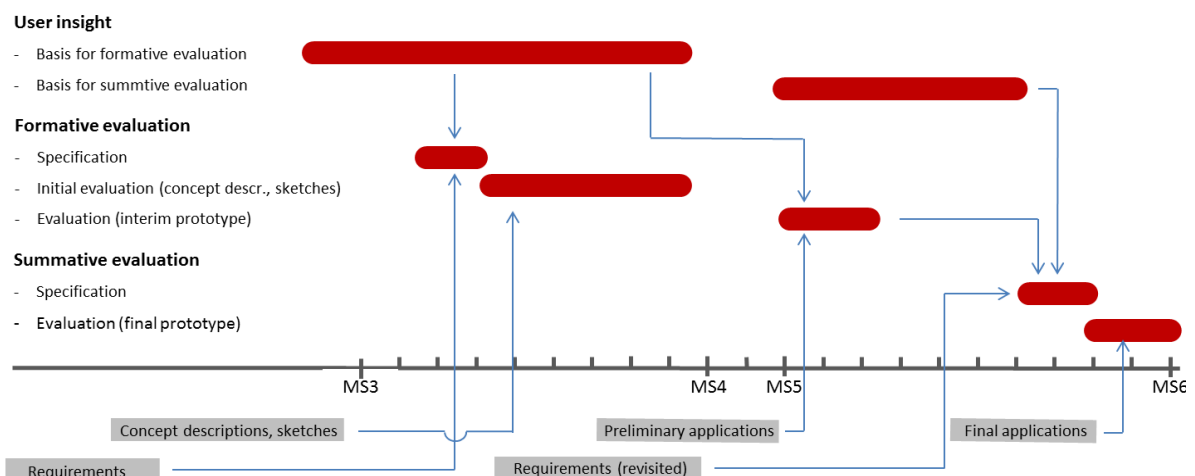


Figure 2: Overview of user evaluation activities

3.2 Specification workshops for the formative and summative evaluations

Specification of both the formative and summative evaluations will be conducted as a collaborative process involving WP1 (requirements) and WP6 (framework). To enable this we will organize two **Specifications Workshops**, one for the formative evaluations and one for the summative workshop. A collaborative specification requires the input from different project stakeholders involved in WP7; users, domain experts, software developers and testers. These workshops will discuss issues such as the specific evaluation targets, the process and responsibility for *recruitment of users*, detailed timeline for the evaluations, and how the results should be formulated to be useful for the developers and testers.

These specification processes is a key to ensure an efficient flow of information in a large research and development project like REVAL. The goal of the workshops is that all participants have a shared understanding of the evaluation process in both the formative stage and the summative stage, so that developers and testers have enough information to complete their work for the current iteration. The output of these two specifications workshop needs to be nailed down and efficiently communicated to all project participants interlinked with WP7, such as WP1 and WP6.

During the specification process, care will be taken when deciding on the evaluation targets. The object of evaluation (i.e. the application or its presentation) should be set up so that the users clearly understand its purpose, and to avoid that a-priori known component-level performance issues biases the users' overall perception of the REVEAL framework and applications. Furthermore, the evaluation constructs need to be refined to fit the user requirements as they are understood at the time of evaluation.

3.3 Overview of legal and regulatory evaluations

Task 7.3, legal and regulatory evaluations (not included in Figure 2), will build on the results of WP1, and especially T1.3. It will consist of several steps. The starting point will be the assessment whether requirements provided in T1.3 are implemented into the technical solutions. Next, we will analyse whether the current state of regulation created any obstacles for the REVEAL objectives. Further, we will examine whether the existing regulatory framework is sufficiently conducive towards achieving its objectives. From there, we will continue an assessment of the impact of new technologies, advanced in REVEAL, on existing regulations. Finally, we will spell out policy recommendations for privacy and data protection, intermediary liability, media law as well as protection of freedom of expression.

Strictly speaking, Task 7.3 consists of the following subtasks:

- assessment of impact of new technologies on existing privacy and data protection rules (M16-M18);
- assessment of impact of new technologies on existing intermediaries' liability rules (M19-M21);
- assessment of impact of new technologies on existing media rules and ethics (e.g. in terms of liability of journalists using these new technologies) (M27-M29);
- formulation of policy recommendations to modernize privacy and data protection rules (M30-M36);
- formulation of policy recommendations for intermediaries' liability rules to underpin the discussions on the update of the E-Commerce Directive (M30-M36);
- formulation of policy recommendations to modernize media law and journalistic ethics, and/or support transparency and user empowerment initiatives, and/or complement existing media monitoring tools on the basis of new methods developed in REVEAL for social media (M30-M36).

4 User insight

The context of use for the REVEAL framework and applications is constantly changing. For evaluations to be grounded in an updated understanding of the context of use, studies to gather complementary user insight are conducted throughout the design and evaluation phases.

The idea of the user insight studies is to benefit from available social media content on the key REVEAL topics of interest. Specifically, we will conduct analyses of user-generated content made by target users in available online venues such as twitter, blogs, and discussion forums.

The studies will take as their starting point the identified user requirements, with the aim of maintaining and elaborating on these requirements. The studies will benefit both the following formative and summative evaluations and also generate knowledge of general interest to be published in scientific conferences and journals.

The research questions for the user insight studies will be, following from the research questions of the requirements phase:

- What characterizes the emerging practices concerning verification of social media content and sources within the two target domains (journalism domain and/or enterprise domain)?
- What are the challenges regarding verifications of content and sources in social media? How does the use of social media content and sources comply with what is currently regarded as best practices within the target domain (journalism domain and/or enterprise domain)?

The user insight studies will be conducted in three waves, as shown in Table 1.

4.1 Why analyses of user-generated content?

A substantial proportion of the future users of the REVEAL framework and applications are assumed to be active users of social media, potentially also using online content as a source for updating themselves on issues of importance for their work as well as an arena to pose questions concerning verification to people in their network. We aim to tap into this potential source of user insight by gathering and analysing user-generated content on verification for specific events and specific user groups. The identification and analyses of the content will follow elements of a netnographic approach (Kozinets, 2002); *netnography* understood as technologically networked, ethnography adapted to support the inquiry of individual users experiences and behaviour in addition to the meanings of a phenomenon as established within a social group in a networked context.

Following Kozinets, and the netnographic approach, the online environment and user generated content offers us nearly unlimited access to people's communications (including journalist or enterprise workers) that are relevant and detailed, from a naturally-occurring context, and obtained in a way that is unelicited and unobtrusive as well as timely, effective, and efficient.

These data or user generated content are raw and authentic and can as such give the REVEAL project a new and crucial insight into current user behaviour, understood in this context as general working practices and more specific verification practices in regard to the journalism and enterprise domain.

Due to the rapid technological advances in the field of social media search technologies, utilizing social media content for user insight will imply method development. This is in line with the stated objective of the evaluation work package, that we aim to develop new methods for capturing working practices.

4.2 Data identification and gathering

Two of the chief data gathering challenges for user generated content within social media, are: (1) how to find the appropriate data, and (2) how to balance vast amounts of available user generated data with the necessity of an in-depth understanding of working practices and verification issues.

Data identification and gathering will be conducted through special purpose tools for social media analysis. For this purpose we aim to use social media analysis tools such as those built by consortium partners (such as Itinno), other research projects (such as Social Sensor, <http://www.socialsensor.eu/>) or commercially available solutions (such as Meltwater, <http://www.meltwater.com>, or similar), serving as online intelligence platform that harvests online content and discussion according to specified search terms. Data identification may be conducted in a two-step procedure:

1. Searches conducted with a starting point in key words from the established research questions and user requirements.
2. Identification of world events associated by the use of key words, and refinement of searches on the basis of words representing these events.

For example, in the journalism domain an initial search could use key words such as "journalism AND (verification OR factcheck)". If conducting this search in June/July 2014, real world events closely associated with these initial search terms would likely have included the Ukraine conflict and the shooting down of the Malaysian Airlines MH17. To further refine the search, it would then have been relevant to filter initial search results with terms such as "Ukraine OR Malaysian Airlines OR MH17".

4.3 Data analysis

Data analysis will be conducted both through high level trend analyses for search words, as well as through content analysis on the level of specific communities or contributors.

High-level trend analyses will be conducted to investigate how interest in particular combinations of terms change across time. Is, for example, a user groups' interest in verification depending on the characteristics of real-world events. For example, will journalists' interest in verification concerning a particular event be determined by the phase of the event (more interest in verification issues in early phases of an event where the situation is potentially less well known?) or by its characteristics (more interest in verification issues for particular types of events or events in particular parts of the world?).

Content analysis will be conducted to identify themes or meanings verifying or expanding on the topics covered in by the current user requirements. Content analysis will be conducted on datasets delimited during data identification to be of particular interest. The dataset could be from a set of separate users contributing on a particular theme, or from a distinct community of users. The analysis will be data driven, starting out with a thematic analysis to identify high level themes in the data before coding the data according to these themes (following Ezzy 2010).

4.4 Relation to other project activities

The user insight studies will contribute output to other evaluation activities at three points in time. First, the analysis results will serve as basis for specifying the formative evaluation procedure, together with the background represented by the user requirements. Second, the analysis results will serve as basis for verifying the evaluation procedure for the preliminary applications. Third, the analysis results will serve as basis for specifying the summative evaluation procedure, together with the background represented by the revisited user requirements and the final applications.

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All three waves of analyses take as their starting point the user requirements. As formative evaluation activities are conducted, these analyses will also be based on the findings from these evaluations. The method setup, contributions to other evaluation activities, and starting points are summarized in Table 1.

Table 1: Method setup for the user insight studies

Wave	Contribution to other evaluation activities	Method	Starting point	Deadline
1	Basis for specifying the formative evaluation	Analysis of UGC*	User requirements	MS3 + 2 months (M17)
2	Basis for verifying evaluation procedure for preliminary applications	Analysis of UGC	User requirements Results from initial formative evaluations of concept specifications and sketches.	MS4 (M24)
3	Basis for specifying the summative evaluation	Analysis of UGC	User requirements (revisited) Results from the evaluations of preliminary applications	MS5 + 6 months (M32)

*) UGC=User-generated content.

Findings of relevance for other project WPs, in particular WP1 (requirements) and WP6 (framework and applications), will be communicated as project internal presentations following each of the three study waves.

5 Formative evaluation

To support a user-centred design process, the REVEAL framework and applications are developed iteratively with feedback from formative evaluations with users. The objective of the formative evaluation is to provide feedback from representative users concerning the usefulness, usability, and user experience of the REVEAL applications.

The formative evaluations will take as their starting point the user requirements and the user insight studies. The study will benefit the development process by systematically providing input of relevance to the design of the next version of the applications.

It is considered particularly important that the formative evaluations contribute insight in the usefulness and user experience of the REVEAL applications. The early-phase nature of the preliminary applications, implemented on the interim prototype, implies that they may need changes of a conceptual nature, and not just changes to details in the user interface. Evaluations of early design representations typically help both users and developers better understand the requirements, something that may imply reformulation of requirements or refocusing of the design.

To facilitate formative evaluations where users contribute insight on usefulness and user experience, we have decided to use evaluation methods where the participants both interact with and reflect on the presented applications. To allow for the involvement of a relative large sample of users we use an online Living Lab approach. To allow for in-depth data collection with a smaller sample of users we use a cooperative usability test with an extended debrief interview.

The formative evaluations will be conducted in two waves, as shown in Table 2. The first wave concerns the initial evaluation of concept descriptions and sketches leading to the preliminary applications. The second concerns the preliminary applications.

5.1 Online Living Lab

The online Living Lab has been established as an approach to gather early design feedback from representative users. The guiding principle of Living Labs is to facilitate the involvement of users in innovation processes, where users are exposed to new ICT solutions in the context of their everyday environment. In the online Living Lab, the solutions are made available through an online content platform where users are invited to review and try out designs and solutions.

In the formative evaluation, the objective of the online Living Lab evaluations is to gather user feedback on the preliminary applications to serve as input in the downstream development process and to challenge and verify current user requirements.

5.1.1 Feedback topics

The feedback process in the online Living Lab has been described as *social design feedback*, "an approach to usability evaluation where user participants are asked to comment on designs asynchronously in online ad-hoc groups" (Følstad, Hornbæk, & Ulleberg, 2013, p. 1).

When setting up the online Living Lab, the evaluators will decide on a set of predefined topics for feedback or discussion on the basis of the user requirements, the user insight studies, as well as the characteristics of the preliminary applications. Each feedback topic will describe some aspect of a design, request the user to review or try out this aspect, and ask the user for comments. The comments should contain statements on what the user liked in the design, potential concerns or problems, as well as suggestions for redesign.

The feedback topics will be defined in collaboration with representatives from WP1 (requirements) and WP6 (framework and applications) during the specification workshop for the formative evaluation

(M16-18). It is expected that each Living Lab study will include 4-6 feedback topics, and the topics should reflect the key knowledge needs at the particular phase of the development process. Example feedback topics, in reference to specific user requirements, are given in Table 2.

Table 2: Example formative feedback topics in the online Living Lab

User requirement	Example feedback topics
A1: I can search for contributors based on search terms.	<i>The REVEAL application allows you to search for contributors of social media content when working on news events. To try out the contributor search functionality [... brief description]. Then, please comment on the following: What is your impression of the search functionality? What do you particularly like? Do you see any problems or things that need to be improved? Change suggestions?</i>
A3: I can search for contributors based on geo-location and see them displayed on a map.	<i>If you want to search for contributors on within a specific geographic area, you can limit your search geographically and also have the search results shown in a map. To try out the geographical search [... brief description]. Then, please comment on the following: What is your impression of the geographical search? What do you particularly like? Do you see any problems or things that need to be improved? Change suggestions?</i>

5.1.2 Participant recruitment

Each online Living Lab study should involve between 20 and 50 users. Recruiting representative users is expected to be challenging for the two REVEAL domains, due to the users characteristics of being particularly trained and specialized (journalists and administrators of enterprise communities).

Users will be recruited through several approaches: Through the networks of the REVEAL partners, through individuals assisting in the recruitment to the requirements interviews, and through other arenas such as university colleges (for journalist students) or Facebook ads (for targeting potential users not part of the REVEAL participants networks). We will also capitalize on people from the REVEAL community that will be built in Task T8.4.

Details on the user samples (professional status, country, language) will be decided during the evaluation specification period, depending on the current needs of the involved project partners.

5.1.3 Running the study

During the study, the users enter the online Living Lab following their registration of a user name (for privacy purposes). Here they are presented to a series of feedback topics. For each topic, the user contributes his or her comments in a designated comment field. The comments are made available to all study participants in an adjacent comment thread. The user is also invited to review and reply on other users' comments, for example to elaborate on or challenge the point made by the other user. This way, users can expand on each other's contributions, allowing for richer feedback.

When someone replies to a comment, the author of this comment is notified by email with a direct link to the feedback topic. This way, users are encouraged to return to the study to respond to replies made by others.

The user comments are monitored by a study moderator. The moderator also replies to user comments to acknowledge useful contributions, to ask follow-up questions, or to challenge controversial contributions. This way the moderator both helps keeping the discussions alive and also shows to the participants that contributions are read and appreciated.

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Online Living Lab studies typically last from a few days to a few weeks. We intend for the studies in the formative evaluation to last for approximately two weeks.

Depending on the needs of the REVEAL project partners, the online Living Lab evaluation may be split in two waves as described above.

5.1.4 Data analysis

The data from the analysis will be exported from the Living Lab environment and analyzed. An initial analysis will categorize the feedback as positive, negative or suggestions (following Følstad and Knutsen, 2010).

For each of these categories, feedback themes will then be distinguished through a thematic analysis, and then made subject of a content analysis on the basis of these themes (Ezzy, 2010). The themes will be data driven, but grouped within the conceptual framework of the evaluations; that is usefulness, usability, and user experience. It is, in particular, expected that the online Living Lab will generate findings concerning the usefulness and user experience of the REVEAL applications.

5.2 Cooperative usability testing with extended debrief interviews

While the online Living Lab serves to involve a relatively large number of users, it does not provide direct access to user behaviour. For this purpose, and also to provide more in-depth data than what is possible in the online Living Lab, a small number of users will participate in cooperative usability testing. This approach to usability evaluation is particularly suitable to gain insight into the three constructs of our evaluation framework: Usability, usefulness and user experience. The cooperative usability testing procedure will be extended with comprehensive debrief interviews to gain in-depth insight in how key requirements are perceived from the perspective of individual users.

The collaborative usability testing will be set up according to the description of Følstad and Hornbæk, (2010). The extended debrief interview will be conducted according to the guidelines of Kvale (1996).

5.2.1 Cooperative usability testing

Usability testing is one of the most applied methods for user evaluation. In a usability test, users are observed while conducting specified tasks with the interactive system under evaluation. The tasks are specified on the basis of user requirements and scenarios, inviting the user to interact with the key functionality of the interactive system.

The usability test is typically led by a moderator, and the user is instructed to think aloud while conducting the tasks in order to understand the users thought processes and experiences during task completion.

In the cooperative usability test, the evaluation procedure is divided into interaction phases and interpretation phases. In the interaction phases, the user conducts the task as requested by the moderator. In the interpretation phases, immediately following each interaction phase, the user and moderator walks through the task that the user just completed while the user is encouraged to reflect on his task completion, his thoughts and experiences, and possible concerns related to the task.

The introduction of dedicated interpretation phases to the usability test has been shown to generate a broader set of findings from the evaluations (Følstad & Hornbæk, 2010).

The test tasks will be defined in collaboration with representatives from WP1 (requirements) and WP6 (framework and applications) during the specification workshop for the formative evaluation (M16-18). Example tasks, in reference to specific user requirements, are given in Table 3.

Table 3: Example tasks for cooperative usability testing

User requirement	Example task
A1: I can search for contributors based on search terms.	<i>You are researching for a news story on the recent upheaval in [country nn]. It is important to you to establish who are the key contributors of social media content concerning this event. Please, use the REVEAL application to find this out.</i>
A3: I can search for contributors based on geo-location and see them displayed on a map.	<i>For the new story on the recent upheaval in [country nn] you are particularly interested in contributors from the area [area yy]. Please, use the REVEAL application to get an overview of contributors from this area.</i>

5.2.2 Extended debrief interviews

Immediately following the completion of all tasks in the cooperative usability testing, the user will be made subject to an extended debrief interview. The themes of the interviews will be decided on the basis of the user requirements and scenarios, as well as on the findings from the user insight studies. Furthermore, the interviews will be designed to explore the applications from the perspectives of usefulness, usability, and user experience.

A semi-structured interview guide will be established. Key requirements will be addressed with a starting point in the mini-scenarios of the requirements document (D1.1). Usefulness, usability and user experience will be addressed with a starting point in the experiences from the user testing tasks.

5.2.3 Participant recruitment and timing of the evaluations

Participant recruitment will be conducted in collaboration with the same institutions that contributed user participants for the requirements task. We aim for 5-10 user participants from each domain (journalism domain / enterprise domain) to take part in the formative evaluations.

Depending on the needs of the REVEAL project partners, the cooperative usability testing of the formative evaluations may be split in two waves where the first wave concerns early concept specifications and sketches and the second wave concerns the preliminary applications as implemented on the interim prototype. The needs of the partners will also decide the detail characteristics of the user samples (professional status, country, language).

5.2.4 Data analysis

The usability testing and interviews will, upon the informed consent of the participants, be recorded and transcribed. The data from the interaction phases will be made subject to an analysis of critical incidents indicating usability problems, that is, breaches in the usability of the design.

The data from the interpretation phases and the extended debrief interview will be analysed in two steps. First a set of themes will be established. Here the set of themes decided through the specification workshop will be complemented with themes emerging from a thematic analysis of the data set. On the basis of the full set of themes, a content analysis will be conducted (following Ezzy, 2010).

5.3 Relation to other project activities

The formative evaluation will contribute output to the summative evaluation. Furthermore, the formative evaluation in Wave 1 will contribute to the formative evaluation in Wave 2.

Both waves of formative evaluation take as their starting point the user requirements and the findings from the user insight studies.

The method setup, contributions to other evaluation activities, and starting points are summarized in Table 4.

Table 4: Method setup for the formative evaluations

Wave	Object of evaluation	Method	Starting point	Deadline
1	Early concept specifications and sketches	Online Living Lab and/or Cooperative usability testing	User requirements and user insight	MS4 (M24)
2	Preliminary applications as implemented on the interim prototype	Online Living Lab and/or Cooperative usability testing	User requirements Results from the initial evaluations of early concept specifications and sketches	MS5 (M26)

Findings of relevance for other project WPs, in particular WP1 (requirements) and WP6 (framework and applications), will be communicated as project internal presentations following each of the two study waves. The findings will be reported to the relevant project partners as soon as possible in order to ensure an iterative design process, where the final applications can be changed and adapted to better fit user requirements and needs, and as such to optimize the potential impact of the applications.

6 Summative evaluations

To assess the final REVEAL applications, a set of summative evaluations are conducted. The objective of these evaluations is to investigate the usefulness, usability and user experience of the applications, and thereby provide insight in the potential impact of the REVEAL toolbox.

The summative evaluations will be firmly grounded in the user requirements. The evaluations will aim to reliably verify and detail the usefulness of the framework and applications, assess the usability of the final applications in terms of effectiveness and efficiency in use, and gain insight in the user experience of the applications in terms of privacy, trust, and possibly other aspects of user experience identified as important during earlier evaluation activities.

The summative evaluations will be conducted applying the same two evaluation methods as for the formative evaluations. However, the methods will be configured to provide a reliable assessment of the applications, and not just input to further development. In particular, the procedure for the online Living Lab will be changed towards providing reliable estimates of technology acceptance. The procedure for the cooperative usability testing will be changed towards providing reliable estimates of usability aspects such as task completion, time on task, and severity of remaining usability issues. Both methods will be changed towards providing insight in users' reflections on the impact of the applications in their work context.

The summative evaluations will be conducted on the final applications as summarized in Table 3.

6.1 Online Living Lab

In the summative evaluation, the objective of the online Living Lab evaluations is to gather user feedback on the final applications to assess the end results of the REVEAL development process; in particular to assess the usefulness and user experience of the REVEAL toolbox as well as to assess its future impact.

The method details are provided in Section 5. In the following, we describe the differences in setup for the purpose of summative evaluation.

6.1.1 Feedback topics

As for the formative evaluations, the evaluators will decide on a set of predefined topics for feedback or discussion in collaboration with representatives from WP1 (requirements) and WP6 (framework and applications). However, the feedback topics will be more tuned towards inviting the participants to reflect on the future impact of the REVEAL framework and application.

Each feedback topic will take as a starting point one or two user requirements associated with a specific scenario. The instructions to the participants will mainly concern their views on the usefulness and user experience of the applications concerning the given scenario, and how the applications used in this scenario may impact their work domain. Usability issues and suggestions for redesign will not be encouraged, but will be acknowledged if contributed.

The feedback topics will be defined on the basis of the user requirements, the user insight studies, and findings in the formative evaluations. Each Living Lab study will include about 5-7 feedback topics, as this is typically the number of topics the study participants will be motivated to contribute to.

As for the summative evaluations, the feedback topics will be defined in collaboration with representatives from WP1 (requirements) and WP6 (framework and applications). This will be done

during the specification workshop for the summative evaluation (M32-34). Example feedback topics, in reference to specific user requirements, are given in Table 5.

Table 5: Example summative feedback topics in the online Living Lab

User requirement	Example feedback topics
A1: I can search for contributors based on search terms.	<i>The REVEAL application allows you to search for contributors of social media content when working on news events. To try out the contributor search functionality [... brief description]. Then, please comment on the following: How could access to such a contributor search benefit your work as a journalist? For which type of journalism work (if any) do you see it as particularly useful?</i>
A3: I can search for contributors based on geo-location and see them displayed on a map.	<i>If you want to search for contributors on within a specific geographic area, you can limit your search geographically and also have the search results shown in a map. To try out the geographical search [... brief description]. Then, please comment on the following: How could access to such a geographical search benefit your work as a journalist? For which type of journalism work (if any) do you see it as particularly useful?</i>

6.1.2 Assessment of technology acceptance

Following their contributions to the feedback topics, the user participants will be invited to complete a standard technology acceptance questionnaire (Davis, 1993). The purpose of this is to gather a reliable quantitative estimate of whether the users would take the REVEAL framework and applications in use if these were provided in their everyday work context. The technology acceptance measure will supplement the performance metrics from the cooperative usability testing (described below).

The technology acceptance data will provide complementary insight to the other findings on usefulness and user experience from the online Living Lab.

6.1.3 Participant recruitment

Participant recruitment will follow the same strategy as for the formative evaluations. Between 20 and 50 users should be involved for each application domain. In addition, the participants involved in the online Living Lab for the formative evaluations will also be invited to participate. Hence, it is expected that some, but not all, participants in the online Living Lab of the summative evaluation also will have participated in formative evaluation. To control for the effect of some participants having participated in earlier evaluation activities, these will be assigned to a separate online Living Lab instance.

6.1.4 Running the study and analysing data

The study will be run in the same way as for the formative evaluations, with the exception that the moderator will follow up user participants in terms of their expected impact of the REVEAL framework and applications more so than potential design issues.

Data analysis will be conducted through a thematic analysis, adding to the themes represented in the requirements analysis. The complete set of themes will then be used for conducting a content analysis (Ezzy, 2010). As for the formative evaluations, the themes will be data driven but grouped within the conceptual framework of the evaluations (i.e. usefulness, usability, and user experience).

6.2 Cooperative usability testing with extended debrief interviews

The cooperative usability testing in the summative evaluations will follow the same basic plan as for the formative evaluations. However, it is now important that the evaluations can generate reliable data on usability. For this purpose, it is necessary to increase the number of participants as compared to the formative evaluations, following the guidelines of Nielsen (2006). This also means that we will get richer insights concerning usefulness and user experience, given the larger number of participants.

In the following we will present the cooperative usability testing in the summative evaluation to the degree that it differs from that of the formative evaluations. For more details on the evaluation method, please consult Section 5.

6.2.1 The testing and interview procedure

The testing and interview procedure will differ from that of the formative evaluations on the following:

The tasks for cooperative usability testing will be decided on the basis of revisiting the user requirements, and designed so as to cover a broadest possible section of the high priority requirements.

The cooperative usability testing procedure will differ from that of the formative evaluations by including performance metrics for task success, time on task, errors on task (frequency and severity). Furthermore, upon completing all tasks, a System Usability Scale (Brooke, 1996) questionnaire will be administered as an additional performance metric for usability with established benchmarks (Bangor, Kortum, & Miller, 2008).

The test tasks and topics of the extended debrief interview will be defined in collaboration with representatives from WP1 (requirements) and WP6 (framework and applications) during the specification workshop for the summative evaluation (M32-34). The tasks will be decided so as to cover a broad section of the high priority requirements. Furthermore, the interview guide will include questions that invite the participants to reflect on the potential impact of the REVEAL framework and applications in their work context.

6.2.2 Participant recruitment

Participant recruitment will be conducted in collaboration with the same institutions that contributed user participants for the requirements task. Details on the user samples (professional status, country, language) will be decided during the evaluation specification period, depending on the current needs of the involved project partners.

We aim for 15-20 user participants from each domain (journalism domain / enterprise domain) to take part in the summative evaluations; that is, about twice the number of participants as will be involved in the usability tests of the formative evaluations. The users involved in the summative usability tests should not have been involved in previous evaluation activities for an unbiased assessment.

6.2.3 Data analysis

Qualitative data analysis will follow the same approach as for the formative evaluations. Quantitative analysis will be conducted on the objective usability measures, reporting also on the confidence intervals of the results.

6.3 Relation to other project activities

The summative evaluation will contribute output to the final project report. The evaluations take as their starting point the user requirements and the findings from the user insight studies and formative evaluations. The method setup is summarized in Table 3.

Table 6: Method setup for the summative evaluations

Object of evaluation	Method	Starting point	Deadline
Final applications	Online Living Lab and Cooperative usability testing	User requirements User insight Evaluation results from the preliminary applications	MS6 (M36)

7 Legal/regulatory requirements evaluation

Legal research in REVAL focuses on three main areas: media law, privacy and data protection, and intermediary liability. These three areas are crucial for the development of the REVEAL concept. Each area consists of specific concepts that have to be analysed and implemented in the context of REVEAL. For example, this includes examination of concepts such as ‘editorial responsibility’ (in media law), ‘data controller’ and ‘sensitive data’ (in privacy and data protection), and the concept of ‘notice-and-take down’ (in intermediary liability). Such analysis has to be conducted for the both REVEAL scenarios (journalism and enterprise). Additionally, the fundamental human right to freedom of expression is present in the contexts of all three areas. Therefore, each year of the project is devoted to one of the legal areas. In the first year of the project the main focus was on privacy and data protection. This issue was considered to be the most pressing with practical implications on the project. Since the project involves processing of personal data from social media, this aspect was also considered crucial from the perspective of ethics. The results of the conducted research were presented in WP1 deliverable D1.2 - Legal /regulatory requirements analysis. In the second year of the project, we will focus on intermediary liability aspects of REVEAL and the third year will be devoted to media law. The division of work into three areas is however not exclusive. This means that, for example, we will continue to work on the privacy and data protection aspects also in the second and third year of the project, to the extent it is necessary. This stems from the specificity of the legal research in scientific projects like REVEAL. In order to keep up with the project developments we need to constantly monitor the work of other partners, as well as the changes in the laws, policies and regulations. This means continuous re-evaluation. In case of any changes, legal requirements and guidance need to be updated.

The planned legal/ regulatory requirements evaluation will consist of several steps. It will build up on the legal analysis and guidance provided in WP1. First, KU Leuven will check whether the legal issues and recommendations described in the legal deliverables (D1.2, D1.2a and D1.2b) were taken into account. The main question will be whether the chosen legal solutions were properly implemented, in a way that ensure compliance with the existing law. Every project year in REVEAL is devoted to one legal research area, but monitoring of the requirements implementation will take place continuously throughout the project lifetime. This is because the technical side of the project is in progress and certain specifications might change. Similarly, the law is not static, and its provisions and interpretations constantly change. Next, we will conduct a gap analysis during which we will evaluate the extent to which the existing regulatory framework is sufficiently conducive towards achieving its (existing or future) objectives.¹ We will also examine whether any of the initially planned REVEAL solutions faced obstacles (and in what form) posed by the currently existing laws and regulations. For example, we will analyse how the limited possibilities of grounds for legitimate data processing might result in a barrier for some of the REVEAL applications. For that step, the requirements formulated in the legal deliverables will be used. Requirements for privacy and data protection were specified in D1.2 and requirements for intermediary liability and media law will follow (in D1.2a and D1.2b). From there, we will continue an assessment of the impact of new technologies, advanced in REVEAL, on existing regulations. It is a particularly interesting exercise, considering that the legal framework for data protection in the EU is currently being revised. The new data protection regulation is expected in 2016.² Similarly, the e-Commerce Directive, which

¹ For a detailed description of the methodological steps involved in this exercise see e.g. D. J. B. Svantesson, ‘A legal method for solving issues of internet regulation; applied to the regulation of cross-border privacy issues’, EUI Working Paper Series, December 2010, available at <http://ssrn.com/abstract=1785421>.

² EU General Data Protection Regulation State of play and 10 main issues, Lead EP Committee: Committee on Civil Liberties, Justice and Home Affairs (LIBE), Rapporteur: Jan Philipp Albrecht, Greens/EFA, 7 January 2015, <http://www.statewatch.org/news/2015/jan/ep-dp-state-of-play-10-points.pdf>.

addresses the intermediary liability issues, is under the review process.³ It is hence an excellent moment to discuss the impact of the new technologies on the existing rules. To the extent that legal research aims to be not only descriptive (compliance), but also normative in its analysis, an additional step is still necessary. This step consists of formulating policy recommendations for the three legal areas in REVEAL. Drawing on the lessons learned in the project, we will propose modification to the existing laws that will allow the legal framework to keep up with new technologies and, at the same time, continue to fulfil its role in achieving policy objectives (such as protection of individuals or combatting of illegal online content).

³ The EC on the Notice and Action Initiative: http://ec.europa.eu/internal_market/e-commerce/notice-and-action/index_en.htm.

See also: A. Kuczerawy, “Intermediary Liability & Freedom of expression: Recent developments in the EU Notice & Action Initiative”, Computer Law and Security review, Vol. 31, Issue 1, forthcoming.

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8 Conclusions

The user evaluation plan has established to make sure that we reach the objectives of WP7, as laid out in the description of work (DOW). In this conclusion, we summarize how the evaluation plan supports each of the four sub-objectives listed in the DOW

8.1.1 Identifying behavior patterns of communities of users and their requirements

Three types of evaluation activities are described in the evaluation plan. The first of these is the user insight studies, to be conducted by analyses of user generated content. These analyses are intended to continually update our insight in the evolving context of use for the REVEAL framework and applications. In particular, the working practices of the users and the users' perceived needs in relation to these practices.

Analyses of user-generated content are expected to be a useful approach to gain insight in relevant working practices. For example, it is assumed that these analyses will provide insight into types of situations where verification is seen as particularly relevant and relevant, current approaches to verification and their limitations, as well as needs and desired means of verification.

The user insights from the analyses of user generated content will also be used as basis for setting up the formative and summative evaluations. Hence, these two other types of evaluation activities may serve to verify or expand on the patterns of working practices identified in the analyses.

8.1.2 Providing and further developing a set of methods for capturing user behavior and experience

The evaluation plan provides the outline for the set of evaluation methods to capture user behavior and experience. Three types of evaluation activities are described. The proposed user insight studies will provide insight in the evolving working practices and experiences of prospective users and user communities. The formative evaluations provide insight in user behavior and experience that helps us gain insight in the usefulness, usability and user experience of the preliminary applications to support subsequent development. Finally, the summative evaluations provide insight in user behavior and experience that help us assess the final REVEAL applications.

The evaluation plan describes the detail specification of the formative and summative evaluations to be done right before the startup of these, in collaboration with other relevant project partners. This specification will imply some adaptation of the current methods, and might also require some method development.

The user insights studies, conducted through analysis of user-generated content, is the evaluation activity foreseen to require the most in terms of method development. This is in particular due to the rapidly evolving character of available tools for such analysis. We have in the plan outlined that the outcome of the user studies should generate general findings for scientific publication.

8.1.3 Establish a testbed and evaluating the REVEAL toolbox in an iterative and user-centred manner throughout the whole project

In the evaluation plan we have described how we will set up an online Living Lab as testbed to get user feedback on the REVEAL applications. The online Living Lab will be used for gathering user feedback for formative and summative purposes, and can be used for evaluations at all levels of maturity for the design.

The evaluations in the online Living Lab will be supplemented with cooperative usability evaluations. Hence, the online Living Lab will provide feedback from a relatively larger set of users whereas the usability testing will provide more in-depth results from a smaller number of users.

In support of the iterative and user-centred character of the REVEAL development process, findings from evaluations will be handed over to relevant project partners as soon as possible, and if needed, prior to the findings being formalized in the form of formal deliverables.

8.1.4 Investigating privacy and trust issues that might influence acceptance of the REVEAL applications

In addition to usefulness and usability, user experience is in the evaluation plan highlighted as a key evaluation construct. In particular, we expect this construct to concern user perceptions of trust and privacy. Hence, users' perception of trust and privacy relative to the REVEAL framework and application will be duly studied.

Trust and privacy is also addressed in terms of a legal and regulatory requirements evaluation. In this context, however, it is examined from the perspective of legal and ethical compliance. For REVEAL, in order to be implemented in the EU, its solutions must follow the existing rules and regulations, such as the Data Protection Directive or e-Commerce Directive. To achieve this, the legal partner provides legal guidance, and recommendations. Following these recommendations will ensure that REVEAL platform is legally and ethically compliant. Ensuring that the laws protecting individuals' rights are respected contributes to their trust and confidence in the proposed technology.

8.1.5 Concluding remarks

The evaluation plan has been set up to provide an effective and efficient set of activities to cover the evaluation needs of the REVEAL project. The evaluations should benefit all project partners. Hence the detailed specification of the formative and summative evaluations will be conducted collaboratively in the form of specification workshops. We trust this approach will secure the project internal relevance of the evaluation activities, and also to contribute to an objective assessment of the REVEAL framework and application at the end of the project.

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