D3.11
Analysis of Societal Acceptance and Ethical Acceptability – Issue 1

Instrument	Collaborative Project
Call / Topic	H2020-SEC-2016-2017/H2020-SEC-2016-2017-1
Project Title	Multi-Hazard Cooperative Management Tool for Data Exchange, Response Planning and Scenario Building
Project Number	740689
Project Acronym	HEIMDALL
Project Start Date	01/05/2017
Project Duration	42 months
Contributing WP	WP3
Dissemination Level	PU
Contractual Delivery Date	M7
Actual Delivery Date	30/11/2017
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Document History			
Version	Date	Modifications	Source
0.1	15/10/2017	First draft.	EKUT
0.2	01/11/2017	Second draft.	EKUT
0.3	10/11/2017	Third draft.	EKUT
0.4	14/11/2017	Internal review.	EKUT
0.5	16/11/2017	Ready for quality assurance review.	EKUT
0.6	29/11/2017	Quality assurance review performed	TSYL
1.0.F	30/11/2017	First issue.	EKUT

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List of Acronyms

AVA	Avanti Communications LTD
CIMA	Centro Internazionale in Monitoraggio Ambientale – Fondazione CIMA
CTTC	Centre Tecnològic de Telecomunicacions de Catalunya
DLR	Deutsches Zentrum für Luft- und Raumfahrt e.V.
DLR-DFD	Deutsches Zentrum für Luft- und Raumfahrt e.V.; German Remote Sensing Data Center.
DLR-KN	Deutsches Zentrum für Luft- und Raumfahrt e.V.; Institute of Communications and Navigation
EB	Ethics Board
EC	European Commission
EKUT	Eberhard Karls Universität Tübingen
ELSI	Ethical and Legal Issues
EU	European Union
FBBR	Frederiksborg Brand & Redning
GDPR	General Data Protection Regulation
GUI	Graphical User Interface
ICGC	Cartographic and Geological Institute of Catalonia
INT	Department of Interior of the Catalan Government
INT-FRS	Department of Interior of the Catalan Government – Fire and Rescue Services
INT-PD	Department of Interior of the Catalan Government – Police Department
ITRC	Italian Red Cross
PB	Project Board
PC	Project Coordinator
PCF	Fundació d'Ecologia del Foc i Gestió d'Incendis Pau Costa Alcubierre
PM	Progress Meeting
SFRS	Scottish Fire and Rescue Service
SPH	Space Hellas S.A.
STS	Science and Technology Studies
TL	Task Leader
ToC	Table of Contents

TSYL	Tecnosylva S.L.
UNISTRA	Université de Strasbourg
WP	Work Package
WPL	Work Package Leader

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Executive Summary

This deliverable deals with the ethical acceptability and social acceptance of the HEIMDALL system. It sets out the difference between the two concepts and gives in two parts a summary of the current status of the work on these two concepts. In the part on ethical acceptability, it sets out several values that are related to factors of human-machine actors and formulates questions and topics that should be addressed in the project work in order to assure that the result of the project adhere to the values that are part of an ethically acceptable system. It has to be noted that this shows work in progress and that the list of the addressed values (justice, responsibility, privacy) will be enlarged and become more detailed in the course of the project. An update will be provided in D3.12, which constitutes issue two of the reporting on ethical acceptability and social acceptance.

In the second part of the deliverable, the concept of social acceptance and its objective are outlined as well as the research design that EKUT developed and is going to follow in the upcoming months. Again, the disclaimer applies that this is the first issue of three deliverables assessing ethical acceptability and social acceptance and it will be amended continuously.

1   Introduction

WP3 "focuses on all those activities and actions that involve stakeholder knowledge capitalization, support stakeholder engagement and Human factor and ethical issues for a suitable design of the system platform." ([14] Annex 1, Part A:24) In this regard, WP 3 provides insights into the interaction of stakeholders (e.g. end-users), disasters and the HEIMDALL system and is therefore an important source of system requirements. These requirements are going to be determined based on three different interactions:

T3.1 and T3.2 focus on the (current) response strategies of end-users, referring to knowledge of stakeholders, currently used procedures and experience which stakeholders have made in previous disaster events. The resulting requirements thus **address the current situation** and the **needs of stakeholders**.

T3.3 takes a closer look on the interaction between the HEIMDALL system and disaster situations in terms of application scenarios and best practice examples. The resulting requirements therefore are based on the differing **needs considering different kinds of disasters**.

Finally, T3.4 adds a perspective on the interaction between end-users and other stakeholders and the HEIMDALL system (see Figure 1-1). In this regard, the resulting requirements refer to **aspects of human-machine-interaction in technical and social terms**, in order to increase the acceptance of the HEIMDALL system. This deliverable is concerned with the social aspect of human-machine-interaction and serves as additional perspective to D3.8 on human factors. In order to gain a better understanding of the content of this deliverable, a short outline showing the relationship between a more technical and a more social perspective of human-machine-interactions as well as acceptance and acceptability will be presented in the following diagram.
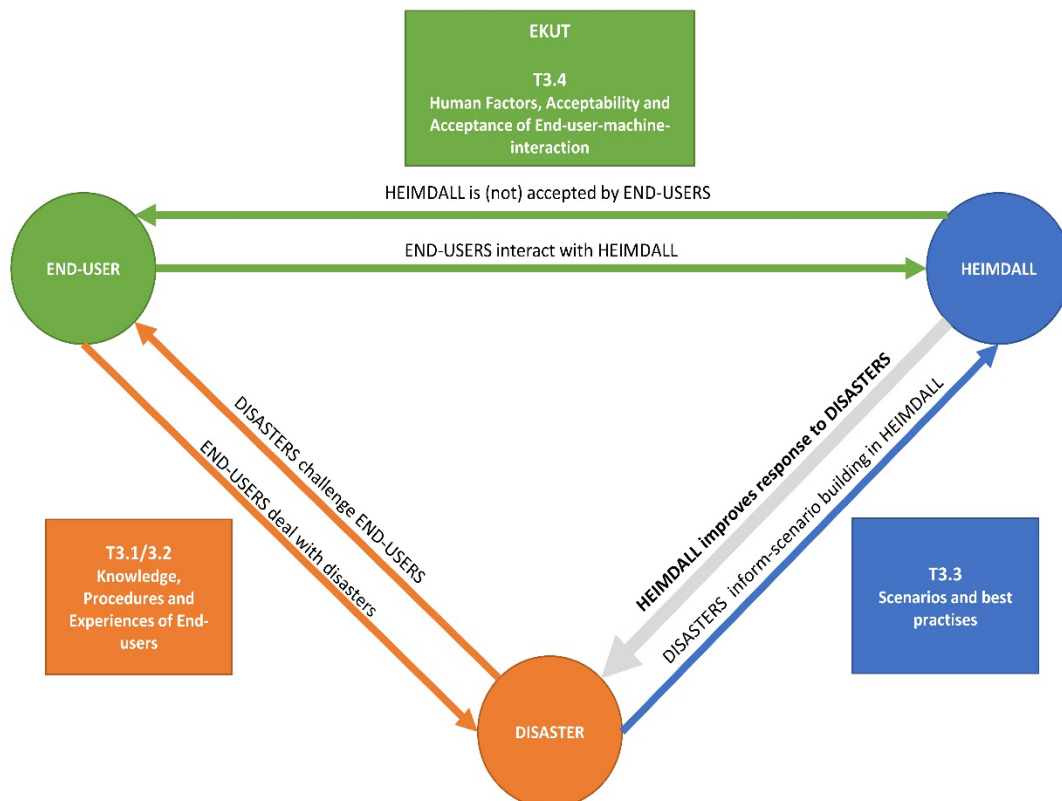

Figure 1-1: The role of WP3 in HEIMDALL (own compilation)

The success of the HEIMDALL system is not only dependent on its technical operability, but also a question of its acceptance by users and, more general, by society as a sensible tool to improve disaster response. Data on "social acceptance" is gathered by empirical research, e.g. expert interviews and focus group discussions and will be performed along the development of the system. In this regard, **social acceptance represents a descriptive perspective ('What is?')** on the empirical question whether a technology is likely to be used and under what conditions.

In addition, it is important to scrutinise the criteria that make a technology likely to be used. This **normative perspective ('What should be?') is discussed in terms of human-machine-interaction** referring to two sets of factors:

The first set comprises **Human Factors**, aiming at a well-suited working environment for the users of any kind of technology. As [20] explains, ergonomics, or the study of human factors, focuses on improving peoples' productivity, health, safety, and comfort while efficiently and effectively interacting with the technology in use in the context/environment technology and humans work together. In other words, ergonomics aims at optimising work environments and at reducing mistakes. Examples therefore are the physical design, understandable user interfaces or possibilities for the user to adjust the interface to personal needs and preferences. Furthermore, it includes the prevention of careless mistakes or an overload for individual capacities. This topic is discussed in D3.8 on "Human Factors".

In this deliverable the technological and psychological perspectives of D3.8 are complemented by **social or value-related factors** of human-machine-interaction. The term "ethical acceptability" refers to the question of how technology is related to values a society needs for thriving or to the question *in which society we want to live* (see [31]). This rather abstract concept may be illustrated using the example of a machine being able to make us feel happy during the time we are physically connected to it. In this fictional case, we would just sit in a comfortable chair with all our physical needs satisfied and there would be no harm or grief, just a beautiful life. While this machine might be widely accepted due to its design and the pleasure it provides – this is an empirical question -, we might not feel comfortable with it as it may not fit our idea of a life worth living. These two different aspects refer to the difference of acceptance and acceptability. Furthermore, a constitutive condition of acceptability is that it cannot be determined easily. It is rather connected to discourses on one of the fundamental ethical questions: "Which society do we want to live in?". Therefore, the formulation of acceptability criteria is less a definition than an ongoing discourse. This topic is presented and discussed in the present deliverable D3.11 "Social Acceptance and Ethical Acceptability".

The combination of both technical and ergonomical factors (human factors) and social or value-related factors (ethical acceptability) and the feedback from the empirical work on acceptance (social acceptance) will serve as crucial foundation for the formulation of stakeholder-related points to consider for the HEIMDALL system.

2   Ethical acceptability within the HEIMDALL project

Acceptability is an ethical and philosophical concept that cannot be approached by empirical research methods like interviews or polls: even if the societal acceptance of a technology, a strategy or a procedure is high, it might be unacceptable in terms of ethical standards or values [31]. Therefore, the formulation of acceptability criteria is less a definition than an ongoing discourse. At the same time, this ongoing complex and elaborate discourse is in strong contrast to the need for quick and pragmatic decisions and the necessity to operationalise points to consider. To make sure that this complex discourse as well as the clarity and functionality of results are acknowledged, this report issues just a limited set of values, which are of primary interest and are as well sensible and manageable as part of the project. Nonetheless, the questions and issues raised with regard to these values should be discussed in the consortium throughout the project lifecycle to make sure that the system under development matches the standards of acceptability.

Applied to HEIMDALL, the aspects of ethical/social/societal acceptability refer to value-laden "if-then" clauses like "if the HEIMDALL platform is meant to preserve or improve privacy standards, then personal data must be protected in an appropriate way." Similar questions might be raised with a negative perspective; i.e. "is it desirable that the HEIMDALL platform gives decision making advice like 'optimal procedure' as this easily tends to move decision making away from human operators?"

2.1   Objective and methods

As outlined at the beginning of this deliverable, it is a fundamental predicament that technologies unfold their full societal impact only after they have been rolled out and implemented into everyday use, thereby transforming power, authority, knowledge, social relations, and others. As ([22]:161) write, "the fact is that ethical issues arise regarding technological development when these developments appear within society, amid people in cultural settings, with viewpoints and values – technology itself is not value-neutral". In this vein, ([26]:141) adds that "diffusion of technology is mostly left to markets, which makes it difficult if not impossible to know what the social consequences of wide-spread use will be". Putting it differently: during research and development, we do not know enough about technologies to fully and comprehensively assess them, while after they have left the realm of research and development, it is nearly impossible to go back and change the trajectory that was initiated by fundamental decisions during research and development.

Against this backdrop, a set of values is presented and the associated "if-then"-clauses are outlined in the following paragraphs. Subsequently, further discussions and decisions on the aims of the HEIMDALL system will follow during the project. Depending on the answers given, requirements of the HEIMDALL system have to be added, adjusted or removed.

The list of values put forward in the following should be understood as preliminary and subject to change, as this deliverable is the first issue of three deliverables (D3.11–D3.13) dealing with the topics of social acceptance and ethical acceptability. All values discussed here are related to HEIMDALL in terms of the question:

**How could the (use of) the HEIMDALL system
affect the society we want to live in in terms of …?**

Therefore, the decisive question for this assessment is: "How can we make sure that the values of 'normal times' (in contrast to a state of emergency) become enshrined in technologies under development such that those values cannot be violated in future emergencies?" The list of values of high importance to HEIMDALL currently includes: justice, responsibility, privacy.

2.2 Value-related factors on human-machine-interaction

In this section, the previously mentioned values are introduced. This will be done in two steps: firstly, a general understanding of the values is presented. Secondly, potential questions related to HEIMDALL are outlined. Since the deliverable at hand represents issue 1 of three consecutive deliverables (D3.11–D3.13), the following paragraphs have a rather preliminary and general character subject to refinement and extension as the project proceeds.

2.2.1 How could (the use of) the HEIMDALL system affect the society we want to live in in terms of *justice*?

"Disasters do not discriminate. […] But discrimination can multiply the effects of a crisis on vulnerable people [8]." Claims like this gained increasing attention during the past years of disaster research and disaster policies, as the role of society in disaster prevention and reduction is getting more attention. The chances to benefit from disaster protection measures are not equally distributed, since coping capabilities depend on a variety of individual and societal factors, which commonly include place of living, reachability by communication, mobility, and also the knowledge of the hazard, the existence of appropriate precaution, and the context of an event. Therefore, an extreme event can also be understood as a special situation with regard to the equal distribution of opportunities: equal opportunity to overcome a disaster with as little harm or loss as possible. Security, or better, resources allowing for the provision of security are therefore at the core of the issue of distributing equal opportunities. Hence, where and for whom security is provided is crucial for determining which groups of people are defenceless in a disaster situation.

At the same time, it is not easy to determine what defines a just and equal distribution of security in disaster situations, yet rather more than one answer may be justified on reasonable grounds. In this regard, the philosopher Amartya Sen points to the fact that no concept of justice alone may achieve justice in all situations thereby relieving decision-makers from case-specific decisions ([24]:228–230). Instead, it is reasonable to differentiate situations of injustice and outline corresponding aspects of justice in reverse. For instance, it might be unjust to hinder individuals from preparing themselves against potential disaster situations; in this vein, a corresponding contextual specification of justice could be the provision of sufficient resources to allow preparation. "Contextual specifications" of justice is therefore conceived of as a partial definition of justice in the form of a point to consider, in order to prevent at least one of the identified kinds of injustice. Against this background, [2] outlined four important aspects of justice, which might serve as an orientation within HEIMDALL. These include transparency, recognition, equity and equality, and the consideration of consequences.

Following John Rawl's [23] arguments on a theory of justice, it is further important to take both procedural (fairness of process) and outcome-oriented (fairness of outcome) aspects of justice into account. Procedural justice follows the question: What are criteria for just processes? Justice of the outcome, however, asks the question: What are criteria for just results? Both kinds of justice are important for a fair distribution of what and one cannot be substituted by the other. Thus, on the one hand, a fair process may lead to unfair results (e.g., an actual offender is acquitted due to a lack of evidence) and, on the other hand, unfair processes may produce fair results (e.g., a redistribution imposed by fraud may lead to a fairer distribution).

2.2.1.1   Transparency of operational protocols?

In order to allow an equal distribution of justice, it is mandatory to unveil injustices wherever they appear. Transparency thus refers to a formal-abstract right of visibility and comprehensible information about imminent decisions (on distributions), topics, actors involved, interests, arguments, and power hierarchies. The latter are often concealed, but they influence decisions to a large extend and sometimes in a highly problematic manner. Ensuring transparency might help to avoid injustice. Transparency makes it possible to recognise problematic structures and circumstances. An informed decision, for example, also requires

knowledge about the goal or method of certain measures. This requires a critical awareness of the actors, especially in the security context, in order to uncover problematic structures without creating new uncertainties. At least two relevant topics might be further discussed within the project:

First, transparency might be relevant in terms of operational protocols and in order to trace decision-making processes during a disaster situation. This transparency is important to identify wrong decisions as well as misbehaviour but it may also serve as a learning tool in order to understand how decision-making works and which information is used. However, the extent of this transparency of operational protocols has to be determined.

Second, transparency might be important in terms of responsibility structures, since clear responsibility structures are essential in order to improve disaster response. Decision-support tools, however, are likely to have an impact on this kind of transparency. We will have a closer look at this issue in section 2.2.2.1.

2.2.1.2   Recognition and planning for all groups and areas?

Inequalities cannot be measured by comparing amounts of individual goods [9]. Since the resources for enhancing security are limited, it is also necessary to decide every time which individuals/positions/interests to consider and which to exclude. In the sense of a fair distribution process, the question arises which criteria (such as awareness, desirability, generalisability or feasibility) build the basis of such a selection. After all, the answer to this question depends ultimately on whether it is a question of neglecting certain individuals/positions/interests or a legitimate exclusion. In order to avoid injustice through exclusion when distributing security, the concept of recognition by [7] might function as another aspect of justice. At least one topic might be discussed further within HEIMDALL:

First, recognition appears to be an important value closely related to transparency. Recognition refers to the categorisation and attribution of priorities to e.g. infrastructure or official buildings. This knowledge allows authorities and relief organisations to explore, for instance, omitted areas or institutions, such as rural areas or institutions including kindergartens, schools, retirement homes and others. In contrast, if planning structures are more transparent and comparable, special needs or the neglect of groups or areas can be analysed in order to support an equal distribution of disaster prevention and of reduction measures.

Second, recognition was already mentioned in D8.1 in reference to the accessibility of the HEIMDALL system. As the [28] strongly promotes a more inclusive design of disaster policies in every aspect (prevention, reduction, response, recovery) the HEIMDALL system should include adjustment tools in order to allow persons with disabilities to contribute and participate. "This might require […] an accessible Graphical User Interface (GUI) for the system itself. Furthermore, it refers to a critical view on possible negative stereotypes and other discriminations, which could be inscribed into technology and aimed services. Although a certain amount of exclusion is inevitable; thus the problem of exclusion should be part of an ongoing discourse ([11]:10)."

Third, recognition and justice might be discussed in terms of exclusion through technology. Besides the topics introduced so far, which cover rather social and procedural aspects, there are possible exclusionary effects through technological solutions. The whole idea of the HEIMDALL system is that actors can improve crisis mitigation and prevention by combining and sharing information. However, when these systems are created, certain actors may become excluded. That is, some actors or organisations might benefit from improved information and situational assessment or improved possibilities for information management. Whereas others might be excluded from the information flow. Between organisations involved in crisis management, there are differences and competition with regard to competence, budgets and staff – even though they are all united in a common aim to protect the public. This competition is also relevant in terms of long-term strategy and investment, especially when it comes to common standards and the technologies used. This is in fact something that must be taken into consideration when designing the HEIMDALL system.

2.2.1.3   Equity, equality and fair pricing

The main part of each distribution process is the actual allocation of resources. With regard to the theoretical work of John Rawls, Amartya Sen and Martha Nussbaum, two kinds of distributional justice need to be differentiated. Formal, arithmetic or quantitative equivalence (equality) describes a way of allocating goods in a way that guarantees that every person gets exactly the same proportion. Formal equal distribution is particularly useful in cases when individuals benefit from their share in the same way, for example with regard to rights and freedoms ([1]:420–421). In contrast, substantial, proportional or qualitative equality (equity) describes an allocation based on criteria such as need. This takes into account the fact that a formal equality of treatment in the allocation of resources all too often neglects the individual diversity of life situations. This criticism aims at the fact that the possibilities for the use of allocated resources for a fulfilled life are different depending on the individual and situation ([24]:261). For instance, a person with a chronic illness needs more money to pursue a good life than a healthy person needs.

In this regard, for the design of the HEIMDALL system, justice might be analysed as a modulated system differentiated along different kinds of natural hazards. As different countries or regions are exposed to different hazards and are also more or less probable to be affected, this might lead to situations that some countries or regions have to invest much more than others due to their geographical situation. If the consortium agrees that disaster prevention is equally important to all countries or regions since disasters are neither wanted nor voluntarily caused, a deeper involvement with this question will be necessary. This holds especially true, if the HEIMDALL system eventually will have to be bought on a community level. A pricing system independent from hazards, which allows communities to obtain the necessary modules for their situation rather than only the ones they can afford, might be an important step to prevent an imbalance between communities.

2.2.1.4   Consciousness on consequences

The final phase of a distribution process consists of taking into account the consequences of certain resource allocations. As stated in the introduction to this section, this is a central part of the justice of the outcome, which is not necessarily evident relying on only the aspects of justice mentioned above. Reports on previous disasters as well as the exchange with the project partners may increase the necessity to take a close look on security measures (disaster prevention, reduction, response, recovery), since they always entail advantages and disadvantages. There may already be an awareness of these in many cases or they may even represent the reason for taking certain decisions, but they are also often overlooked. A particularly demanding and challenging form of advantages and disadvantages are those that are only caused by the combination of various factors, so-called (positive or negative) side-effects.

Firstly, this becomes important due to the previously outlined issue of equality, equity and fair pricing (see 2.2.1.3), since as a consequence, an unfavourable pricing system would intensify current disadvantages within EU Member States.

Secondly, with regard to responsibility (2.2.2) side effects relate to technological development and public accountability "as a complementary tool for the establishment of an ethical resonance space for emerging technologies. Public accountability can render development and design processes of emerging technologies transparent through practices of holding those in charge of research accountable for their actions, thereby fostering ethical engagement with potential negative consequences or side-effects ([16]:3)." Therefore, in reference to the empirical work and the focus groups with the public (2.2.2) it has to be determined how the results of the focus group interviews with the public are taken into account and to what extend concerns mentioned during the interviews might be considered for the project development.

2.2.2 How could (the use of) the HEIMDALL system affect the society we want to live in in terms of *responsibility*?

The concept of responsibility describes the relation between causation and consequence in reference to an entity. This quite abstract definition might be easier to understand using the example of a disaster manager. The latter has obligations associated with the role, for example screening data of an ongoing event and organising the response. If the disaster manager did not react to the event, she/he would be responsible for the consequences due to the fact that this person was in charge. Besides this functional responsibility, there is a moral responsibility that the Australian ethicist Will Barrett defines as follows: "Moral responsibility assumes a capacity for making rational decisions, which in turn justifies holding moral agents accountable for their actions. Given that moral agency entails responsibility, in that autonomous rational agents are in principle capable of responding to moral reasons, accountability is a necessary feature of morality [3]". "Responsibility, then, is composed of a duty to discharge not only the *functional* obligations of role, but also the *moral* obligations" ([4]:21, emphasis in original).

Furthermore, consequentialist approaches on responsibility tend to demand an additional level of accountability, which takes into account the readiness or preparedness to give an explanation or justification for an action rather than the fault of someone [4][17]. As Bivins ([4]:21) proceeds, in an ideal case the responsible person would also be held accountable for the results of the action. Nevertheless, this is not always the case. For example, in a terrorist attack, the attacker is responsible for the actual event but it might be the Minister of the Interior who will be held accountable since it is said that she/he to have let the attack happen. This holds also true for disasters and natural events. Those might have started a crisis event, however, the authorities can get accused if the consequences were bad because of non-existent preventive measures.

In addition, one might add that for being responsible a relative autonomy of an actor is assumed. "However, the nature of autonomy often changes with the environment in which a public relations person works, and is certainly affected by the role and the functions associated with that role" ([4]:21–22). With regard to the technology of the HEIMDALL system, the question comes up whether and to what extent responsibility can be attributed to a technological system in different use cases.

For the HEIMDALL project, responsibility is an important topic both with regard to acting and decision-taking individuals as well as with regard to decision support by technology. More research will be done on this as the project evolves and the exact kinds of decision support within the HEIMDALL system are determined.

2.2.2.1   Transparency of responsibility structures

The importance of transparency is already outlined in 2.2.1.1, which is why we can proceed with questions on transparency in relation to responsibility.

In this section, it is already mentioned that clear and well-known responsibility structures are important for legal as well as operational reasons. In this regard, transparency is the necessary precondition in order to evaluate any further issues. Issues that might arise according to extensive decision support are used and decision processes are becoming transformed or blurred. Although the HEIMDALL consortium decided against direct decision support in terms of presenting operational options or suggestions to the operation control, indirect decision support still has to be assessed against this background. This includes, for instance, the presentation and selection of data. At the time of writing this deliverable, only options are planned allowing to manually adjust the visible data to personal needs. Nevertheless, two issues will be of further importance: On the one hand, there is still the bias of the data source, where a preselection of the data is set and whereof the disaster response staff might select. On the other hand, and more importantly, there will be a modular bias according to the current discussions; i.e. some information might not be available due to modular limitations. Therefore, it is important to discuss, a) to what extent are these biases made visible to

the user and b) if, in relation to efficiency (2.2.3.1), there is a problem of justice if parts of the HEIMDALL system might become available not according to the need of the public but rather according to the financial strength of communities. This last question is of utmost importance as HEIMDALL aims at improving disaster response and therefore is inspired by a humanitarian ideal.

2.2.2.2   Knowledge leads to responsibility

A key insight of modern disaster politics is that good disaster prevention or reduction is based on as much knowledge as possible. With knowledge comes the power to help people. Yet, it is important that only necessary and specific information is taken into account as there is also data that will rather confuse, distract or be too sensitive. Equally important, the saying "With great power goes great responsibility" might be added. Since the HEIMDALL system aims at the provision of a comprehensive set of data for users, this might as well have implications for them.

First, responsibility and knowledge should be discussed in terms of the question who actually starts the use of the system for crisis mitigation and therefore has the authority to declare a state of exception because of a disaster. Does the system itself trigger such a situation and if yes, on what grounds? Alternatively, are stakeholders in charge? This question is also important in terms of the misuse protection mentioned in [11].

Second, it is the idea of the system to improve prevention and response measures in disaster events by allowing a better response planning due to enriched simulations and scenario building beforehand. These scenarios might unveil vulnerabilities of current disaster prevention and response structures, which could put pressure on authorities to improve. Therefore, it might be worthy to take a closer look at how this can be considered in the development of HEIMDALL, for example in terms of transparency structures. The idea of the responsibility of authorities to improve disaster prevention and disaster mitigation is very much in line with the Sendai Framework for Action [28].

Third, both questions are related to the public, as disasters are not only about preparation but also about early warning. If the HEIMDALL system provides a comprehensive set of data it might as well serve as an early warning and prediction tool and could be helpful to inform the public. Put differently, although there is no public access planned at this time, nevertheless it might be sensible to prepare a mechanism allowing connections to individuals' apps or devices in order to give citizens the chance to prepare or evacuate as early as possible. In addition, the question is how to address the public in crisis situations. This is not only necessary due to an obligation to keep the public informed about what is going on, but also an essential part of managerial efforts, for example to evacuate an area that is prone to be flooded. However, in times of the diversification of digital communication channels, multiple questions arise around channels, forms, and contents of messages to the public. These questions concern both institutions and organisations vis-à-vis the public, as well as among themselves. Ethical discussions about communication often involve questions of truth telling, for instance when it comes to the possible benefits of paternalism. With regard to crisis communication, one might for instance think of situations where authorities decide not to communicate all facts to the public, or in fact exaggerate a threat scenario in order to gather support for counter measures or to more effectively tackle areas that need to be evacuated.

2.2.2.3   Justice and Responsibility

As the importance of justice is already outlined in 2.2.1, it is possible to go directly to contentious questions on transparency in relation to responsibility.

Firstly, with reference to the previous aspect on knowledge and responsibility, it might be further discussed, who is responsible for prevention measures. "There is a growing disquiet, more visible in Europe [...], that such policies [on privatisation] lead to an abdication of public responsibility and are motivated by efforts to hold down public costs, and taxes, rather than to provide better or more efficient services. There is an ideological component to the encour-

agement of private charitable contributions for disaster relief as a substitute for public responsibility, linked to opposition to raising taxes for the same purpose. Yet public disaster relief and planning are classic arguments for an active public sector" ([19]:283). Furthermore, "under these circumstances and over the last couple of decades, public safety issues have moved from a relatively exclusive task of the police to a mission and shared responsibility of the community at large and a growing number of public-private partnerships. It is exactly this growing diversification and pluralisation of actors and mechanisms of control and surveillance that is generally described as the local 'governance' of public safety" ([21]:305–306). Both quotes refer to the question on whose responsibility it actually is to prepare and to use the HEIMDALL system. If HEIMDALL scenario building costs money and might detect weaknesses or needs for investment, public authorities might be reluctant to use it. On the other hand, due to the increasing private sector of security production, it might be necessary to include them as well as a user group. The same holds true for the public, which might bare the major effort to prevent and therefore needs access to information in order to do so.

Secondly, in reference to recognition (2.2.1.2), responsibility exists not only for actual, but also for potentially knowable knowledge, for instance for data on specific groups or needs within society. As the HEIMDALL system sets the framework of which data is included, the inclusiveness of these datasets should be discussed intensively with the end-users in order to allow disaster planning and response that is as just as possible.

Thirdly, in terms of transparency and responsibility it might be discussed who is responsible for mistakes or failures of the HEIMDALL system or the used devices and the consequences which might follow? They could not only lead to damages or material loss, but also to injuries and casualties. This is not only a question of legality but also of design and implementation since one could argue for offline back-up systems, redundant servers, training of administrative IT experts for every user and others. Nevertheless, to give an answer on this question is essential not only for the success of the HEIMDALL system but more importantly in order to prevent unnecessary loss of life or infrastructure due to collapsing mission control.

2.2.2.4   Trust in a responsible system

Trust defines the subjective belief in the credibility and authenticity of another individual or institution. Although this is predominantly an individual and psychological phenomenon, trust might also be understood as a social value, since especially the trust in institutions is a necessary condition for society. This certainty of expectation of the reliability of rules and social principles is important to allow individual action ([10]:643). Therefore, trust is a functional strategy to be able to act in uncertainty and against the backdrop that it is impossible to check everything by oneself ([18]:8–9).

Firstly, trust might be assessed in reference to communication between the end-users, though building trust requires communication, preferably face-to-face. As a study on the flooding in Dresden suggests, the successful handling of disaster events is often only possible because there was no common information platform, because staff was forced to talk to each other and in this way a common picture of the situation and confidence could develop ([27]:173). In other words: "If you trust the risk manager, communication is relatively easy. If trust is lacking, no form or process of communication will be satisfactory" ([25]:677). Therefore, it might be necessary for HEIMDALL to implement ways to allow trust building and the maintenance of trust relationships in order to support its use.

Secondly, trust has to be assessed in the way mistakes or problems are made transparent and are discussed. As the final demonstrator of the HEIMDALL system cannot be completely flawless it is important, in order to generate trust, to discuss these problems and allow criticism.

2.2.3 How could (the use of) the HEIMDALL system affect the society we want to live in in terms of *privacy*?

Data protection and privacy are among the most important values when it comes to crisis management practices. This is mainly due to the fact that data/information is considered the backbone of crisis management. In order to be able to respond to any given situation, crisis managers at all levels need to have multiple layers of information at their disposal: about the nature of the event, the affected topographies and populations, the available first responders and equipment, weather forecasts, critical infrastructures, transportation routes, etc. Only if and when all relevant information is at hand, informed decisions can be made and enacted. However, this idea of perfect availability (which is an ideal typical notion that will never be encountered in actual crisis management) stands in stark contrast to the value of privacy and legal concepts like data protection. Furthermore, the new General Data Protection Regulation (GDPR) of the European Union will come into force in May 2018 and will harmonise data protection guidelines. One part of the GDPR is the explicit mentioning of privacy/data protection by design.

Privacy and data protection are acknowledged and valued as important principles – however principles that at times stand opposed to the operational needs. Thus, the challenge for any information exchange tool (not only limited to crisis management) must be to enable data exchange without violating privacy and data protection. This means that data must be rendered in such a way that it does not lose its informational value, while at the same time not infringing on personal details.

2.2.3.1   Data security

As opposed to the notion of security in crisis management itself (i.e., the security of the population), data security means that the data that is gathered, exchanged, and used in crisis management operations must be protected from unauthorized access. While at first sight, this might not necessarily appear to be of ethical or moral nature, but rather a technical question of encryption, password protection, physical integrity of server architecture, etc., the concern here is that information about ongoing crisis operations could end up in the wrong hands.

This leads to a first issue that might be discussed: Organisations with malicious intent could seek to make use of the provided data and tools of the HEIMDALL system in order to plan attacks on critical infrastructures, or possibly to loot abandoned areas after they have been evacuated. One could also think of leakage to the media that would then communicate faulty or partial details about crisis situations to the public, thereby causing unintended effects. The question arises whether the HEIMDALL system is secure enough to withstand external (and internal) attackers.

2.2.3.2   Privacy by design

Ann Cavoukian, the then Canadian Information & Privacy Commissioner, published the concept of privacy by design in the 1990s and thereby extended the idea of privacy enhancing technologies to include positive values. She formulated seven foundational principles of privacy by design that should be followed not only in the development of technology, but also in the organisation of businesses and systematic practices. She argues: 'Privacy by Design advances the view that the future of privacy cannot be assured solely by compliance with regulatory frameworks; rather, privacy assurance must ideally become an organization's default mode of operation' [6].

In this vein, it has to be assessed and continuously discussed whether the HEIMDALL system adheres to the values of privacy by design so that no privacy issues arise in the first place. This is, in contrast to data security in section 2.2.3.1 where it is about leaking information, mostly about minimising and anonymising data that enters the HEIMDALL system.

2.2.3.3   Privacy and stakeholders

In the grant agreement, one of core functionalities of HEIMDALL is outlined as follows: "HEIMDALL will develop applications to gather in-situ information in the course of the response and recovery of an emergency situation." The objective is NOT to gather private data. Instead, the objective is to gather information about the disaster situation itself. However, the design of the applications to gather such information may be limited by the application program, so that it may not be possible to directly extract the disaster situation information without a link to some private data (e.g. name, pseudonyms or others)" ([14], Annex 1, Part A:100).

This asks for ongoing discussions and assessments whether all information gathered by the HEIMDALL system is truly disconnected from personal data and remains like this.

3   Social acceptance within the HEIMDALL project

Societal, social and/or public acceptance are no new terms and can be easily found in any search of databases. At the same time, these results neither refer to one specific discipline nor are clearly and broadly described or defined. Moreover, regarding literature in the field of technology for disaster response and disaster risk reduction, the analysis of societal acceptance is almost null. Thus, this deliverable is a first attempt to map the working definitions and use of societal/social/public acceptance and to provide with a possible definition of societal acceptance of the HEIMDALL system that will be tested during the empirical research.

In what follows a summary of literature regarding several aspects of the term will be provided along with a potential conceptualisation of societal acceptance. Then, a proposal of elements and circumstances that are necessary for the societal acceptance of the HEIMDALL system will be explored. Finally, a description of the firstly selected topics to be touched upon and from which to obtain a participatory view to generate and understanding of the acceptance of such system will be presented.

Following [29] the first references to technology acceptance are found in the classical diffusion model, referring to the stages of implementation and adoption ([29]:6). Although a simplistic understanding, they consider it a valid model as it helps to define this concept and to identify the moment when it is of most importance. In this framework, technology acceptance means to persuade and influence the attitudes towards a technology –and to modify them if they are unfavourable- in order to obtain a positive decision related to its (successful) integration in society ([29]:6). It is evident that such definition is valuable and needed for marketing and economics purposes, and that psychological and behavioural studies focus on fostering those characteristics and aspects that make a rejection less likely. Specifically, this strand of literature in psychology and economics focusses on attitudes and their three main components: knowledge (connected to intellect and beliefs), feelings (emotions) and behaviour (past and present response) ([29]:8;[30]:3). Nonetheless, it is important to stress that attitudes can be modified by many factors but they might not predict any change of behaviour ([30]:4).

In contrast to the previous understanding of the attitudes-behaviour connection, another stream of research on acceptance considers that practices, habits and routines are the medium for changing behaviour [30]. In this case, attitudes are secondary as well as knowledge, persuasion or experience, and the context of the individual takes precedence. Altering the social, economic and/or political environment of the person conditions the potential acceptance/rejection of the technology. For example, sociology of consumption holds that (rational) deliberation or decision-making is not affecting behaviour, it is the context which constrains options and, therefore, attitudes are following behaviour [30]. Furthermore, Science and Technology Studies (STS) hold that people are embedded in their environment affected and adapted to it (and the opposite) and that as a consequence lay people and not only experts should be part of any study regarding risks, concerns, values and perception of technology. Although potential differences and controversies might arise, their opinions are not a consequence of lack of knowledge or misunderstanding but grounded in different values, interests, concerns and knowledge [30].

Acceptance is not only a concept with multiple meanings but also with many different methods to empirically test its value. For example, psychological and marketing studies use public opinion surveys and panels to evaluate the public acceptance (or opinion), while many STS (a field that as such encompasses many approaches and methodologies) scholars consider that ethnographic and qualitative interviews are better tools to understand the social acceptance.

In this deliverable, the proposed definition follows Upham et al., considering social acceptance as "a favourable or positive response (including attitude, intention, behaviour and – where appropriate - use) relating to a proposed or in situ technology or socio-technical system [in this case, HEIMDALL], by members of a given social unit (country or region, commu-

nity or town and household, organization)" ([29]:9). As a working conceptualisation in need of empirical confirmation, the projected plan is to study this positive response in focus groups with different stakeholders in order to identify which elements affect it and how HEIMDALL can be better equipped to respond to those.

In this sense, according to [5], there are four issues that this research will try to address. Regarding the first one, this study will focus on understanding the broad spectrum of stakeholders involved in the project and their attitudes, behaviour, intention and use of the system ([5]:2). In other words, focus groups have been selected as the method to elaborate on the values, attitudes, concerns, behaviour and potential use that HEIMDALL generates on those most likely to be affected by it: end-users, technical staff, interest groups, citizens and public authorities.

Secondly, societal acceptance is not a one-time decision. It is a process, a matter of time and development, a co-evolution of the technology and the social groups, their context and the alignment of HEIMDALL with those historical, institutional, social, economic and geographical settings that shape and are shaped by the system at local, national and European level ([5]:2–3). This point, in particular, presents itself as an important challenge for EKUT, and the whole consortium, due to the current stage of the system's development. As many studies before have shown, the acceptance of any technology is situational, which means that is an issue of time, place, societal, political, economic and other contextual factors of actual adoption/implementation. Coming back to the beginning of this section, in HEIMDALL's case, this technology is not at the stage where it is fully operational and can be tested in a particular location. It is in this case that according to [5] a project's characteristics, the environment, and the stakeholders' perspectives will be more difficult to elaborate. Nevertheless, it is expected that the research will produce important insights regarding the forms, timing and features considered most valuable to be addressed at the said stage of development.

The third important topic to be considered for this work is, connecting to the previous issue, the dynamic political process that any technology goes through as it evolves. As HEIMDALL develops the stakeholders and their contexts are modified, and also the policy culture, policy decisions, instruments and procedures might change. This is a matter connected as much as to the desk-based research part of this study as to the empirical methodology selected to gather data of the active/passive acceptance/rejection phenomenon evolution- the dynamic distribution of power.

Currently, the proposal is to focus on those aspects that are pertaining to the macro and micro level, or the general, policy-political level, on the one hand, and the individuals' level (person, households, organisations) on the other ([29]:10). In other words, the plan is to evaluate the "political acceptance in the sense of policy support by governmental levels, agencies and political parties" [29] and the individuals' (different stakeholders-lay public, end-users, technicians, policy officials, others) attitudes, expectations, values, concerns and behaviours. In this level, the socio-demographic characteristics such as gender, age, income level, education and other might play an important role.

The meso level, the one corresponding to the geographical space in which the technology is implemented, is the one left out of this plan as it was emphasised before that the current stage of HEIMDALL's development prevents from identifying a specific community to study. However, a compromise might be achieved in terms of doing the focus groups on two European countries to be selected. In any case, it is expected that more defined and new issues will be likely to emerge as the time goes by.

In addition, three more topics have been identified as important for the social acceptance of HEIMDALL. One is connected to the modification of the circumstances in which HEIMDALL is used. The objective of the system is to improve the preparedness of societies to cope with complex crisis situations. Then, the discussion during the focus groups will delve around the exceptionality of the crisis and the conditions it generates regarding the potential use of the

system. Once again, socio-political and individual perspectives might differ and they can be affected or affect the development of HEIMDALL.

Another aspect of technology acceptance that will also be analysed but in nuanced terms is the market acceptance. In this case, it is not only a question of technological readiness but also the existence of a specific deliverable, D 3.8, regarding Human Factors that will examine the user-centred perspective of the system in more details. However, a probable outcome of the empirical research will be the most adequate regulatory frameworks and financial instruments necessary for a successful implementation. Moreover, another generic result could be the attitudes, values, socioeconomic dimension, psychological traits and needs that end-users and citizens, alike, invest in the system. These are potential features to be considered not only for the alignment of technology and society, but also for the development of the business plan.

A last consideration to be made in terms of organising the focus groups is the (un)familiarity that end-users and lay public have with this type of technology. The level of knowledge, experience, and awareness might be low, which might require providing an introduction to decision support systems for crisis management in order to obtain opinions, comments and understandings. In this case, it is important to be conscious of the potential effect of this action in the output of the discussions in terms of bias.

3.1 Objective and methods

The main objective of the empirical research in T3.4 is to analyse the societal acceptance of the use of the HEIMDALL system (or other similar systems) as a device for disaster response and planning. For this objective, five explorative discussions with focus groups that represent relevant societal groups (potentially) being in touch with the HEIMDALL system will be conducted. This includes the end-users of the HEIMDALL consortium (n=1), the technical developers or engineers of the HEIMDALL system (n=1), the representatives of the data providing services (n=1) and members of the general public potentially affected by the use of the HEIMDALL system in their home regions (n=2). The focus group discussions will be conducted in order to get a common understanding of the acceptance of the HEIMDALL system and to develop a context-sensitive concept for the analysis of criteria concerning human factors and the ethical acceptability of the system.

Note: The empirical research on societal acceptance approached by the focus group discussions will be completed by the findings of the qualitative interviews with potential end-users of the HEIMDALL system, as described in D.3.8 (Description of research plan on Human Factors). The aim of these interviews is to explore the practical experience and knowledge of the end-users and to actively involve their perspectives into both the technical development and into the research on human factors and ethical issues. In order to guarantee an early involvement of the end-users' perspective, the first focus group discussion will be conducted with the end-users of the project. Based on the results of the focus group discussions, the guidelines for the interviews with the end-users (see D.3.8) will be adjusted and refined.

3.2 Research design: focus groups

3.2.1 Sample of focus groups and participants

As outlined in section 3.1, three discussions with different subgroups among the members of the HEIMDALL consortium and two discussions with members of the public will be done.

The decision to include the perspectives of the consortium members into the sample of focus group discussions arises also from our observations in the previous HEIMDALL meetings (Oberpfaffenhofen: Kick-Off Meeting; Barcelona: PM 1; Athens: PM2). The members of the different subgroups (end-users, technical developers/engineers, data providers) seem to have different approaches to both technical and ethical issues, which seem worth expanding on their perspectives separately. Furthermore, we want to provide a smaller and private space in order to discuss these issues in more detail. For these reasons, a much smaller

space for the three subgroups should be provided, in order to find out about common attitudes and perspectives as a group.

On the other hand, it is of fundamental importance to detect the societal acceptance of HEIMDALL and similar systems in general. For this reason, two focus group discussions with members of the public in two different European countries will be conducted. Unlike the discussions within the HEIMDALL consortium, these discussions have to be organised with individuals who are not involved in the development of a disaster response system and who might not even have any knowledge about it. Therefore, the moderator of these discussions has to give an introduction into the most relevant functions of the HEIMDALL system and point out the most striking questions/topics which should be discussed with the public (e.g. the decision support system). As the participants might lack personal experiences with this kind of technology, the topics under discussion have to be presented in a generally intelligible way. The fact that the general public might answer in a more intuitive rather than well-informed or reflected way, must be considered when evaluating the findings.

The recommended number of participants per focus group depends strongly on their level of expertise and involvement in the discussed topic: experts and participants with a high level of involvement tend to participate in a very active way and need a lot of speaking time, whereas participants with less knowledge and involvement tend to act in a more reserved way. In that case, a higher number of participants make it easier to keep the discussion going ([15]:109 et seq.). In the case of the scheduled focus group discussions in HEIMDALL, both the level of expertise and the level of involvement are expected to be higher among the members of the HEIMDALL consortium (discussion 1–3) than among the members of the general public (discussions 4 and 5). For this reason, the focus groups consisting of members of the HEIMDALL project (the end-users, the technical engineers and the data providers) will be conducted with relatively few participants (approximately 3–6), whereas the focus groups consisting of members of the general public will be conducted, if possible, with a relatively high number of participants (up to 12).

Note: The aspired number of focus groups and participants outlined here might be subject to changes, depending on the recruitment process, the level of saturation or redundancy of the findings, as well as on possible budget and time limitations (see 3.2.2).

3.2.2 Preparing, conducting and recording the focus group discussions

The successful implementation of a focus group discussion requires a well thought out preparation of both the content-related and the organizational aspects of the discussion ([15]:89 et seq.). The researchers have to define the object and the objective of the empirical research (see 3, 3.1 and 3.2.1), the number and size of the focus groups (see 3.2.1) and a topic guide or questioning route for the moderation of the discussion. In order to have a productive and vivid discussion, appropriate opening questions have to be formulated (to break the ice), introductory questions (often asking for personal experiences related to the discussed topic), transition questions (gradually leading the attention towards the topic itself) and key questions (targeting at the main interest of the research) ([15]:99). Although the moderator should try to intervene as little as possible in the ongoing discussion, he or she has to keep control, providing a pleasant and participative culture of discussion and making sure to stick to the time schedule and avoid digression from the subject. When the moderator notices a decrease of the motivation and concentration of the participants or when the arguments start to repeat, he or she should switch to the next topic or close the discussion, summing up the arguments of the participants and underlining the common positions and attitudes of the group members.

Before starting the discussion, the moderator should roughly introduce himself/herself and the research project, he or she should point to the need of recording the discussion, as well as to the anonymity of the participants and the confidentiality of the analysis ([15]:138). The moderator should also give some basic information on his/her role and the importance of the

participants' points of view for the project; he or she should explain that there are no "wrong" answers and that all participants will have the same right to express their opinions. Furthermore, the moderator will explain the main rules within the discussion process and provide a rough time schedule (at least he or she will set the estimated duration of the whole discussion).

In order to verify, the voluntariness and awareness of the participation, all participants will sign the informed consent sheet (see [12]) before starting the discussion. Participants of the public focus groups will additionally receive the project information sheet (see [13])

The discussions will be recorded via voice recorder and thereafter transcribed by members of EKUT. The audio files will be stored in an encrypted container and they will be deleted after transcription. The remaining transcripts do not contain any personal or identifying information. The names of the participants will not be mentioned during the discussion by the moderator. If a name is unintentionally mentioned by the moderator or other participants, it will be anonymised in the process of transcription. The findings of the discussions will be presented to the HEIMDALL consortium or, if appropriate, to other publics in a strictly anonymised and aggregated way.

Finally, there are some organisational aspects to be considered when planning the focus group discussions: time and place for the discussions have to be set according to the needs and conditions of both the participants and the EKUT team members. In order to avoid high costs, it seems suitable to do the discussions directly before or after the HEIMDALL project meetings in the respective cities. This might allow us to reduce travel costs and to use some of the infrastructure of the hosting project members who might be able to help us to find appropriate rooms for the discussions and to find participants for the discussions with the general public in their cities.

These and other organisational matters will be discussed with the Project Coordinator and the members of the consortium soon.

3.2.3 Evaluation of the generated data

As outlined in 3.2.2, the audio files generated during the focus group discussions will be transcribed and anonymised by a member of the EKUT. In order to guarantee a consistent transcription process, common transcription rules will be established for all the focus group discussions. Important points to consider, or rather open questions to be discussed, are the following ([15]:174):

- Will we transcribe only spoken words, or also breaks, laughter, sighs etc.?

- Will we transcribe only clearly-defined statements, or also spontaneous reactions to these statements by other group members?

- Will we roughly summarise the content of the statements, or will we transcribe everything word by word?

- Formal aspects like line numbering, line spacing etc. have to be defined.

The open questions concerning the transcription rules will be discussed among the EKUT team when developing the questioning route for the discussions and then will be fixed in written form.

The transcripts of the focus group discussions will be evaluated using the descriptive-reductive content analysis method (see [15]:183 et seq.). The aim of this method is summing up the main contents and arguments of the debate, increasing the density of the information by reducing the data volume. Therefore, in a first step, a system of categories will be developed according to the main interests of the research. In a second step, relevant text passages will be identified and grouped by the corresponding category. By using this cut-and-paste-technique, relevant information (words, sentences or entire passages like dialogues) can be quickly extracted and distinguished from less relevant information. In a third step, appropriate quotations of the participants will be looked up in order to illustrate the main arguments.

The extracted information should then, in a last step, be summed up and, if necessary, interpreted in the context of the research field. In reference to other discussions, consistent and/or divergent patterns of information can be worked out.

For the evaluation, the following questions (see [15]:186) can function as an orientation guide:

- What do the participants say?

- What do they feel?

- What is (most) important to them?

- What are the relevant topics?

- How far can we compare the different groups?

- Are there any statements apart from the defined categories that should be mentioned nevertheless?

- Which quotations represent the topics most appropriately?

- Is there a consensus among the group members? Where is the most obvious discrepancy?

Although the evaluation of the focus group discussions will be based on the written transcripts, it might be helpful to have as well brief (and selective) protocols of the debates, written during or right after the focus group discussions by a member of the research team. This type of protocol helps to conserve an overall impression of the discussion, the atmosphere and the (non-verbal) interactions of the participants, which later on might not be possible to be derived from the audio file or transcript. In any case, it is important to start the transcription and evaluation process as soon as possible after finishing the discussions, as the crucial aspects of the debate are most present right after the discussion ([15]:191). Another advantage of an immediate evaluation is the possibility to add some of the findings to the next discussion's questioning route, or to avoid possible mistakes (like misleading formulations in the questions) in the following group interviews.

The weak point of the descriptive-reductive content analysis method is the potentially high influence of the researcher (who decides what is relevant or less relevant for the research interests) on the results. To reduce the subjectivity of his/her decision, it is recommended to compare his/her findings to the perceptions of other team members or participants. This balance can be done, for instance, on the basis of the audio file or the transcription of the discussions.

4 Conclusion

This deliverable provided an overview on the work that has been done so far on the two questions with regard to HEIMDALL: 'What is?' the social acceptance of the HEIMDALL system and 'What should be?' the relation between the HEIMDALL system and society, in other words, what should HEIMDALL look like in order to adhere to ethical acceptable standards in terms of human-machine interaction.

Following the more specific question 'How could (the use of) the HEIMDALL system affect the society we want to live in in terms of …?', several topics are presented that should be taken into account in order to develop an ethically acceptable system. The three values presented include justice, responsibility and privacy. Under each of these values, several other values and topics were presented and questions formulated that will guide ongoing discussions in the project. The list and assessment of these values is not finalised. Further work will be done on ethical acceptability and updates as well as results will be reported in upcoming deliverables.

In order to empirically assess the acceptance of the HEIMDALL project by the public but also with regard to end-users and stakeholders, the research design and methods of research are set out in section 3. They include the 5 focus group discussions with several groups of participants. This has been done with reference to a detailed assessment of what technology acceptance deals with.

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30/11/2017

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