

Ethical Framework for a Disaster Management Decision Support System Which Harvests Social Media Data on a Large Scale

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Abstract. This paper presents preliminary results of ongoing research on the ethics of using social media on a large scale in disaster management.

To date social media use by disaster response agencies has been relatively ad-hoc. The Slándáil project aims to build a system for harvesting publicly available data from social media and using it in an ethically responsible and appropriate way to enhance the response of emergency services to natural disaster.

The ethical framework draws on the traditions of Isaiah Berlin's value pluralism and Giorgio Agamben's State of Exception in its approach. Value pluralism relates to an understanding that every pluralist society is organized around several and different sets of values and traditions. State of Exception theory is concerned with ethical consequences that arise when governments or state agencies arrogate to themselves extra powers in response to extraordinary circumstances, such as a natural disaster.

The implications of these ethical approaches for the Slándáil system are examined and discussed according to their impact on the various stakeholders: the system end-users, the public at large, the state and the emergency responders themselves. Implications for the technical design and governance of the system are also deduced and evaluated.

Keywords: Ethics · Value pluralism · State of exception · Disaster management · Social media

1 Introduction

The advent of social media provides an opportunity to better inform disaster response by collecting and using this publicly-contributed information to develop better technology systems. However the ethical implications of using social media data in this way demand consideration. Slándáil (EU FP7 Security sponsored project #6076921) is a project that aims to build a platform that will ethically use social media data to better inform emergency managers during a natural disaster. It is a collaboration between 9 beneficiaries in Italy, Ireland, Germany and the UK including academics, emergency operatives, civil protection organisations and four SMEs with expertise in software and communications.

The need for an ethical framework to inform the design of and use of the Slándáil system was recognised and integrated into the project from the outset. This need arises for two reasons: Firstly, the world of social media and information technology is continuously evolving at a pace which far outstrips the legislative process. This entails a growing role for ethics. [25]

Technologies such as Slándáil which are being developed with the intention of benefitting society therefore need to go further than mere legal considerations in order to fulfil those intentions.

The second reason is related: the legislative context is also continuously evolving and changing, even during the course of the project. In considering potential ethical concerns, future legal measures may also be anticipated.

The project participants have drawn on two fields of ethical theory in the development of the ethical framework: value pluralism and state of exception theory.

2 The Slándáil System

The Slándáil System will be comprised of both hardware and software that will be installed and used as a decision support tool by emergency managers, such as police or fire departments.¹ The platform will harvest social media data, including textual, image and video data, during a natural disaster (data which will include sensitive data such as individuals' names) and will aggregate this data and provide outputs to emergency managers that identify vulnerable areas. While other systems have been developed which analyse textual information with the aim of providing actionable outputs, [1, 10, 11, 14, 26] the multimodal scope of Slándáil represents a new development.

These outputs will be in the form of actionable information that has been derived from aggregated social media data and identifies key places to target that are under particular threat of damage or loss of life from a natural disaster. The system is designed to increase efficiency in emergency response, but it cannot be understated that the level of data collection may be intrusive or may cause some level of distress to the general public.

The system, due to launch fully in 2017, is in its early prototyping phase at time of writing. The ethical framework has been written to coincide with the early prototype launches to ensure that ethical guidelines are in place prior to the harvesting of social media data.

3 Value Pluralism

Value pluralism is a strand of ethical theory that flows from the claim that there are a plurality of genuine moral values. It was initially developed by the philosopher Isaiah Berlin in the essay "Two Concepts of Liberty" [2].

¹ For the purposes of clarity, this paper uses the phrase 'end users' to refer to the users of the Slándáil system (i.e. emergency managers), not to the end users of social media technologies.

It differs from much mainstream ethical theory in that it does not primarily concern itself with demonstrating a way to make decisions ethically.² Rather, it recognises that the many ethical perspectives and culturally varied value systems in a society have intrinsic merit and that they can't be reduced to one over-arching system that can be used to determine the best course of action in a given circumstance.

Where value pluralism gets its teeth is in the further assertion that this diversity of systems of value, which reflect the cultural, ethnic and social diversity of the community, need to be protected and fostered. Berlin recognised that great harm has been done when one particular value system dominates in a specific period of human history. He therefore concluded that the valuing of pluralism itself needs to be explicit.

It represents a kind of value-system equivalent to the oft-cited expression of the principle of free speech: "I wholly disapprove of what you say - and will defend to the death your right to say it."³ Berlin argues that we have an ethical obligation to defend others' right to live according to their ethical value systems and cultures, even if we wholly disapprove of them, because the alternative is hegemony and domination.

In addition to its implications for protection of pluralism at a societal level, value pluralism can be applied at the personal level of an individual's decision-making. As individuals, we subscribe to a plurality of values. These genuine values contend with one another in influencing our decisions and actions and will sometimes come into conflict.

In such circumstances not only may it be impossible to determine which value is more important in the circumstances than the other, but it may be impossible to compare them at all as they are incommensurable.⁴

Such decisions are very much a part of lived human experience: we find certain decisions difficult because no matter what we decide, some harm will result to our principles or values. This is experienced as "the agony of choice" [16].

3.1 Implications of Value Pluralism

Societal Level: William Galston recognises that, although value pluralism is not relativism, it does nevertheless allow for a "[f]ragmentation of value" [5]. He therefore asks how (an ethically fragmented) society is to be held together and a decently ordered public life sustained?

He adopts the notion of legal presumption (or precedent) to provide a model for a system of *ethical* presumption, where "practical [ethical] principles function as powerful but rebuttable presumptions" [5]. The objective should be to provide for the fulfilment, to the greatest extent possible, of each of the values in question, rather than a winner-takes all situation, as is common in the judicial domain.

² Mainstream ethical theory has been criticized by so-called anti-theorists for losing sight of practical application in seeking to explain ethics principles beyond where such explanation is useful. [9].

³ This quotation is often attributed to Voltaire, but was actually written by a biographer, Evelyn Beatrice Hall to illustrate his ideas on freedom of speech. [12].

⁴ That is to say that they cannot be measured on the same scale as they are qualitatively different and irreducible.

Organisational Level: Administration theorist Hendrik Wagenaar has advocated a practice-based approach where practitioners “deal with” value conflicts using their experience and intuition, rather than “resolving” them [22, 23]. The implication here is that organisations ought to foster an environment that facilitates the virtues of wisdom and courage, and engenders learning from experience.

Michael Spicer also considers organisational implications and makes the important point that power relations within the organisational structure need consideration. Power relations are a potential factor in the context of decisions made by people in an organisation, therefore a value pluralist “... approach should begin ... with a recognition that the application of power can narrow the bounds of administrative and political discourse and, in doing so, can serve to restrict the range of values brought to bear in such discourse” [17]. Dissent must be acceptable and contrary opinions considered.

Individual Level: Spicer argues that value pluralism has implications for the cultivation of virtues as does Paul Nieuwenberg, claiming that facing up to the agony of choice requires the cultivation of the virtues of honesty, truthfulness and courage:

What a moral life incorporating this understanding requires, then, are certain dispositions—dispositions enabling us to endure conflict and its agonies. These dispositions are nothing but virtues: more specifically, the classical virtues of honesty, truthfulness, and even courage [16].

4 State of Exception Theory

Human rights law experts Evan Criddle and Evan Fox-Decent explain that “In common parlance, the ‘state of exception’⁵ denotes “a legal regime in which public institutions are vested with extraordinary powers to address existential threats to public order” [3].

The crucial question to pose is the following: How can liberal democratic values accommodate extraordinary powers and measures that are apparently illiberal? Given that liberal democracies are primarily concerned with protection and promotion of fundamental rights and separation of powers, how could prerogative powers and the derogation of human rights and civil rights be ever justifiable to these same liberal democracies?

According to Carl Schmitt, the only juridical subject endowed the right to proclaim a state of emergency (and accordingly suspend the constitutional provisions) is the executive power itself in its various forms: king, president, prime minister, etc.⁶ Leaders can be inevitably tempted to exaggerate the peril in order to justify their emergency declarations.

Schmitt, along with many other proponents of the state of exception rationale, also pointed at the undeniable evidence that democratic systems generally take a lot of time to deliberate and produce a political decision.

⁵ For the purposes of this paper the terms “state of exception” and “state of emergency” are used interchangeably.

⁶ Carl Schmitt, a major intellectual figure in 20th century legal, political and constitutional theory, is unquestionably recognized as the “outstanding legal theorist of the notion of exception”. [7] citing [4].

While a number of commentators portray the state of exception as inherently prone to generating abuses of power, others highlight the fact that national emergencies are not exempted from legal oversight or scrutiny.

In her book, N. C. Lazar argues that during national emergencies heads of states or governments are not exempted from political accountability: their actions are always subject to adversarial review by the courts of law, the legislative body, the larger political community and a free media [13]. On a similar note, Peter Swan's study details how during national emergencies, the rule of law of liberal democracy does not "willingly abdicate its role to a state of exception" and more often than not "continues to act as an obstacle to the arbitrary authority of the executive branch" [19].

From an international human rights law perspective, the state of exception bears important consequences for the mechanism of derogation. The leading international and regional human rights covenants endeavoured to regulate states' entry, conduct and accountability before, during and after the state of emergency. The "cornerstone" of these covenants are their derogation clauses, which permit states to restrict some human rights in exceptional times - but only where this is strictly necessary to address serious threats to the life, independence or security of the nation and its members. The suspension of those human rights is subject to a carefully calibrated system of limitations, safeguards, notifications, and review procedures.

Recognizing the dangers attached to a period of national emergency, international human rights law limits the circumstances under which states may legally derogate from their international obligations to respect, protect, and fulfil civil and political rights. Each of the leading international and regional conventions on civil and political rights deploys the following criteria and guidelines to evaluate the lawfulness of the derogation processes initiated by state members:⁷

As far the derogation mechanism is concerned, one has to keep in mind an important caveat, which is founded on a qualitative discrimination between "non-peremptory" and "peremptory" human rights.

During national crises, state governments may derogate from "non-peremptory" human rights norms such as the freedoms of expression, movement, and peaceable assembly. In keeping with international human rights law, however, state governments are never permitted to derogate from peremptory norms because under no circumstances could the violation of these norms be consistent with states' legal and ethical obligations towards their citizens.

4.1 Justification and Strict Necessity

All derogations from human rights will be legally permissible only where "genuine public emergencies undermine the institutional prerequisites for the enjoyment of human

⁷ The ICCPR, African Charter on Human Rights, American Convention on Human Rights (ACHR), Arab Charter on Human Rights (Arab Charter) and European Convention on Human Rights (ECHR).

rights by imperilling the ‘life’, ‘independence’, or ‘security of the state’” [3].⁸ A state’s failure to provide a reasoned justification for particular emergency measures renders those measures unlawful, as the UN Human Rights Committee has recognized.⁹

4.2 Last Resort

Even under such extraordinary circumstances, however, the state still has an obligation to show that it cannot adequately address the crisis with ordinary measures and applicable laws. In other words, derogating from its non-peremptory human rights obligations must represent the last resort.

4.3 Proportionality

The influential document “Syracusa Principles on the Limitation and Derogation Provisions” suggests that “any measures a state undertakes to restrict or suspend non-peremptory human rights during emergencies must be supported by a principles of proportionality”, requiring states to use “only those measures that minimally restrict the freedoms ordinarily protected by the suspended treaty rights” [21].

4.4 Notification and Monitoring

Furthermore, to ensure that international human rights law restrictions on the commencement of the derogation are taken seriously, each of the leading covenants on civil and political rights obliges states to notify the international community promptly, either directly or through an intermediary, when they suspend their human rights obligations during national crises. Traditionally, “notification requirements have been understood primarily as devices to facilitate international monitoring; when states provide notice of derogation pursuant to their treaty commitments, international and regional tribunals and other states-parties are better equipped to check human rights abuses” [3].

4.5 Temporal Scope

In their notification, states must also provide a clear timeframe (a “sunset” clause) for the state of emergency during which non-peremptory human rights are temporarily suspended. In Oren Gross and Fionnuala Ní Aoláin’s words, “Only a truly extraordinary

⁸ For instance, the European Commission on Human Rights has clarified the contours of the justification criterion, by understanding a public emergency crisis as a danger that is (1) present or imminent, (2) exceptional, (3) concerns the entire population, and (4) constitutes a ‘threat to the organised life of the community’.

⁹ “If the respondent Government does not furnish the required justification itself, as it is required to do under article 4.2 of the Optional Protocol and article 4.3 of the Covenant, the Human Rights Committee cannot conclude that valid reasons exist to legitimize a departure from the normal legal regime prescribed by the Covenant”. [3, n. 90].

crisis that lasts for a relatively brief period of time can be a derogation-justifying emergency” [8]. Permanent or institutionalized states of emergency would represent an anathema to the principles undergirding international human rights law.

4.6 Contestation

In addition to the obligation to demonstrate justification of the necessity of declaring a state of emergency, it is crucial that, when public officials derogate from ordinary human rights, their decisions are open to public contestation to ensure that emergency powers are not held or abused so as to dominate the state’s subjects.

5 Value Pluralism, State of Exception and the Slándáil System

What is desirable under value pluralism is a society structured to protect the ability of people to live out their cultural and ethical identities fruitfully.

The most pertinent implications of value pluralism for a system such as Slándáil relate to how it is used, particularly situations when decisions which involve conflicting values have to be promptly made. For example the need to protect the life and health of emergency responders can come into conflict with their duty to help and potentially save the lives of civilians. Value pluralism recognises the difficulty, even painfulness of such decisions and gives a place of priority to experience, precedent and virtue, acknowledging the courage and integrity required to put oneself at risk to protect the rights and liberty of others. It understands that, in practice, value conflicts are not “resolved”, but “dealt with” through intuition and experience, in concrete and varying practical settings. Sara Geale lists “[t]he cardinal virtues of disaster response [as] prudence, courage, justice, stewardship, vigilance, resilience, self-effacing charity and communication” [6].

State of Exception doctrine has implications for a system like Slándáil primarily in its treatment of sensitive data in the exceptional circumstances of disaster response where normal ethical priorities do not pertain due to the imminent risks to life and property. In such circumstances there are strong ethical arguments to suspend normal provisions (such as privacy and data protection measures) constraining the use of personal data if necessary to save lives. State of Exception doctrine outlines the extent and scope of such constraints and therefore the provisions that must be made in the design of the system in order to implement these constraints.

The purpose of this theoretical analysis was to inform the development of an ethical framework to oversee the design, use and governance of the Slándáil system. To this end, the end users of the system were consulted on an ongoing basis to ensure that the framework accounted for their *modus operandi*, workshops were organised to discuss the proposed framework with them and the other project beneficiaries and scenario analyses were undertaken. This work highlighted the importance of consideration of ethical implications not only for the *human stakeholders* but also for the treatment of *information* contained in the Slándáil data that has been gathered from social media sources.

6 Ethical Implications for the Slándáil System

The potential ethical benefits and risks arising from use of the system were considered in the light of this theoretical research and the ethical implications were crystallised into an ethical framework. This framework set out explicit measures to be followed in terms of technical design, end-user practices (at the various phases of emergency management), licencing and administration of the Slándáil system. Naturally, some of these measures could have been (and have been in other disaster management systems) arrived at through other means; nevertheless it is useful to demonstrate their grounding in robust ethical deliberation.

The framework is structured in three sections, concerning the ethical implications for (a) the design, (b) the use and (c) the governance of the Slándáil system. In terms of the technical design, the main implications concerned data security, access control and authentication, data accuracy, anonymisation, data expiry and journaling. With regard to end user practice, information verification, triage protocols, attention to the effects of organisational power relations and adhering to specified use constraints were the main areas of ethical concern. Finally, issues relating to governance, including the ownership and licencing of the system and its associated intellectual property were assessed.

6.1 Ethical Implications for the Design of the Slándáil System

Implications for the technical design of the Slándáil system entail constraints in both its configuration and logical functioning, primarily derived from State of Exception considerations and related to the integrity and security of the data accessed by and information generated by the system.

Implications Concerning System Data

Security of the Data. Security of the system data is of primary concern. In order to respect the dignity and privacy of the people who could potentially be identified it is imperative that databases be secured to defend against hacking or any other unauthorised access.

Messages to emergency response personnel “in the field” should be encrypted, unquestionably if they contain potentially identifying data.

The physical location of the servers storing the system data and running the system’s code must be considered to ensure that it cannot be accessed by external governments or agencies of other states. In addition, the legal context is affected by the physical location of the servers as even within the EU, for example, the Data Protection directive is implemented slightly differently in each state.

Access Control and Authentication. In order to ensure access to the data is only available to authorised persons the system will require user authentication and access control functionality.

User authentication will determine who can “log on” to the system. Access control permissions will need to be designed so that access to various parts of the system can be configured for each user dependent on their role and the current phase of emergency

management. For example, certain data which is personally identifiable should only be accessible during the response phase of emergency management.¹⁰

Implications Concerning Public Protection

Data Accuracy. The phenomena of hoaxes and viral spreading of misinformation makes the task of verifying the accuracy of information especially difficult [18]. If the Slándáil system can give some measure of confidence or otherwise in the accuracy of the data it provides it would be extremely valuable for the end users and for the utility of the system as a whole.

Anonymisation. The task of emergency response personnel would be greatly facilitated by automated anonymisation of the data, whilst recognising that complete anonymisation is impossible. It is almost always possible to retrospectively disaggregate or re-nonymise data should it fall into the wrong hands [15]. Ethically speaking, it is highly desirable that the Slándáil system incorporate anonymisation measures as this would diminish the risk of infringements of privacy and dignity.

Data Expiry. A further step that is ethically desirable, and possibly legally required, is that of data expiry dependent on the phase of emergency management. In order to respect the temporal scope criterion of the state of exception doctrine it should be possible to define rules which govern the expiry of data that has been gathered or processed by the Slándáil system.¹¹

Implications Concerning Slándáil End Users

Journaling. The incorporation of a journaling function that records management history as well as a journal of transactions, for the purposes of review, simulation and training is, ethically speaking, a double-edged sword. There is a risk that end-users' decision making could be influenced by the knowledge that every action taken on the system is recorded. Nevertheless, on the other side of the coin, the fact that there *is* a record of every action taken by each end user enables decisions to be retrospectively reviewed and evaluated should they be found to have been sub-optimal in the extant circumstances. Such a record also mitigates the risk of scapegoating in such circumstances.

6.2 Ethical Implications for the Use of the Slándáil System

Discussion of the ethical implications for the individuals using the Slándáil system is best structured along the phases of emergency management.¹²

¹⁰ To be clear: the Slándáil system itself is to be used at all phases of emergency management but certain data (personal data) should be masked (anonymised) at phases other than the response phase.

¹¹ It may be ethically justifiable that the data be used post-response phase in order to facilitate debriefing and ascertaining learnings which can be used to improve response to future disasters.

¹² The UN-SPIDER glossary gives the following as the phases of disaster response: prevention, mitigation, preparedness, response, rehabilitation, reconstruction and recovery. The most relevant ones for Slándáil are mitigation, preparedness and response. Post-response, debrief and review are necessary but do not fit particularly well into the UN_SPIDER phases. [20].

Phases of Emergency Management: Mitigation and Preparedness

The main ethical implications here entail taking existing vulnerabilities and inequalities into account.

In the context of ethical considerations related to Slándáil, vulnerability of mobile internet infrastructure is a key consideration and a geospatial analysis of likely infrastructural damage would inform disaster response as there is a likelihood that areas susceptible to infrastructural damage would be under-represented in social media data.

Inequality in access to information technology and communications, the digital divide, would also lead to under-representation in the data. Again, geospatial analysis at the planning phase of the existing distribution of access to and use of social media technology would alert emergency response personnel to such inequalities which could then be accounted for in subsequent response.

Inequality in vulnerability needs to be integrated into disaster planning. These inequalities are likely to be reflected in social media use. Over-reliance on social media data may thus exacerbate them.

Another aspect of planning is training. The relevant emergency response personnel clearly need to be adequately trained in the use of the Slándáil system and in the manner in which its use is to be integrated into the overall disaster response strategy.

Phases of Emergency Management: Response

Verification. The importance of information verification has already been stressed and whilst it is anticipated that Slándáil will have means to assess the validity of information there nevertheless remains an ethical obligation on the part of the end users to seek to verify information by other means if possible, be that via traditional media, reports of emergency services personnel on the ground or interaction over social media with people on the ground.

Triage. The response to a disaster is essentially a triage operation at several levels, depending on the scale of the disaster. At each level decisions are made concerning the distribution of emergency response resources. The Slándáil system is intended to support decision making by providing information that would otherwise be unavailable. Nevertheless, such decisions are difficult as resources are not infinite and therefore sometimes will not be sufficient to meet need. In such circumstances a triage operation is undertaken and a decision made as to where there is the most need or where there will be the most benefit from deployment of limited resources.¹³

¹³ Gaile outlines the distinctions between triage in an emergency room situation and a disaster response situation: “*In day-to-day [A&E] triage, the common sense rule is to serve persons whose condition requires immediate attention and defer care to those who are more stable and can afford to wait; however, all patients will eventually get care. The process helps to ensure that no one is lost, and all get care appropriate to their needs. In a disaster involving multiple victims, and resources are completely overwhelmed, new protocols come into play. Disaster triage allows that the most seriously injured are left to the end – and may even remain untreated – so that those who can be saved can be cared for. This approach is one of the few instances where the utilitarian rule applies in health care. The greater good rule can be justified because of the clear necessity for allocation of resources to benefit the most people.*” [6].

Value pluralism recognises the difficulty of such decisions and that experience and certain character virtues enable people to make the best choices. Therefore, as noted earlier, a culture supportive of unencumbered decision making should be fostered which has respect for stakeholder needs, desires, self-abnegation, courage and integrity. Aristotelian virtues also come into play in the decision not to treat in a disaster. It takes courage to make an ethical decision that a patient cannot be saved and that the resources both in manpower and equipment are better used in some other area [6].

Again, given considerations such as the digital divide and unequal vulnerability to disaster, the Slándáil system should not be the only means of triage in disaster response.

No personally identifying data, or data that identifies the ethnicity, sexuality or other potentially categorising data of people should have any effect on decisions of emergency response personnel. In other words, social sorting is unethical as it infringes the principle of justice as fairness.

Power. Issues around power are particularly pertinent when the emergency response personnel do not share the culture (and/or values) of the affected population. In any case response personnel have power based on their role of authority and their knowledge in the circumstances of disaster response, and Slándáil is a part of that.

Attention to the power relations inherent in the circumstances of disaster response demonstrates the danger of objectifying the “disaster victim” and essentialising the affected population, highlighting the necessity of respect for the dignity and worth of each individual, as is espoused by the principles of value pluralism and the absolute priority given to the protection of (all) human life by the emergency services.

The power of the Slándáil system itself to gather data which could be misused, renders it imperative that Slándáil data not be used for surveillance. Not only would this infringe on people’s dignity through their right to privacy but it would also undermine the beneficence of the Slándáil system by undermining public trust in it, thus potentially putting lives at risk in future disaster situations.

Data Protection and Specified Use. End users have an ethical and legal obligation to respect privacy and anonymity of members of the public by using personal data only for the specified purpose (of emergency response) and for the period of the emergency itself. In communications with the public, as Watson et al. state:

“It is essential that those organizations involved in sharing material such as photos of disaster sites, take the appropriate measures to ensure the privacy of the public is upheld (e.g., masking faces and vehicle number plates), and where required, ensure that permission is gained from people to ensure their anonymity is protected” [24].

Legislation recognises that consent for the use of data is not always possible in a state of emergency, however, publicising personal data is a separate consideration which should respect privacy and anonymity rights.

Phases of Emergency Management: Post-response

Post-response phases of emergency management are not so closely related to the use of the Slándáil system, which is primarily intended as a decision-support tool. There remains, however, a question as to the ethical justification of using Slándáil data in the situation that a potential criminal offence becomes apparent during emergency response.

Ethically speaking, this could undermine trust in the system, as well as risking its use for purposes of surveillance should such “function-creep” be permissible. Legally speaking, derogations from human rights laws do apply for the purposes of criminal investigation, but may fall foul in this case as the specified use of the data is emergency response, not criminal investigation.

More straightforward ethically is the use of the system for debrief and review. The question is over the time-period of derogation: can it be said to include post-disaster review and learning? Certainly there is a strong ethical argument that review is an integral part of disaster response as it has the potential to improve future operations and therefore pertains to the principle of beneficence as it increases the system utility.

6.3 Ethical Implications for the Governance of the Slándáil System

Principles of beneficence and respect for human dignity entail further implications for the use of the Slándáil system that do not relate to the end users in a situation of disaster response but more to the uses to which the technology is put.

Firstly, responsibility for its governance in each state should be vested in an appropriate authority which has exclusive rights to the technology within the territory of the state, in order to prevent misuse for nefarious purposes by third parties. Responsibilities of this authority would include monitoring for and detecting ethical violations in the use of the system. Ownership of intellectual property must also be vested in an appropriate (European-level?) authority which can licence it out to the relevant national bodies to use in emergency response.

Secondly the terms of the end-user licence must ensure that its use is according to legal and ethical standards and in a transparent and accountable manner.

Finally, each emergency response organisation which uses the system will, under the terms of the licence, have to sign a document which specifies the legal and ethical constraints and terms governing the manner of its use so that its use at all times respects the ethical principles outlined in this document as well as the legal context in which it is deployed.

7 Conclusion

The large scale use of publically-available social media has great potential to inform decision making and improve disaster response efficiency. The Slándáil system is intended to achieve this in an ethically sound manner by harvesting social media data related to natural disaster, aggregating this data and providing informational outputs to emergency managers that identify vulnerable areas.

To this end the ethical traditions of value pluralism and state of exception have been adopted to assess potential benefits and risks of the system. This has resulted in a practical and robust ethical framework which will inform the development, use and governance of the system to minimize the potential for undesirable consequences from its use.

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