Representing ethical decision-making graphically

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Abstract

Ethical Decision-Making Models (EDMMs) can formalize the course of action through which agents reach their decision-making processes, concerning morals and ethics. The interest in ethical decision-making both from academia and practitioners in Business Computing has increased recently due to the applied computing advances, specially regarding Artificial Intelligence. Research is mainly focused on theoretical models to explain ethical decision-making, factors that influence it or measuring tools to assess it. However, to the best of our knowledge there is an absence of a graphic resource to represent the elements of an EDMM that goes beyond the textual scope. This paper is a first proposal in thinking-making a graphical representation that includes elements of EDMM, enables a more complete information panorama as possible, documents ethical decision-making and facilitates the visualization of these knowledge assets.

Keywords: EDMM, Ethics, Information Systems, Graphical Representations

1 Introduction

What is the relationship between Ethics, cat adoption, and Online Social Networks (OSN)? To expose how computing is pervasive, widespread, and culturally prevalent, we started analyzing this question. Rulli (2017) ethically debates the relationship between buying or adopting animals, advocating for their adoption, and debating the morality of both options. There are indications that fewer and fewer black cats are adopted because they are less aesthetically pleasing in photos (Barton, 2018). Black cats are not "self-friendly". As the cyberculture of life exposure and aesthetic validation by third parties advances, the motivation to maintain domestic animals that favor the construction of pleasant experiences and images is proportional. Why adopt a black cat that will be blurry and ugly in my photos if I can also choose a lighter one for free? If the burden of responsibility for maintaining it is or will be mine, why should I choose an animal that is negative to the pleasantness of my contemporary experiences?

You may wonder what this has to do with Information Systems—developed and owned by Facebook, Instagram [1] is an OSN dedicated primarily to image or photo sharing, worldwide accounting for hundreds of millions of users, planetary reach, and with increasing numbers (Kemp, 2020). In its current version, 10.34.0, Instagram has a ceiling on file size and quality resolution of its images (Webb, 2021). That is, the application will be able to "manipulate" the characteristics of the images inserted in the platform to suit specific parameters. This practice is opaque to most users.

Since its invention, traditional image capture technology, photography, has not been designed to represent elements of dark colors. Consequently, the technological conception did not encompass the black population (Lewis, 2019). Many decades of technological advancement in this field have neglected this characteristic, from which cinema, surveillance cameras, and smartphone cameras emerged. Today, authors discuss algorithmic racism regarding facial recognition applications (Silva, 2020; Ferreira et al., 2021), promoting discrimination and oppression through exclusionary or outdated image capture technologies combined with a false "efficacy" discourse (Buolamwini and Gebru, 2018).

Who is also affected? Black kittens. And the jeopardized? Animal care and protection organizations accumulate black cats or receive more abandoned black cats because they are not "self-friendly" or are harmed by some cyberculture negative aspect, as their color hampers the rendering of the images containing them. Despite this, black kittens are oblivious to their conditions' morals or ethics, very different from the black population. Who is responsible for the rejection of black cats? Something or someone is responsible? What is the decision to be made by the animal care and protection organizations? Who can or should solve or mitigate this problem?

A few years ago, this was a significantly non-existent issue for animal care and protection organizations. Cyberspace has expanded and indirectly encompassed actors compulsorily obliged to interact with digital ethical concerns. Ethics is a resort for this context. Actors who previously remained at the border or outside the concrete influences of digital networking are dragged into cyberspace, voluntarily or not. Black kittens take up space and resources in shelters. Should shelters reject them and preserve their space and resources for other cats "more interesting in cyberculture"? Should government entities undertake awareness campaigns on this topic? Should Instagram be socially and technologically engaged in this issue? Should adopters consider adopting animals as a means to their digital pleasure and vanity and not as an end to the animal's well-being? Following reasoning analogous to Kant's second categorical imperative (Ferraz, 2014). What is the ethical decision to make?

The course of action through which agents reach their decision-making processes, moral or immoral, can be formalized through Ethical Decision-Making Models (EDMMs) (Torres, 1998). The past four decades have

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[1] https://www.instagram.com/ [accessed 08/08/2022]

shown an increasing interest in ethical decision-making from academia and practitioners (Luca Casali and Perano, 2020). Research is focused on theoretical models to explain ethical decision-making, factors that influence it, and measuring tools to assess it. Several conceptual frameworks date back to the 20th century, generic or domain-oriented, such as Marketing and Sales. In Information Systems, two of the most prestigious books in the field propose EDMMs, Stair and Reynolds Stair and Reynolds (2018, p. 622) and Laudon and Laudon Laudon and Laudon (2020, p. 129). Critically scrutinized, the models are generalist and domain-flexible, similar to other well-established EDMMs (Torres, 1998). Although deontological or teleological analysis is a computational disjoint, it is worth the intention.

To the best of our knowledge, there is an absence of a graphic resource to represent the elements of an EDMM that goes beyond the textual scope. Mostly, the EDMMs intention is to structure and guide stakeholders in ethical decision-making without managing knowledge effectively, i.e., without registration or documentation. Specific proposals will only recommend written registration. For Knowledge Management, explicit knowledge (written) is considered an advance compared to tacit knowledge (mentalization or verbalization) (Nonaka et al., 2018). However, graphical representations are more suitable for scenarios with different dimensions and simultaneous information (von Engelhardt et al., 1996), as seen in the components of the EDMMs. Furthermore, consolidated as notations built from design rationale and grounded epistemologies, they can be interpreted and executed by computational applications.

Unfortunately, we will not tackle the bad scenario that afflicts black kittens, not directly. This proposal is the first step in thinking-making a graphical representation that includes elements of EDMM, enables a complete informational panorama, documents ethical decision-making, and facilitates the visualization of these knowledge assets. Based on the Design Science Research (DSR) methodology (Wieringa, 2014) this pragmatic research intends to develop an artifact, a graphic representation, with a scientific basis and epistemological rigor.

We would like to add kitten pictures in Section 2, but because of the space restriction we will limit ourselves to the theoretical foundation; Section 3, related work; Section 4, the research proposal and; Section 5 concludes.

2 Theoretical Foundations

"Ethics is the formal process of intentionally and critically analyzing, with clarity and consistency, the basis for one's moral judgments" (Glover, 2017), the subject of the Ethical analysis is Morality (Fieser, 2020). Even irrationally or unconsciously, we all engage in decision-making constantly; most importantly, we distance ourselves from relevant ethical issues or dilemmas. That is, structuring, formalizing, and recording ethical decision-making is, in itself, an activity that requires time and resources. For example, solely going after someone's OSN profile to communicate something

critical and urgent is not an ethical dilemma. However, if that person has blocked you and has already made it clear that does not want to interact with you, it is an ethical dilemma.

Not all decisions need thorough scrutiny to the point that a formal EDMM analyzes them. Public or private organizations often engage in decision-making that will symbolically or concretely involve an expressive or uncontrolled number of people. In this case, guiding yourself rationally and consciously through an EDMM is a recommended course of action. Simon (1979), since the 1970s, analyzed the benefits of Decision Theories and rational decision-making, pursued understanding and explaining intrinsically exciting phenomena, and offered direct advice to business and governmental decision-makers. For example, when Facebook blocks John Doe for an explicit hate speech or blocks Donald Trump (Fung, 2021). The magnitude of the two actions is different, and so are the consequences.

Is it ethical to limit computational ethics to technical aspects, disregarding their applications, influences, and uses? In this work, we consider that it is not. A meta-ethical questioning about the boundary of ethics applied to computing, and any other plausible ethical framework is appropriate. We will extend computational ethics to any context in which a technical element (Software, Hardware, Network, Data Storage (Stair and Reynolds, 2018)) is involved, as proposed by an IS perspective. Although ethical decision-making is a multi-faceted phenomenon, the literature often ignores its heterogeneous nature from an empirical perspective (Luca Casali and Perano, 2020; Vázquez, 2018). If the phenomenon of black kittens' rejection is estimated to have a significant influence on computational factors in this phenomenon, it would be invalid to disregard this as an issue pertinent to computational ethics. Alternatively, if applicable, an IS ethic. From a post-structuralist perspective, we can associate this dilemma with several domains other than just computational. Instead of a linear, deterministic, binary analysis, we can look like a network or rhizome (Escobar, 2018), enriching the perception of reality.

As a technology, does computing offer specific ethical scenarios? Is there no consensus if the computing domain offers unique or new ethical questions or dilemmas (Johnson, 2008), i.e., is there a specialization in the analysis and evaluation of computational phenomena, or are they universally generalizable? For us, the answer to this question is yes. Laws and regulations such as the General Data Protection Regulation (GDPR) in the European Union (EU), and the General Personal Data Protection Law (*Lei Geral de Proteção de Dados Pessoais* - LGPD), in Brazil would exist with the same structure disregarding the computational influence? We go further; before these legal artifacts, data protection was a less relevant and problematic ethical issue in business informatics. Although data protection principles have been in the literature for many years, this ethical concern will reach increasing concreteness and materiality in the 2020s. Medium or bigger-sized companies are most affected not only by financial losses due to the fine but also by a negative impact on their image, values, and profitability (Bioni, 2019). In a country under the influence of a specific
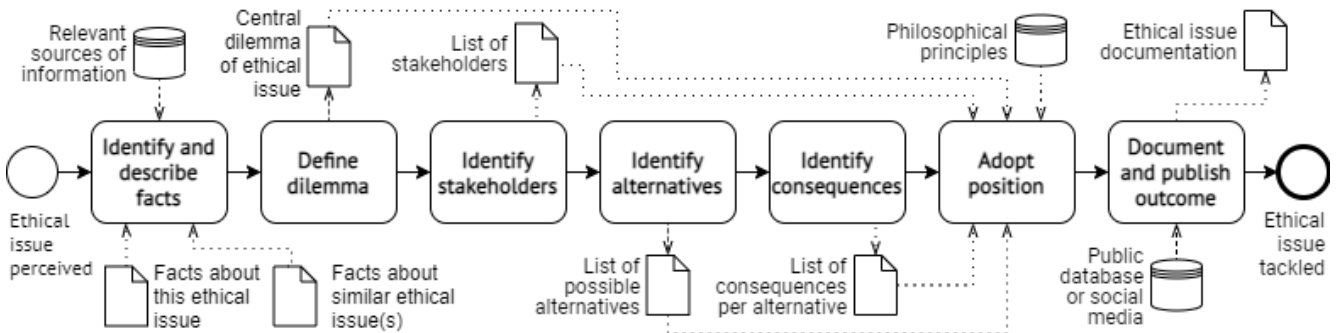
Figure 1. A process for deliberation on ethical issues (adapted from Santoro and Costa (2021))

data protection law, can the processing of personal data of its employees, customers, and partners bypass the law? Ethically, how do you make decisions in unusual cases?

When proposing an EDMM for Ethics applied to Medicine, Glover (2017) presents a hypothetical scenario. MT, a 16-year-old, is diagnosed with a fatal tumor in his brain. His parents decide that no one should disclose to MT about his condition, despite accessing a patient portal that he and his parents signed up for a long time ago. He discovers his diagnosis through an online search and receives a poor prognosis. Two intersections with computation occur, (i) in general, people find wrong and misleading prognoses in different cyberspace environments; (ii) in business informatics, the access to the patient's portal, previously in agreement with their parents and in this scenario considered improper by them. Even though it is a health-related communication, the ethical dilemma is primarily related to access to data and informative self-determination, demonstrating that the topics involving computational applications pervade societal domains and areas. *Information rights and obligations*, as one of the IS moral dimensions of the Information Age (Laudon and Laudon, 2020).

When proposing an EDMM for an Online Cultural Conflict, Masiero (2013) presents a real scenario. Unlike the case in Glover (2017), the case is indirectly related to computing, with a greater focus on Anthropology and Social Communication. This scenario, from the beginning, has direct involvement with computing considering the online interaction. The computational aspects are just an abstraction for communication, a medium. The communication quality and the student's potential academic loss are caused by losing the internet connection.

Figure 1 shows an EDMM proposed by Santoro and Costa (2021) for IS, modeled using the Business Process Model and Notation (BPMN) [2] notation. As Stair and Reynolds (2018) and Laudon and Laudon (2020), the proposal is generalist and domain-flexible. We insert complementary data to enrich this new version, (i) label the initial and final events; (ii) added the entry "facts about a similar issue(s)" to the first activity to involve facts about the specific case and similar ones for comparison and analysis; (iii) added a task and output data related to the documentation, registering the knowledge asset instead of just publishing it.

Jones (1991) propose an EDMM, Figure 2, including

the construct "moral intensity" and synthesizing other well-established models. Jones's EDMM illustrates an instance of a model presenting a design rationale, epistemologically constructed based on previous instances, and academically high impact factor [3], despite dating back thirty years ago.

These models commonly present graphic representations and design rationale with referenced epistemological bases. Other models are available and found in the literature; we chose these two as well-founded examples based on recognized sources. However, the standardization of knowledge products generated through these models is absent. They can be texts, recordings, doodles, scribbled mind maps, or informal data. Graphical representations have several advantages over text (Tversky, 2001; von Engelhardt et al., 1996). In graphical representations, syntactic structures involve several dimensions and aspects, while textual structures involve only one dimension and aspect, linearly sequenced (von Engelhardt et al., 1996).

Languages and notations are technologies (Dascal, 2002) aiming to inform and operationalize knowledge management, such as representing, registering, and transmitting procedural information (Nonaka et al., 2018), as communicational means. We use models to represent an intended reality with specific purposes. In this research, they are the elements that make up ethical decision-making.

2.1 Methodology

Design Science Research (DSR) (Wieringa, 2014) is a methodology dedicated to the engineering of artifacts, such as, for example, languages and graphical notations. This proposal, and the respective research, are in a stage of technical consolidation and focus on effectiveness. The pragmatic approach of this investigation guides the production of an artifact that facilitates, synthesizes and encompasses the representation of tacit knowledge, or explicit in the form of text or audiovisual, of the epistemology of ethical decision-making using graphic resources with adequate formalism and structure.

DSR points to two contributions (Pimentel, 2017). First, pragmatics comprises the artifact that acts on and alters reality, encompassing its technique related to "making"; in this case, the technical specifics of ideation, design and development of a language/notation that represents EDMM
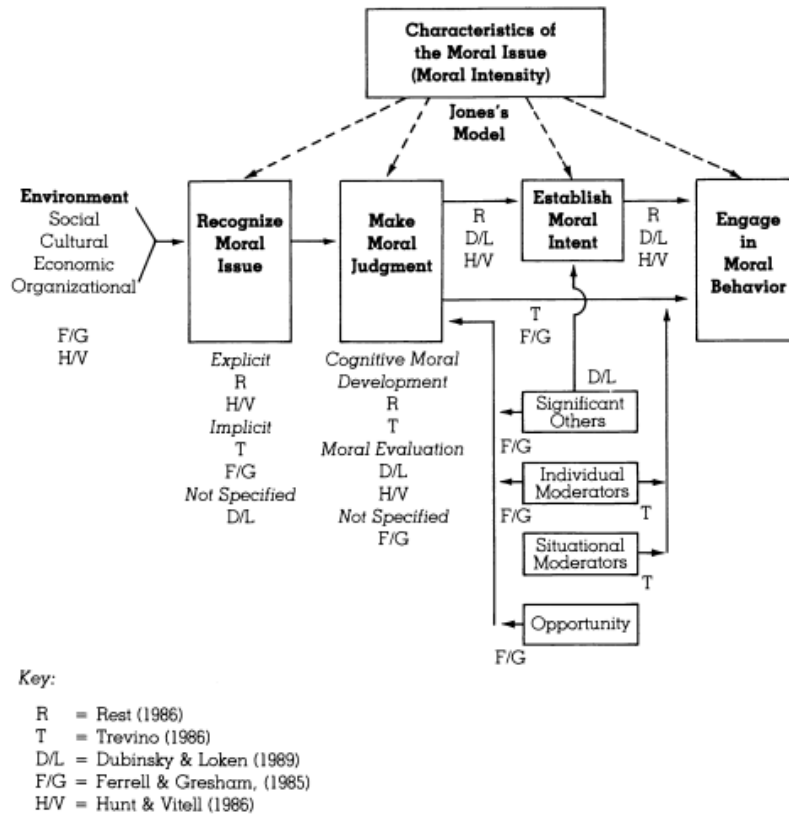

Figure 2. Jones' Synthesis of Ethical Decision-Making Models (Torres, 1998)

graphically. Second, scientific reflection, epistemology, considering the dialogue between the artifact and its elaboration, and other knowledge that seeks to systematize, categorize or model reality, complementing, refuting them or bringing new specific knowledge, which we call "thinking"; as the elements of the domain of ethics necessary to elaborate a correct, valid and adequate representation to the needs. For example, studying the use, application and respective consequences of adopting this artifact in specific case(s) is a reasonable academic reflection.

In this present work, we bring an effective proposal to represent EDMMs based on virtues, principles and associations of entities. We present a formative and collaboratively incremental idea, so what is proposed here is not a final version. Similarly, only one aspect of ethics is contemplated in this solution, leaving room for others.

3 Related Work

EDMMs are a critical part of Ethics. One crucial issue concerning such models is the assumption of one area of Normative Ethics. For example, virtue ethicists concentrate on ethical people's characteristics as the primary cause of decision-making, but they also consider the decisions' consequences or reasons. Still, a consequentialist would focus on the outcomes of decisions.

Different ethical decision-making models have been proposed both by researchers and practitioners in the Business Informatics area. Jones (1991) reviewed the classic models offered at the time, and more recently, other researchers analyzed well-known models (Cottone and

Claus, 2000; Whittier et al., 2006; Luca Casali and Perano, 2020).

Principles and suggestions complement some well-known models on how to perform the steps. For example, the PLUS Decision-Making Model, developed by the Ethics and Compliance Initiative (ECI), applies ethics filters to determine if the ethical components of the decision were addressed: P = Policies Is it consistent with my organization's policies, procedures, and guidelines?; L= Legal Is it acceptable under the applicable laws and regulations?; U = Universal Does it conform to the universal principles/values my organization has adopted?; S= Self Does it satisfy my personal definition of right, good and fair? Those filters support some of the steps proposed for the decision-making process. Step 1, define the problem; Step 2, identify available alternative solutions to the question; Step 3, evaluate the identified alternatives; Step 4, make the decision; Step 5, implement the decision; Step 6, assess the decision.

Baker and Martinson (2001) proposed the TARES model, which stands for five embedded principles: Truthfulness, Authenticity, Respect, Equity, and Social Responsibility. Those principles together should guide the actions of the decision-making process.

Although the models proposed have much in common, we observe that none of them provides graphic support to represent the elements of an EDMM. A generic example of graphic notation for a generic decision-making process is the DMN. DMN is a notation for decision modeling and provides, according to its specification document [4]: "[...]

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[4]https://www.omg.org/dmn/. [accessed 08/08/2022]

a complete decision model which complements a business process model by specifying in detail the decision-making carried out in-process tasks". They are subordinating the foundation and rationale to process modeling, especially BPMN. DMN is independent of BPMN, although its conception aims for interoperability between the two. DMN generates Decision Requirements Diagrams (DRD), with one of the scopes modeling human decision-making.

Good practice in language engineering and graphic notations is to reuse, import, or inherit elements from well-established ones (Clark et al., 2015). Although we disregard DMN as a source for our artifact for three main reasons, (i) its strong association with BPMN weakens its independence for purposes other than the representation of business processes, ethical decision making is nevertheless a process; however, its low degree of repeatability, flexible structuring and mismatch with the "business" ideology makes the association limited; (ii) we consider that the elements of DMN, although not explained in this way in the specifications, complement the features and metadata of BPMN and other notations of business processes, i.e., neither is sufficient semantically; (iii) the notation is defined by its owners as uncomplicated and straightforward, we consider that a notation that involves ethical scrutiny deserves its own graphic and conceptual constructs, i.e., complementing DMN with an ethics-related extension would undermine the essence of it and would our proposal.

4 A graphical representation for EDMMs

To the best of our knowledge, no other notations or graphical representations focus on decision making, except the Decision Model and Notation (DMN), mainly if dedicated to Ethics and ethical principles.

Ones should note that two categories of meta-analysis predominate in decision making, descriptive and normative. The **descriptive models** structure and formalize information from the past or present period, analyzing how entities made or make decisions, e.g., influences and motivations that lead a federal government to provide a health recommendation system application during a pandemic that points out treatments ineffective as output (Tagiaroli, 2021). **Normative models** structure and formalize future information, recommending how entities can or should make future decisions, e.g., considered as a viable option, how a health recommendation system should operate during a pandemic and what features and outputs should appear.

First, we stipulated the contextual characteristics of the proposal, followed by examples. We present them in the next paragraphs.

The notation should support weakly repeatable and standardized situations. The intention is to analyze and evaluate cases without generating automation or repetitive procedure. Far from ours, the primary intent of BPMN and DMN is repeatability. For example, if an organization decides to engage in a social sustainability initiative and to establish affirmative action that prioritizes hiring socially minority identities for the Information and Communication

Technology (ICT) sector. It does not mean that all business units' selection processes will forever develop a new model for each upcoming selection process. There is a compromise between radical relativism and absolute standardization.

Use the notation for complex or open ethical dilemmas. Building a model for simple or binary scenarios is an overuse of graphical representations. For example: for communication with users, the registration form in the application must request e-mail; the ethical analysis of this scenario is too simple to need a specific graphic model of ethical decision making.

The notation should not involve absurd moral scenarios. Example: John hacked Jane's private OSN and shared Jane's intimate content on the company's intranet. The case in question is John's dismissal from the company; self-explanatory. Indeed, John is one of those who abandon black kittens because the sharpness of his images on Instagram is more important than an animal's welfare.

Graphic elements can be semantically perverse (Moody, 2009). Simplicity and intuitiveness of learning without prior training must be priorities. textbfThe notation should enable semantically parsimonious graphic elements. Example: use the clock icon to indicate the idea of "time".

The notation should prioritize the graphic economy, the smallest possible number of notational symbols that encompass the full possible meanings (Moody, 2009), without ambiguity. Example: BPMN has more than one hundred individual graphic elements; its combinations add up to more than a thousand possibilities (Genon et al., 2011), excessively complex if used with all its semantic potential.

The notation should encompass specific ethical principles and elements that represent them graphically, and we believe this is the key and most laborious challenge. This item specializes in the proposed notation as Ethics-related, regardless of domain and setting. EDMMs differ from generic decision-making models because of their frameworks' input of ethical constructs and principles. It is not reducing all ethical principles to graphic icons. For example: how to graphically represent the elements of many ethical principles, traditions, theories, or schools of thought? (Fieser, 2020)

The notation should consider the concrete and material reality; at this point, we will detail by illustrating. For example: as of the iPhone 12, Apple will no longer market its smartphones in conjunction with a charger and headphones — an ethical decision justified by the company aiming at natural sustainability and reducing the generation of e-waste. Among the options the company could follow, enabling reuse, maintenance, repair, and combating programmed obsolescence are the most indicated; even so, it chose another path. Experts are skeptical about environmental altruism and point out that this choice is similar to the green-washing phenomenon. The argument that smaller packaging and less production of electronic components is positive for the environment is how customers will charge their cell phones... without chargers (Calma, 2020).

It is notorious among every smartphone user that generic, poor quality, or clandestine chargers diminish the smartphone's life. Therefore, if the user resorts to this option, she/he will harm her/his smartphone and encourage

an electronic market of dubious quality. Furthermore, if the purpose is to "produce less", this system is again inconsistent. This illustration exposes that our proposal does not prevent or block unethical, immoral, or naive biased actions; however, it enables a shareable knowledge asset that facilitates an ethical referral audit for a scenario.

Considering the five justification categories, social, practical, logical, scientific, and dialectic (Vázquez, 2018); ethical decision-making must contemplate as much concrete and realistic data and information as possible and available, avoiding an empty moralistic abstraction. In this case of iPhone chargers, two justifications are stuck. Scientific justification, as scientists counter-argued the company's proposal, presenting objective analyzes of the environmental impact; and logic, because cell phones keep needing chargers, stopping selling these items is not a sufficient and necessary condition for them to neglect it.

Having exposed the principled contextual characteristics that guide this proposal's initial engineering, we will use an applied decision-making analysis as an input to the operationalization demonstration.

4.1   Notational elements

Visual grammar or notational elements composes every structured graphic language/notation (Clark et al., 2015). Graphic notational elements comprise a set of morphosyntactically condensed and standardized meanings in equivalent or summarized form, considering respective information. For example, considering BPMN, a single solid border circle indicates the trigger that starts the process in question; this element standardizes the "initial event" information. If the circle has the graphic symbol of a clock, it means that the trigger that starts this process is temporal. For example, the sentence "Every day at nine o'clock in the morning the process starts [...]" can be graphically replaced by a simple solid-edged circle labeled "9 am".

Respecting the challenges and quality requirements exposed in Section 4, we indicate elements to compose the initial version of the grammar of this language/notation that is simple, understandable, and oriented toward an iconic pictorial representation; together, enable an ethical perspective; and that, in the following steps, can be developed computationally, becoming a complete computational solution for modeling EDMM instances.

We divide the EDMM into three sections. The first section exposes the facts, stakeholders, and their relationships — essential for rational decision-making and a premise for ethical reflection. The second section brings the relevant characteristics of stakeholders, focusing on virtues and principles and their values. The third section considers the previous two, presents the central ethical dilemma in question, and points out all the pertinent decisions, clearly exposing both the rejected and chosen decisions and the consequences of the chosen one. Both the rejected and the chosen must present a justification.

Figure 3 show the notational elements. We expose the design rationale of the meaningful and informative elements — covering the remaining information later.

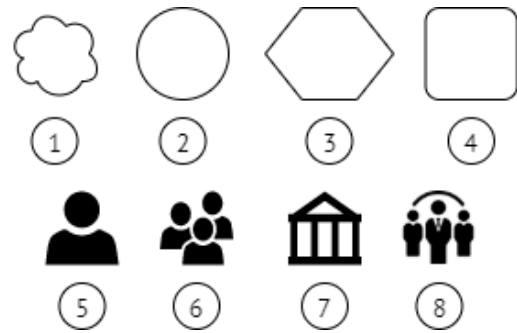The ethical deliberation and involvement of the respective

Figure 3. Proposed notational elements

stakeholders follow the principle that only rational entities, or composed of rational beings, are subject to scrutiny and ethical deliberation (Vázquez, 2018). Ethical reasoning excludes animals, objects, or fictitious elements that can influence the system, reserved only for rational entities. For example, it is ethically absurd to construct an EDMM to represent the ethical decision-making of a dog that bit a child and what the outcome of this scenario should be. However, modeling may be welcome when the dog bites the child. What human beings will decide about the dog (and not considering the dog as a free, conscious, and rational central actor)?

In both cases in Section 4.2 there is a strong presence of codes of ethics or conduct. We consider treating these elements as actants wrong, even if they participate in the scenario. We chose to disregard non-human objects and entities as interested parties. Despite the moral immanence of these objects, they cannot be held responsible. Suppose an interested party justifies a specific action endorsed by the code of conduct. In that case, it is the institution that owns and is responsible for this object that is responsible for it, not the respective object. Responsibility and accountability are essential and primary ethical elements (Vázquez, 2018).

Hypostasis is a common phenomenon in communication (Vázquez, 2018), in which we attribute actions or practices to abstract entities. It occurs routinely in computing, e.g., "the computer system acted perversely". We disregard hypostasis considering concrete, existentialist, and realist ethics. For example, a possible interpretation culminates in the partial accountability of action following a supposed "code of conduct". Transferring the entire onus of moral fulfillment to the object (code of conduct) is to exempt the actant from moral conscience. There is openness to act according to the symbolic dictates of the object, as it should also have it, a priori, to ponder and criticize this decision.

Based on Figure 3, items 1 to 5 are stakeholder borders; 6 to 9 are interested parties; 10 and 11 are decision markers. By order:

Item 1 indicates an imaginary or unknown yet significant element, such as a member of an online forum or a fictional cult. It is crucial to clarify that this stakeholder exists, even if potentially unreal or immaterial; i.e., it is not a "false" element. We must base ethical and rational decisions on valid and trustworthy facts and data. However, in specific scenarios, decision-making may involve concretely unreal elements, despite being symbolically correct in the universe of ideas. In this case, there is no way to infer verifiable and trustworthy data or information about these stakeholders,

but their relevance in the scenario makes their explicit representation essential.

Item 2 indicates a single element. For example, a specific person, collective, organized group, or institutionalized organization. We conceive these institutions as formal legal, social entities, not "objects". The objective is to represent the abstraction of the symbolic organization, even if behind it there is an entire human resource, and not representing the concrete object, that is, the hospital as a building. For, also in the legal sphere, an institution can be attributed responsibility, issues speeches and communications, performs actions under its organizational identity, among others. For example, when the Volkswagen (Hotten, 2015) software scandal took place, the main culprit was the company and not the software engineers alone, even though the responsibility for the development and deployment of the malicious software was primarily theirs.

There is a hypothesis in this case of Volkswagen, as the company is liable as a legal entity. Considering that the software was developed "by Volkswagen" as an abstract entity is absurd. In this case, there is a human, social and cultural aspect behind it, i.e., the software development team or the isolated software engineer, in which there is imputability of guilt.

Item 3 deals with a symbolic collective, class-like idea and objects in object orientation in Software Engineering. Rather than being a specific individual, an instance of an individual represents that class of individuals. For example, in Section 4.2.1, although the case deals with a specific adolescent patient, the deliberation addresses adolescent patients in general and their access to their health information. Section 4.2.2 is about an individual, so it is an instance.

Item 4 is an indirect stakeholder, not directly related to any other stakeholder. For example, several computing societies and associations worldwide have codes of ethics or conduct, which may indirectly influence some stakeholders. It is an involved element, at the same time, distant. As in Section 4.2.1, the State and its values reach the other interested parties indirectly, distantly, and clearly.

Item 5 represents an individual as a unitary stakeholder. Item 6 represents a group or collective of individuals, informal. Item 7 represents institutions. Item 8 represents official or institutional groups or organizations.

The solid line with the directional arrow represents the association between stakeholders, and the dotted line associates stakeholders with facts about them. The remaining elements are self-explanatory and symbolically trivial of apprehension, such as the symbols in the final section indicating denial and acceptance of the decision. It follows the principle of simplicity, aiming at intuitiveness and understanding.

4.2 Operationalization in a real case

In this section, we present two real cases of ethical decision-making in the literature, the first called "Access by Adolescents to Patient Portals" (Glover, 2017) and the second called "Online Cultural Conflict" (Masiero, 2013). We aim to demonstrate the effectiveness and efficiency of the artifact in graphically representing the respective scenarios.

4.2.1   Access by Adolescents to Patient Portals

Figure 4 shows a case of decision making in Glover (2017), named "Access by Adolescents to Patient Portals", present in Appendix A. The analysis is based mainly on three ethical principles also exposed in Glover (2017), Principles-based ethics, Rights-based ethics, and Virtue-based ethics. The model, then, must represent principles, rights, and virtues. We do not add information, faithfully respect the content, and adapt only excerpts without changing the core proposal.

We anticipate inevitable critical tensions beforehand, which differentiate the exposure in Glover (2017) to our proposal: (i) for Transparency, facts and data used in the analyzes must have reliable, traceable, exact, and objective sources, such as "some testing and treatment" or "certain states" undermine ethical assessment; (ii) there are no consequences, i.e., what are the consequences of allowing adolescents to access their personal data? In this case, we synthesize "justifications" and "prevention" as consequences and predictive analysis; (iii) there is a certain inconsistency and discontinuity between the actors presented during the analysis. Some who appear in the facts do not appear in the stakeholders and vice versa. If the facts involve them, why are they not stakeholders?

As this is an analysis based on virtues, rights, and principles, the second section is entirely devoted to exposing this information, where we can see concordant, neutral, or conflicting items. For example, while adolescent patients value autonomy, parents do not; some laws and regulations guarantee adolescents and the hospital's autonomy and respect the laws and regulations; employees value privacy and confidentiality, as do adolescent patients. If the hospital impairs the adolescent's autonomy, it goes against laws and regulations. Suppose the hospital understands that the adolescent's personal information is accessible only to their respective legal guardians. In that case, it implicitly implies that the scenario foundations involve power and money, not the adolescent's well-being.

4.2.2   Online Cultural Conflict

Figure 5 shows a case of decision making in Masiero (2013), named "Online Cultural Conflict". Present originally in Brazilian Portuguese, we have translated it into English and included the text in Appendix B.

In this work, we depart from analyzing the modeled cases, but we would like to present some ethical reservations about this particular case. In the original text, Student A is repeatedly labeled as a "tribe member", even though the author seeks to soften this label in the text, the meaning remains pejorative and reductive. Instead of calling him a "tribe member", we identify him as Student A.

This case exposes the neglect of concrete and material reality. It follows the same problem in Section 4.2.1. Other stakeholders present morally questionable behavior by analyzing and treating Student A as a moral defendant. For example, those who stalk Student A in a specific forum to monitor and supervise their communications or as students who attack their image and ancestry for being a "tribe member" and nothing occurs to them.
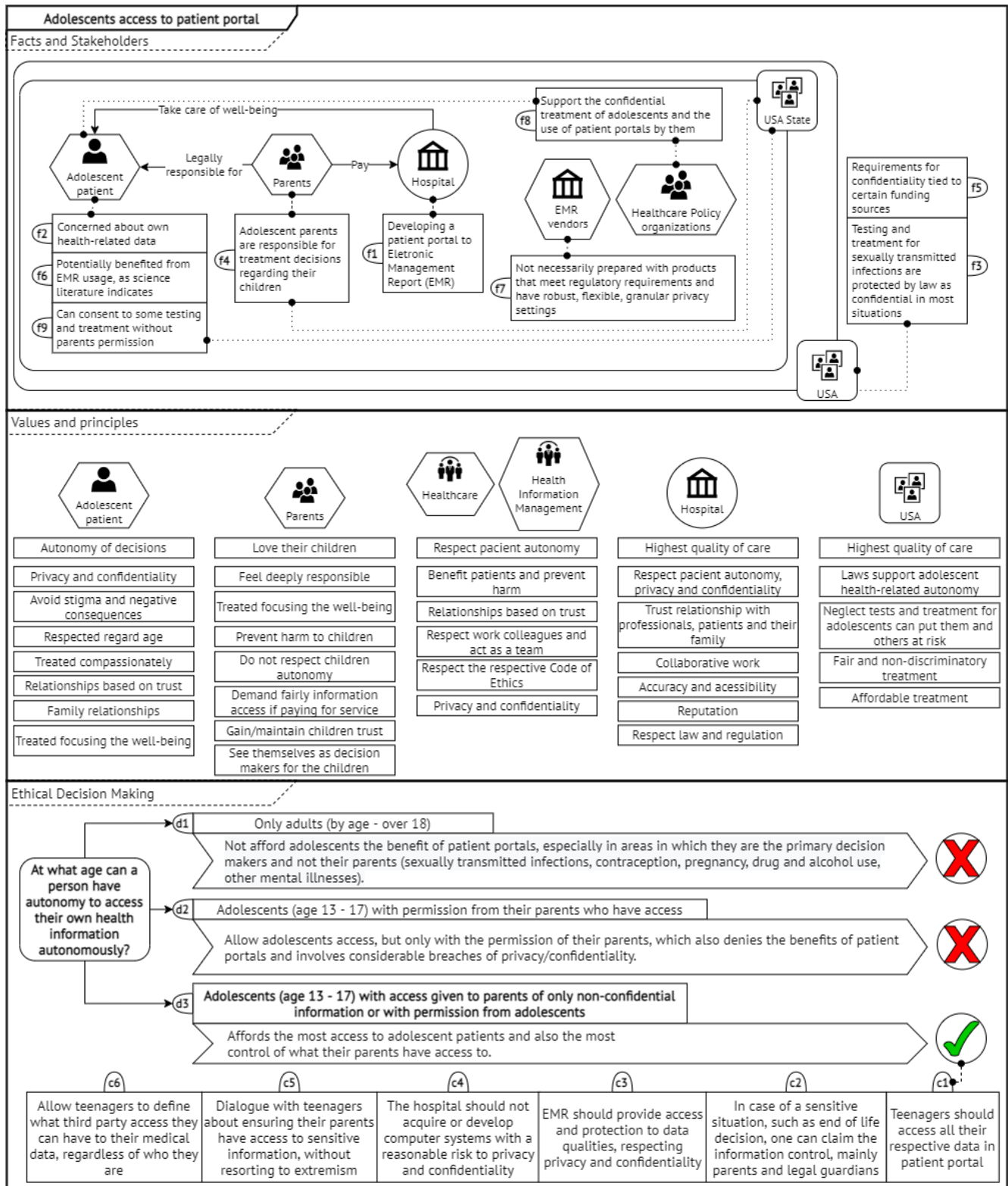
Figure 4. Access by Adolescents to Patient Portals Glover (2017) case modeled
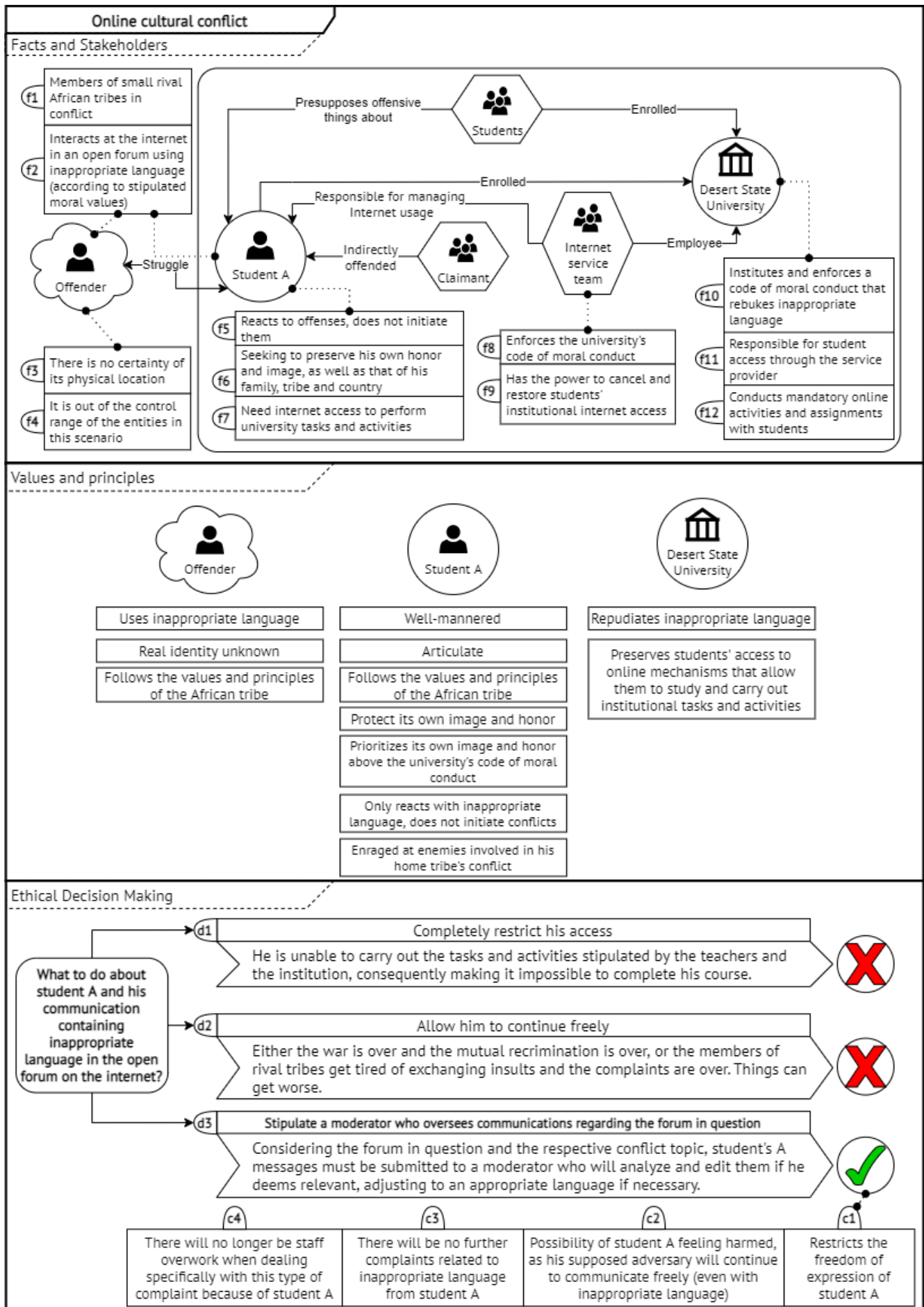
Figure 5. Online Cultural Conflict Masiero (2013) case modeled

Student A's "rival" is repeatedly identified in a certain way, and none of this data is confirmable or verifiable. There is a significant variety of possibilities for who he could be, including someone close to or from the same institution.

In conclusion, the downside of this ethical decision-making is focusing on the student instance and not on a general case, as in 4.2.1. Student A is the main loser in the end, and the case is not about "students who emit vulgar, profane or hateful speech online". It aims entirely at a student with insufficient privilege and power. The decision-making result has serious executability and scalability problems, considering that what is valid for Student A is valid for everyone else because if it is not valid, he is suffering an explicit frame of directed censorship and moral persecution.

5 Conclusion

In this paper, we present a preliminary proposal of graphic representation for EDMMs, to the best of our knowledge, unprecedented and innovative, to be developed based on the DSR methodology. We set out the initial idea, and as an initial work in development, we hope to complement it and include new requirements and graphic features. We built a prototype to demonstrate the possibility of graphing a real case already analyzed (Glover, 2017).

We found inconsistencies and simple discontinuities that are complex when analyzing a large text, as in the analysis of four pages in Glover (2017); we reduced the dimensions to just one image to snap onto a page. When modeling the case of Masiero (2013), we also found questionable elements for ethical decision-making, with the entire focus on just one individual and not the phenomenon. In parallel with the target of the value judgment in question being the subject of ethical investigation, other students deliberately cursed and maltreated him. Nothing occurred to them because they disrespected him precisely for being a "tribe member". While Student A worried about the offenses directed to his image and honor in an Internet forum, in harmless symbolic interactions, students from the same institution where he studied maltreated him, which is a concrete and meaningful interaction.

In conclusion, Student A ended up with his online communication impaired, and nothing happened to the students who treated him offensively. As a setback, graphic representations are subject to notational semiotic interpretation. Unlike traditional and custom texts, there is a new learning experience. We soften the learning curve by proposing a few simple elements.

As DSR values, we look forward to the community's interaction and collaboration to develop this artifact in a usable and interesting way for ethical decision-making based on computational representations. In subsequent steps, we will analyze feedback to formalize the proposal and increase its development; analyze other ethical principles, enabling more complete representations; deepen the collaborative potential of this proposal, where several people can think-make ethical decision-making collaboratively; develop and formalize a consistent notation and its design rationale.

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A   Appendix. Decision Making for an Adolescent

"MT is a 16-year-old young man with terminal brain cancer. At the age of 10 he was diagnosed with acute leukemia. After three years of intense treatment, MT was in remission. After two years of remission, during which he was doing very well in school and loved playing soccer, MT began having severe headaches. Unfortunately, his magnetic resonance imaging (MRI) scan showed a large mass requiring immediate workup. The tissue biopsy of the intracranial mass showed a uniformly fatal tumor, likely related to his previous leukemia treatment. No additional intervention was recommended by the team, and they wanted to refer him to hospice.

MT's parents had heard stories in the media about unprecedented recovery of children with terminal diagnoses. A national search of experimental protocols for brain tumors revealed two centers that were considering starting aggressive surgical approaches to this devastating diagnosis, but no active studies were open at this time.

MT's parents were thinking about moving him to a different cancer center for another experimental treatment. A close friend of theirs had been successfully treated there after everyone else said nothing more could be done.

MT's parents did not want him to know he was dying. They insisted on full code status. They forbid the nurses and resident physicians to tell him anything unless the parents were in the room, and they did not allow any conversation about his terminal condition and their recommendations. When asked by staff, MT seemed to agree with his parents' decisions in the past. Recently, however, he began to initiate conversations with the night nurse on the rare occasions when his parents were not in his room. One night MT was particularly agitated and asked to speak to a favorite resident

physician who happened to be on call and his nurse, and without his parents present. This was a surprising request from MT; his parents were very upset, but they complied and left the room. MT shared with the resident physician and the nurse that he just accessed his health information from the patient portal that he and his parents signed up for a long time ago, and was upset to learn the name of his new diagnosis, glioblastoma multiforme (GBM). Through an online search he discovered the extremely poor prognosis. He asked the resident physician directly, 'Am I dying?' The nurse and resident physician had grown close to MT and wondered what they should do." (Glover, 2017)

B   Appendix. Online Cultural Conflict case

"This problem was originally proposed many years ago when the US state of Utah only had a single Internet service provider and it was comparatively expensive, not a choice many students could make. Today, telling a student to 'just look elsewhere' is not the painful choice it was back then. There are still problems, but now they are somewhat irrelevant.

There was at our university a user from some tribe in a small African country. He had an opponent in the net, from another tribe in that country. There was a war going on, and the opponents were from tribes on opposite sides of the war - and they weren't reputed to get along well before that.

Both were using a web discussion group (soc.culture.[name-of-that-country]) as a forum to express their views. However, both were choosing the meanest, most offensive, rudest, and threatening language possible for this dialogue.

Every time our user posted something like this, we received twenty or more complaints about our user's language, tone, and often inadequacy. We assume that the other side received the same when the other posted something. As this happened every day, there were twenty or more complaints a day, which tied up someone's morning every day.

The messages unquestionably violated the published rules for the accounts, and the user even admitted to it. He was told that if the breaches did not end, his account would be terminated. But he continued, and his account was terminated four times, with a reprimand from a different person here each time before his account was reactivated.

His point of view in all this is, in fact, perfectly defensible: 1) He is only responding to things addressed to him, and responding in exactly the same language and tone used against him. 2) His family honor, his personal honor and the honor

of his tribe have been publicly defamed, and he feels entitled to defend himself, his family and his tribe. 3) Since both are doing this, he thinks it's unfair that his account is closed and the other person's is not. 4) We are effectively allowing someone to insult and lie about him publicly, to the entire world (and therefore in his homeland), while denying him any chance of a response.

Our view is close to this: 1) He's causing us extra work, and he's breaking the rules to do it. 2) He can defend himself. He just can't do it in an obscene and objectionable way (even though that might be culturally accepted in his country as an appropriate response to an obscene and objectionable attack). 3) We cannot close the other person's account because we have no control over any other website. This person, in fact, may not be violating the rules of the site he uses. 4) We have no means of continuing to deal with complaints. As long as the complaints are valid, we have a responsibility to resolve the part of the problem to which we have access. If he continues to use objectionable language, we cannot allow him to continue.

There are several interesting issues here associated with our enforcing this student/tribe member to comply with our cultural norms in a way that is offensive to him. Note that "tribe member" does NOT mean to be 'primitive'. He was a student here at Desert State University. He was well educated and quite articulate. Being a member of a tribe is a cultural fact, relevant to the conflict, not an affirmation of anything else. This statement needs to be made because some students have assumed all sorts of offensive things based on his being a member of a tribe.

[...] a) As an extreme solution, I would suggest permanently removing the student/tribe member's access to the network accessed by the university. The result at best would be that the student/tribe member would no longer be able to make lewd and inflammatory comments, and therefore the complaints would cease. The worst-case result would be that the student/tribe member could not perform his/her class assignments because he/she does not have access to the network, being unable to graduate. I could not accept this result.

b) As the other extreme solution, I would suggest that the administration do nothing. The result at best is that either the war is over and the mutual recrimination is over, or the members of rival tribes get tired of exchanging insults and the complaints are over. The worst-case outcome is that, without any management intervention, things get worse. I could not accept this result.

c) As an intermediate solution, I would suggest that the student/tribe member be allowed to respond to insults, but that they do so by pre-submitting their response to the mediation of someone designated

by the computer network administration. That person would edit the answer, and delete any obscene or inflammatory language before posting it, or allow it to be posted. The result at best is that the student/tribe still has a means of responding to insults (although perhaps not as vigorously as they would like), complaints would end, and staff would no longer have to invest inordinate amounts of time in the situation. The worst-case outcome is that the student/tribe member feels he is being discriminated against for not being able to post with the same freedom granted to his rival by whatever network he is located on. I could accept this result. I would choose solution "c" - the solution that has a tolerable outcome at worst." (Masiero, 2013, our translation)