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Ethical Requirements Stack: A framework for implementing ethical requirements of AI in software engineering practices

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CCS CONCEPTS

• **Software and its engineering** → **Software organization and properties.**

KEYWORDS

AI, AI ethics, AI ethics principles, Agile portfolio management, Ethical requirements, Ethical requirements stack

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1 ETHICAL REQUIREMENTS STACK

The ethical requirements stack uses an Agile portfolio management framework based on agile scrum practices of themes, epics, features, and stories [3, 5] for a practical and hands-on approach to implementing ethical requirements of artificial intelligence (AI) into software engineering (SE) management practices. The framework is conceptualized as spread across actor groups of higher-level management (strategy level activities), middle-level management (product management activities), operational or development levels, and individual or team levels.

The executive or strategy layer corresponds to the themes layer in the Agile portfolio management framework. This layer creates strategic, ethical requirements for the business. Ethical requirements are determined at this stage using appropriate ethical frameworks or tools based on AI ethics guidelines and principles to create a central or strategic ethical requirements theme. The outcome from

this layer, strategic, ethical requirements are then communicated to the next layer. The middle management layer corresponds to the epic layer and is responsible for cascading or interpreting the strategic ethical requirements. Epics in agile context represents large bodies of work that need to be broken down into smaller units before execution. Similarly, breaking the the strategic ethical requirements into smaller components spread into relevant projects within the organization can help to manage the central theme better. This layer also manages its development in releasing the business strategy [3, 5]. The epic layer creates an ethical requirements management plan conforming with organizational policies and objectives where information and procedures from top management are outlined with proper guidance for the lower layers for execution [3, 5]. The epic layer also breaks down the strategic ethical requirements into manageable practices identified in Agile as features. The outcome from this layer is the management ethical requirements.

The operations layer functions as the features layer where business strategy is aligned to mandatory requirements [1, 3]. The management ethical requirements at this level are further decomposed and distilled into the business operations to further the realization of the central vision of the business. Features represent a sizeable deliverable that can provide functionality. Here the management ethical requirements are decomposed into operational ethical requirements that can be addressed within operational units in the organization. The outcome from this layer are the operational ethical requirements for the next layer. The individual or team level represents all the micro activities in interpreting the operational ethical requirements and is identified as the story layer or user stories in agile context. User stories in an agile context translate to smaller units of representation and interpretation of the features. At this layer, the operational ethical requirements are interpreted in terms of individual or team unit of activities or Individual or team ethical requirements in line with the organization's central strategic ethical requirements.

The ethical requirements stack approach illustrated in Figure 1 is not just a singular or linear process but a multi-layered approach with one layer connected to the other to achieve the organization's primary strategy. Using ethical requirements for eliciting value can



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result in a case for ethics to be analyzed across the different groups within organizations and help interpret the importance of the AI project [2].

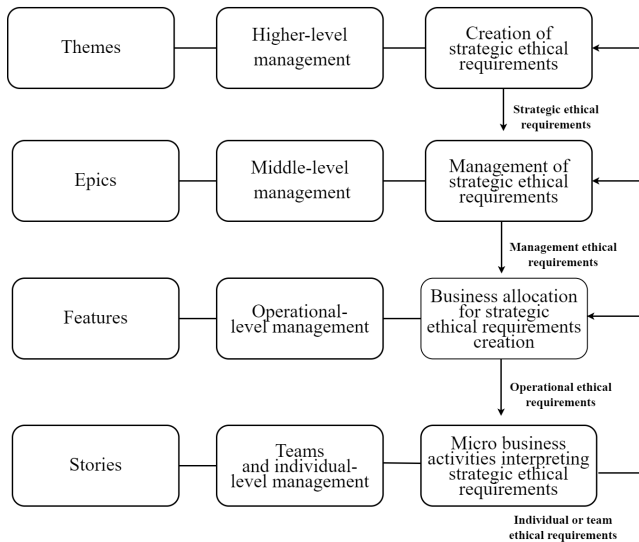


Figure 1: Ethical Requirements Stack

1.1 Motivation

The increased implementation of AI in SE business in various industries is becoming increasingly widespread. Therefore, SE businesses must address the ethical concerns that arise with this technology, particularly within management, given the progress made at the development stages. Current management practices within SE are not hands-on, as ethical requirements are mainly relegated to development teams to implement. SE businesses play a vital role in ensuring that AI systems are developed and deployed ethically, which requires a practical approach where all the relevant stakeholders are involved in evaluating and implementing the ethical requirements of AI. A practical and hands-on approach to evaluating and implementing ethical requirements can help SE businesses identify and mitigate potential risks before they become more significant problems and turn into reputational damage.

This tutorial proposal is to introduce the Ethical Requirements Stack as a practical and hands-on approach for SE stakeholders to implement the ethical requirements of AI. Attendees will learn how to use the framework to evaluate and implement ethical requirements at different business levels and to optimize their potential to enhance research endeavors in AI ethics.

1.2 Target Audience

The tutorial focuses on engineers, project managers, researchers, and practitioners interested in learning about implementing ethical considerations of AI in SE practices.

1.3 Objectives

- (1) To present the Ethical Requirements Stack Framework and its Components.

- (2) To introduce participants to a practical approach to implementing ethical requirements of AI and explain why it is essential to address them in SE practices beyond the development stage.
- (3) Evaluation of the framework to refine and assess its feasibility as a newly developed tool.
- (4) To examine a practical application of the Ethical Requirements Stack through practical examples.
- (5) To provide best practices for using the Ethical Requirements Stack, including common pitfalls and challenges that participants may face and tips for overcoming them.
- (6) To equip participants with the knowledge and skills necessary to close the gap in AI ethics between principles and practice.

2 AGENDA

This tutorial is designed to be interactive, with brief lectures, hands-on exercises, and group discussions. It allows participants to actively engage with the material and apply their newly acquired skills in real-world scenarios.

- 8:30 AM - 9:00 AM: Registration and Welcome
- 9:00 AM - 9:30 AM: Introduction
 - Discussion on the ethical concerns related to AI
 - Importance of addressing ethical concerns in SE practices
- 9:30 AM - 10:15 AM: Ethical Requirements Stack Framework
 - Overview of the Agile portfolio management framework
 - Introduction to the Ethical Requirements Stack
- 10:15 AM - 10:30 AM: Break, email
- 10:30 AM - 11:00 AM: Practical demonstrations of the Ethical Requirements Stack Framework
 - Identification of ethical requirements using ethical frameworks
 - Use of ECCOLA framework an ethically aligned design tool [4] in identifying ethical requirements
 - Use of ChatGPT prompt engineering in identifying ethical requirements
 - Implementation of identified ethical requirements.
- 11:00 AM - 12:00 PM: Hands-on-practice
 - Guided exercises to practice on identification, evaluation, and implementation of ethical requirements using the Ethical Requirements Stack
- 12:00 PM - 12:30 PM: Discussion
- 12:30 PM - 1:00 PM: Closing Remarks and Networking.

2.1 Benefit

By the end of this half-day tutorial, the participants will be better equipped to consider and implement ethical requirements within organizational contexts using the Ethical Requirements Stack approach. The participants would also be more informed on using tools such as ECCOLA and ChatGPT prompt engineering. These practices can further empower them in their research projects.

2.2 Equipment and Services Needed

The organizers would use:

- Projector
- Each participant to have access to laptops

- Stationery including pen, paper, post it notes, booklets

3 ORGANIZERS

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