A Roadmap for Ethics-Aware Software Engineering

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1. Do we need ethics in software engineering?

2. Our vision

3. A roadmap for ethics-aware software engineering

4. Conclusions
Do we need ethics in software engineering?
Few past incidents...
Few ethical concerns...

- Fairness
- Diversity
- Sustainability

- Responsibility
- Privacy
- Transparency

- Dependability
- Professional conduct
- Business conducts
Our vision
Ethical harmony

Stakeholders can choose based on their values, resulting in SE Processes that respect the values of stakeholders. This process leads to software that aligns with ethical values.
Ethical harmony exists when

- Stakeholders state requirements on
  - Software product
  - Software engineering processes
- Professionals produce software and work for organizations that are aligned with their ethical values
- Organizations follow their ethical principles
Ethics-aware software engineering

E0. Ethics Knowledge
E1. Awareness
E2. Conscious Valuing
E3. Transparency

Validation
Articulation
Implementation
Specification
Verification
E3. Transparency
A roadmap for ethics-aware software engineering
RQ1
What are the relevant ethics issues for software engineering?
Ethics issues

energy-consumption  public's-benefit
accountability  transparency
confidentiality  education
dependability  internet
privacy  piracy
autonomy  diversity
education  responsibility
common-goods
sustainability
Research Question 1

RQ1
What are the relevant ethics issues for software engineering?

Artifacts

- Catalog of ethics issues in software engineering
- Crowd-driven ethics standards and code of conduct
- Elicitation methods for ethics requirements
RQ2
What are adequate modeling primitives to capture ethics requirements?
Ethics requirements

- The algorithm shall be fair
- The system shall consume XYZ energy per transaction
- The interface shall promote diversity
RQ2
What are adequate modeling primitives to capture ethics requirements?

Artifacts

- Language for expressing ethics requirements
- NLP tool for deriving ethics requirements from natural language text
RQ3
Which visual notations can help capture ethics requirements?
Research Question 3

RQ3
Which visual notations can help capture ethics requirements?

Artifact

• Visual notation for the ethics requirements language
Research Question 4

RQ4
How to analyze the interplay of ethics requirements and other requirements?
Interplay of requirements

- The algorithm shall be fair
- The system shall consume XYZ energy per transaction
- The interface shall promote diversity
- Performance?
- Safety?
- Security?
RQ4
How to analyze the interplay of ethics requirements and other requirements?

Artifact

- Analysis tool kit for ethics statements
RQ5
Which techniques can help trace ethics requirements?
RQ5
Which techniques can help trace ethics requirements?

Artifact
- Design patterns to map ethics requirements to ethics design
- Traceability techniques for ethics requirements
RQ6
How can we verify software artifacts and processes against ethics specifications?
Research Question 6

RQ6
How can we verify software artifacts and processes against ethics specifications?

Artifact

• Verification techniques for ethics requirements
RQ7
How can we validate software against ethics requirements?
Research Question 7

RQ7
How can we validate software against ethics requirements?

Artifact
- Ethics acceptance tests
Conclusions
Conclusions

Future Work

- Research questions!
- RQ1: Systematic and grey literature survey
- RE related RQ2,3,4
Contact us!

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Thank you for your attention!