

# Responsible Computing Education

An approach to foster human values and responsibility considerations in CS by systematically embedding these aspects in computing education

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## Backgrounds and Motivation



### Digitalization, CS and Transformative Technologies

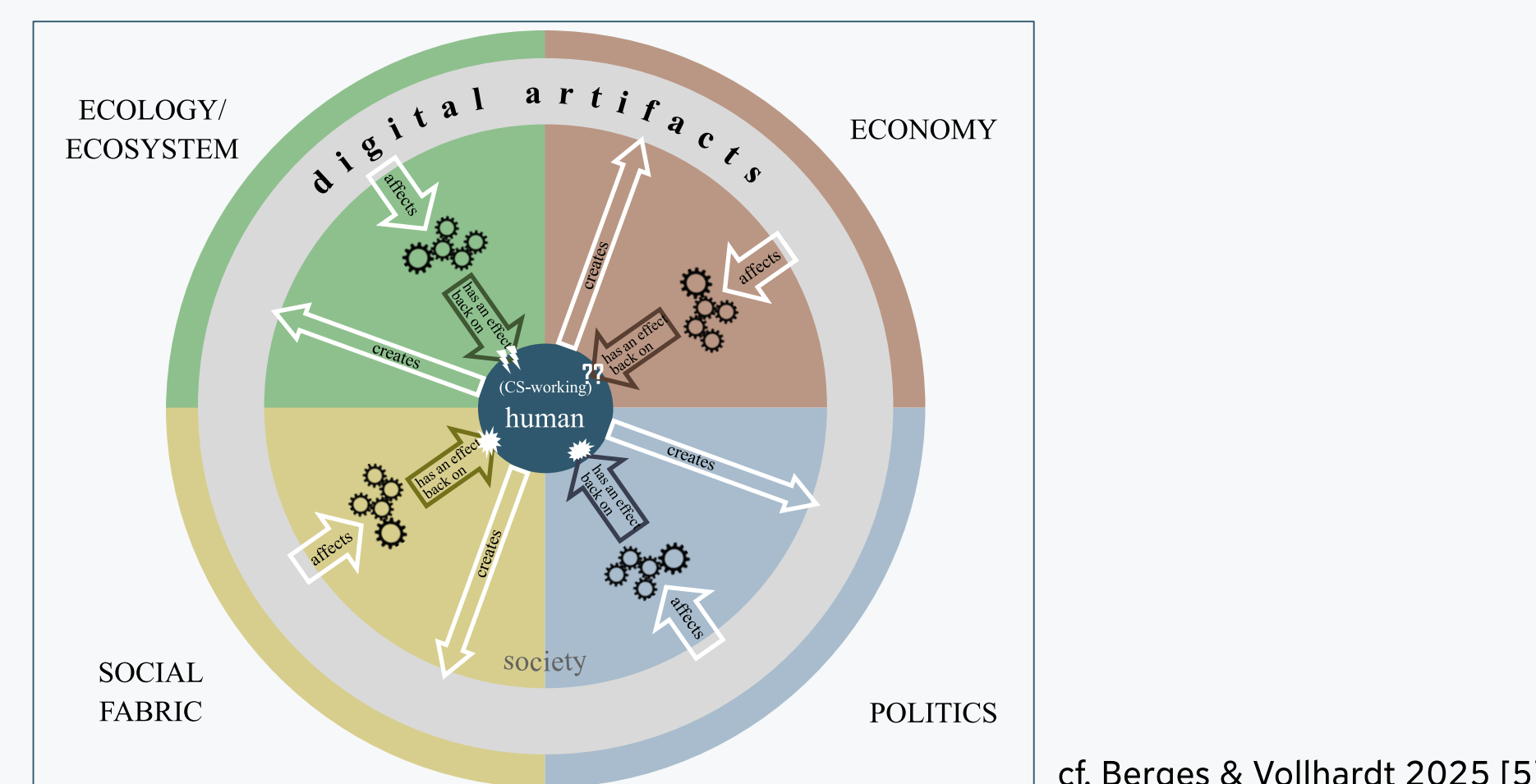
- Digitalization shapes all areas of life; computer science (CS) is its foundation and a main driving force. [1]
- Some CS developments are *transformative technologies* (e.g., Internet, social media, AI chatbots, quantum computing). [2]
- Transformative technologies raise fundamental socio-technical and ethical questions (e.g., autonomy, privacy).
- Significant knowledge gaps limit people's ability to understand and critically assess these technologies. [3]
- Computing education is essential for all members of society to remain informed, autonomous, and capable of shaping digitalization. [4]

**Computer science—especially through transformative technologies—has profound societal impacts. Therefore, computing education is essential for everyone to remain autonomous in a digital world.**



### Interdependencies Between Computer Science and Society

- CS creates digital artifacts (e.g., AI-generated content) that shape the human environment.
- These artifacts impact central dimensions of society: economy, ecology, politics, and social fabric.
- The resulting changes affect people and societal structures (e.g., misinformation, CO<sub>2</sub> emissions, new business models).
- These effects feed back into CS by creating new demands, constraints, and developments.



**Computer science shapes society through digital artifacts—and is, in turn, reshaped by its own societal impacts.**



### Study on AI in School Administration: Challenges in Responsible Decision-Making

Digitalization and AI require educational leaders to make far-reaching decisions on technology use in schools.

#### Findings

- (Empirical Study, Germany, all federal states, N=1336)
- About two-thirds use AI systems in school management (almost entirely generative AI, mostly ChatGPT)
  - AI Literacy about the same level as the population average
  - High self-assessed judgment competence, but limited technical understanding
  - Majority completed fewer than 5h of AI training in total

#### Conclusions

- Indications for unreflected practices through usage of AI in sensitive contexts (e.g., assessment, legal communication)
- AI literacy and the amount of training received in AI appear to be insufficient for well-founded and informed decision-making

cf. Vollhardt & Berges 2026a [6], Vollhardt & Berges 2026b [7]

**Educational leaders must make informed AI-related decisions but lack sufficient knowledge and tend to overestimate their competencies, which constrains informed and responsible decision-making.**

## Problem Framing



### Arising Questions

- How can computer science be influenced so that its digital artifacts are designed more responsibly and not impede individuals' ability to remain digitally autonomous and self-determined in a digitized world?
- What does this imply for computing education?
- Which aspects should be integrated into a responsibility-oriented computing education?
- What is already known and implemented in computing education research and practice?

### Research Rationale

Computer science increasingly impacts societal conditions by creating digital artifacts without sufficient inherent reflection on responsibility. Influence on computer science can be exerted through computing education. Therefore, computing education becomes a leverage point to foster responsibility in CS. This encourages research on responsible computing education.

## PhD Project Design



### Overall Research Question

- How can *responsible computing education* be
- theoretically conceptualized by developing a **framework** that integrates relevant responsibility-related aspects of computer science (education),
  - tailored by investigating to what extent responsibility considerations are **already present** in computing education **research and practice** and
  - integrated into computing education practice by deriving approaches for its **integration**
- to foster people's ability to understand and critically reflect on computing as well as to remain digitally autonomous and self-determined in a digitized world?



### Objectives

- Development of a theoretical framework to conceptualize responsible computing education
- Systematic analysis of the extent to which responsibility-related aspects are already present in computing education
- Derivation of approaches to integrate additional aspects of responsible computing education into educational practice in order to address identified gaps



### Next Steps

- Scoping review (incl. snowballing) and narrative synthesis → theory map
- Framework development based on identified concepts and relations
- Analysis of responsibility aspects present in research and practice



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References and  
downloads can  
be found here.

