

A Research Roadmap for Augmenting Software Engineering Processes and Software Products with Generative AI

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“Background”

“2030 Software Engineering” Workshop @ FSE 2025

- Discussion of recent changes in SE
- Developing shared vision on future SE
- Initiating roadmap for research community

→ **ACM TOSEM Special Issue**



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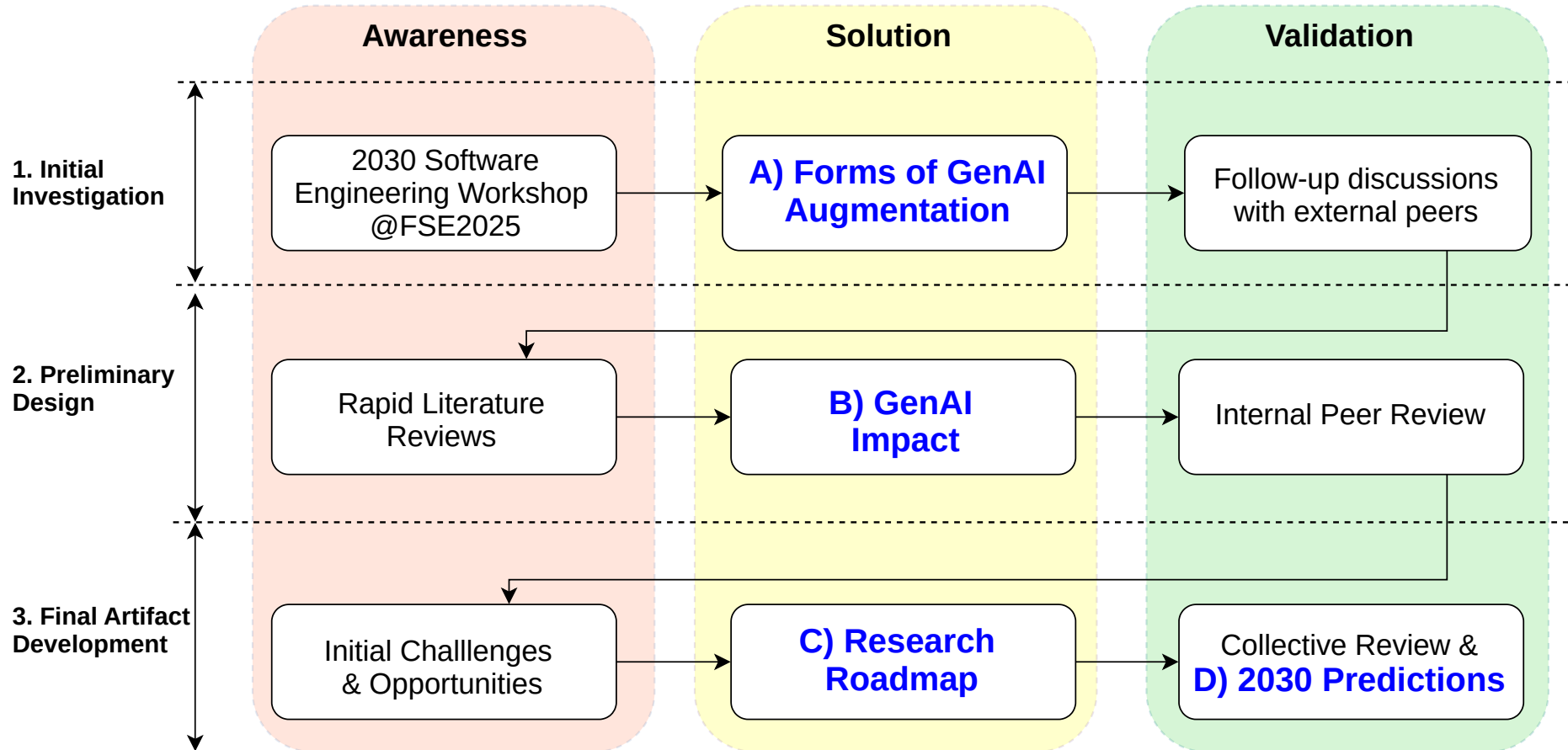
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Our Focus: **Generative AI**

- Transformation of SE on unprecedented speed and scale
- Novel opportunities for developing and operating software
- **But: Are established SE principles, practices, tasks, activities and processes still valid?**
e.g,
 - *Roles of software engineers?*
 - *Dynamics of hybrid human-AI teams?*
 - *Nature of software artifacts?*



Research Approach



A) Forms of GenAI Augmentation

Process

Product

Passive



Active



B) GenAI Impact: McLuhan's Tetrads

Enhances

What does **medium** enhance or intensify?

*e.g., advent of **printing press** revolutionized communication & education*

Obsolesces

What does **medium** make obsolete or replace?

*e.g., **TV** displaced radio as primary source of news*

Medium

Reverses

What does **medium** reverse or flip into when pushed to its extreme?

*e.g., **social networks** can reverse into physical isolation*

Retrieves

What does **medium** retrieve or recover from the past?

*e.g., **Internet** retrieved decentralized & participatory nature of oral communication*

B) GenAI Impact: Example Tetrad

Enhances

- Novel forms of human-computer interaction (HCI)
- Increased human-AI team Performance

Obsolesces

- Natural language AI-to-AI communication (→ “gibberlink”)



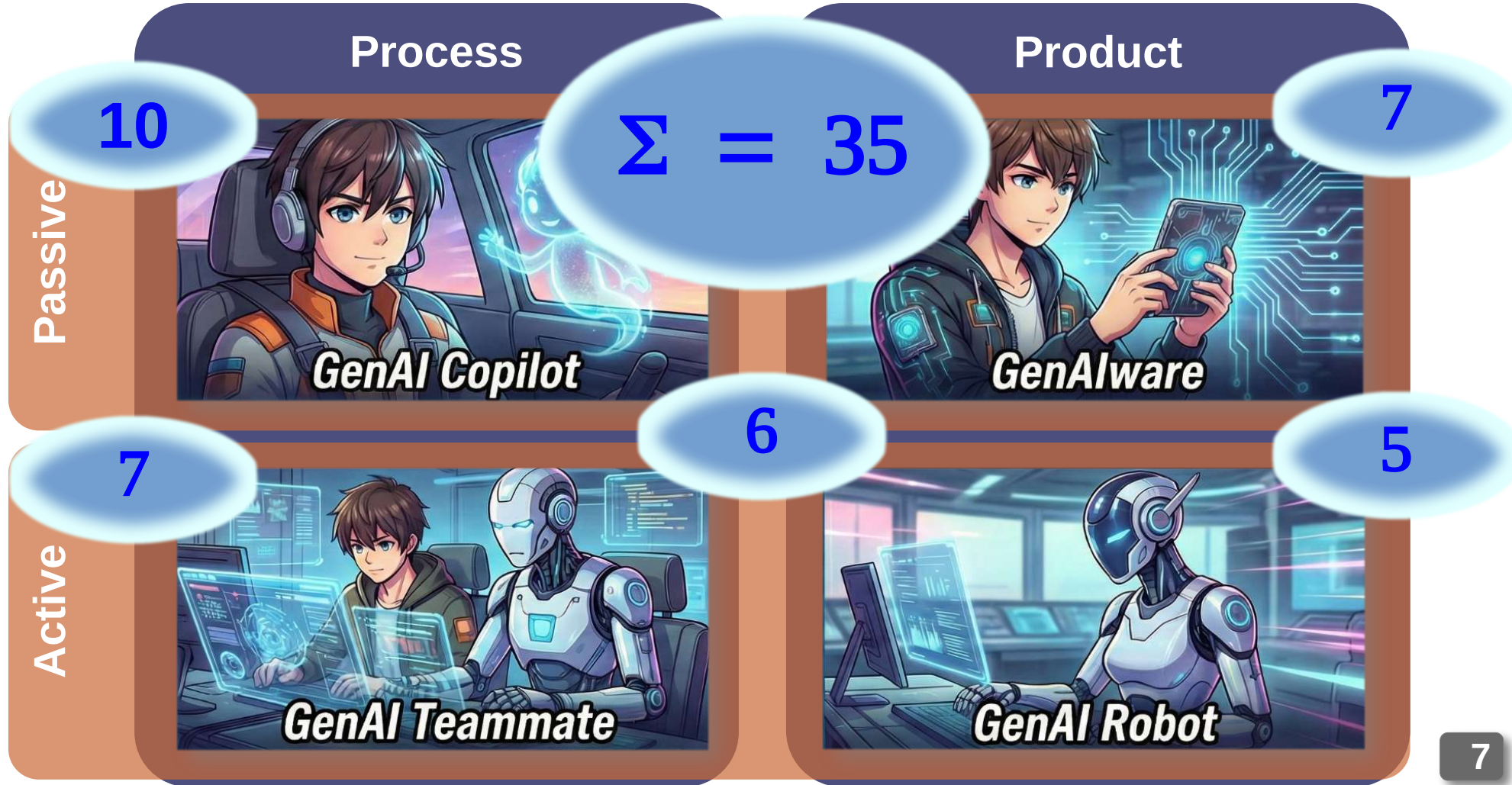
Reverses

- Human-agent balance
- Traditional separation of concerns
- Static assurance of legal and ethical norms

Retrieves

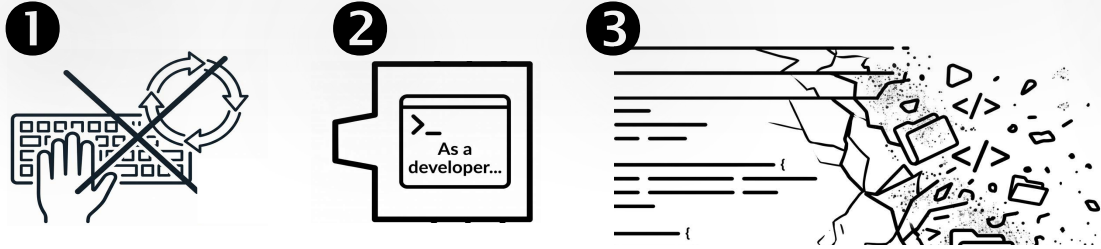
- Agent-oriented Software Engineering (AOSE)

C) Research Roadmap: Challenges & Opportunities

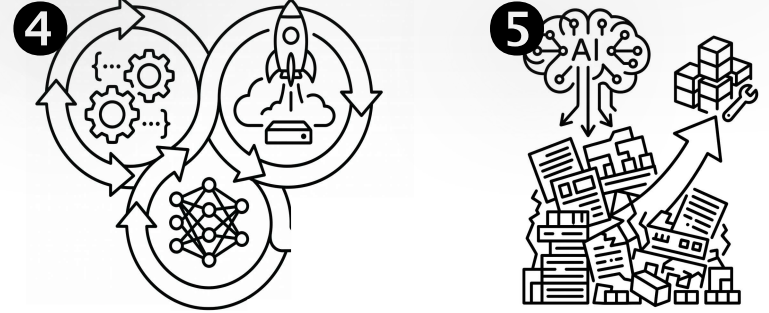


D) 2030 Predictions

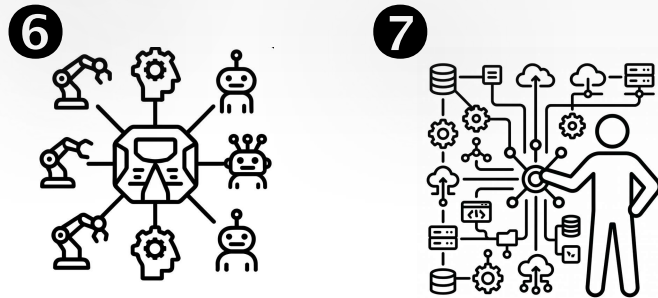
Coding



Life-cycle



Team



Compliance



D) 2030 Predictions

We'd really love to know what you think about our predictions :-)

Have your say here



Click here when done

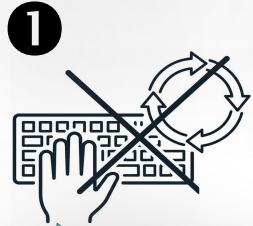
Code"

☐ Emergence of "Responsible GenAI Engineering"

Abstimmen!

D) 2030 Predictions

Coding

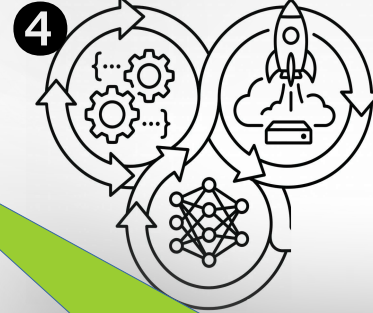


Death of manual coding for routine tasks

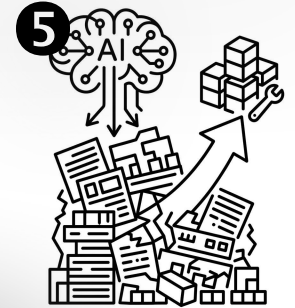


Prompt Engineering becomes a core SE discipline

Life-cycle

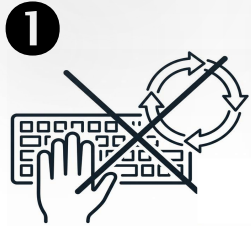


Classical IDEs will dissapear

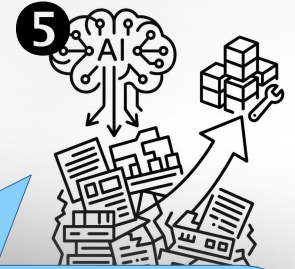
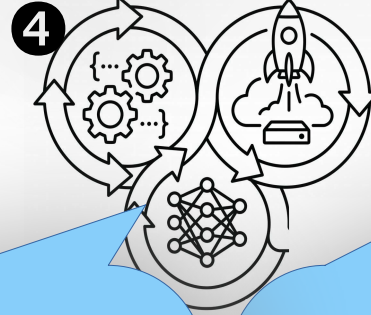


D) 2030 Predictions

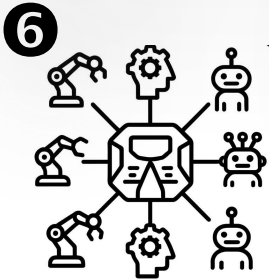
Coding



Life-cycle



Team



Integrated
CI/CD/AI
Pipelines will
become
standard

GenAI-induced
technical debt
crisis and
recovery

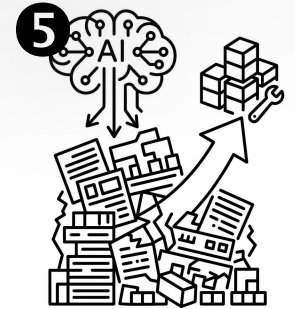
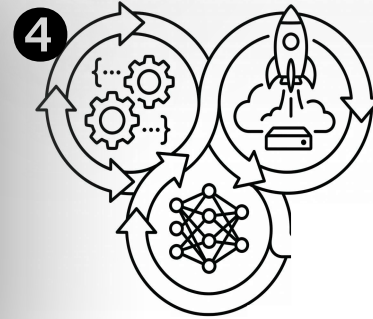
D) 2030 Predictions

Coding

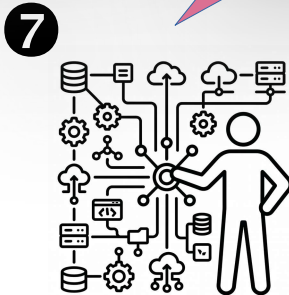
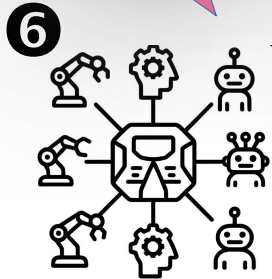
Multi-Agent
orchestration
platforms
become
mainstream

"10x Developer"
becomes "10x
Orchestrator"

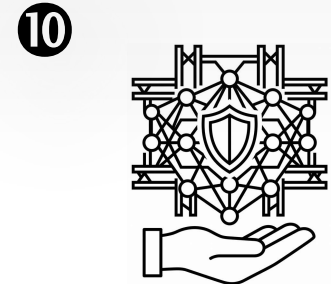
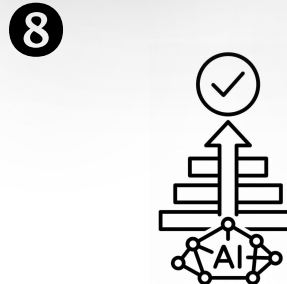
Life-cycle



Team



Compliance



D) 2030 Predictions

Coding

Life cycle

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Rise of AI accountability standards

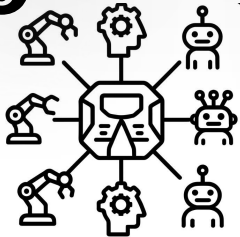
Emergence of "Software Compliance as Code"

Emergence of "Responsible GenAI Engineering"

Team

Compliance

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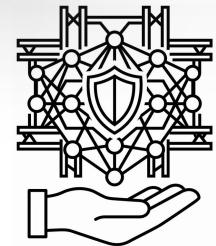
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Thank you!

Keep on Voting:



Additional Material:

- Paper links
- RLR data
- Slides

