

.../ai-where-it-matters

Where, Why, and How Developers Want AI Support in Daily Work

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AI is revolutionizing Software Engg. (SE)



Survey: The AI wave continues to grow on software development teams

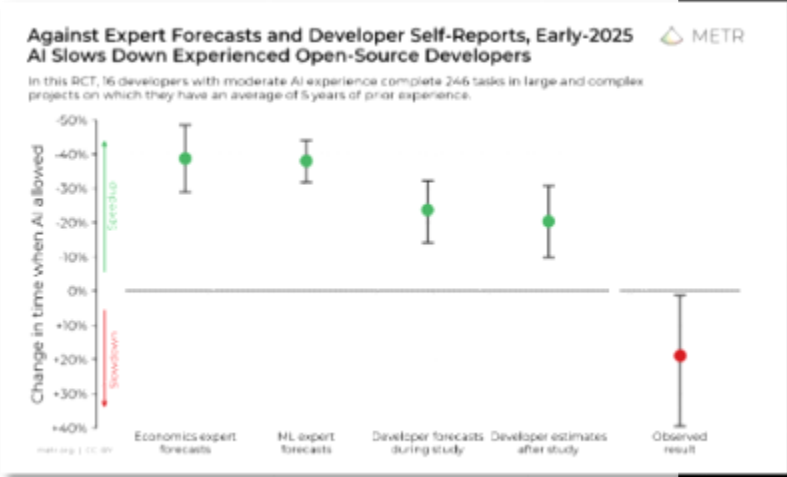


TECH

Google CEO says more than a quarter of the company's new code is created by AI

Hugh Langley Oct 29, 2024, 9:36 PM UTC

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A photograph of Google CEO Sundar Pichai standing on a stage, gesturing with his hands. Behind him is a large screen displaying a grid of blue squares, each containing a white icon representing different AI capabilities or Google services. The screen is flanked by large, colorful, curved structures.

OpenAI Summer Update

Academic

SWE-bench Verified
Software engineering

Without thinking (pink) With thinking (purple)

The bar chart shows the accuracy of three models on the SWE-bench Verified dataset. GPT-5 has the highest accuracy at 74.9%, followed by OpenAI o3 at 69.1%, and GPT-4o at 30.8%.

Model	Accuracy (%)
GPT-5	74.9
OpenAI o3	69.1
GPT-4o	30.8

5:13 / 1:17:30

How much does AI impact development speed?

A randomized trial at Google estimates a 21% speed boost from AI coding tools.

ABI NODA
JUN 25, 2025

Research Scope & Goal

Where to build AI tools for developers and how to do it responsibly?

My Goal: Automate **Inform** how to **value-align** developer-AI collaboration

Why care?

From a labor economics standpoint, technology that:

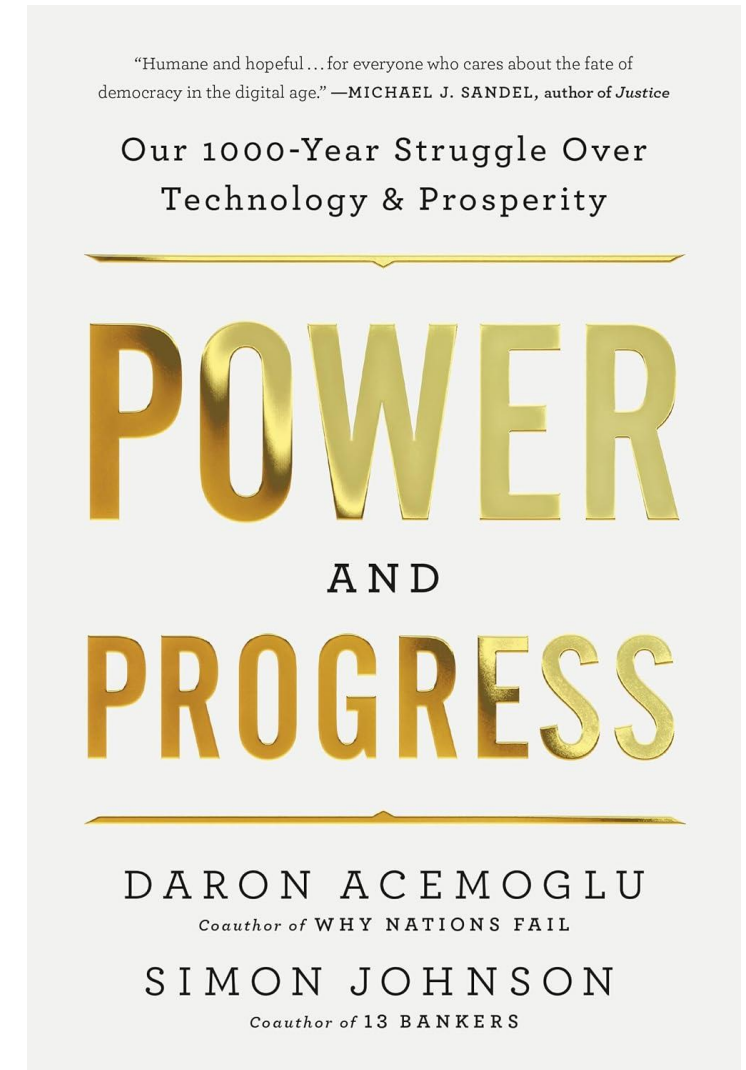
- complements expertise and upskills workers generate sustained economic benefits and enable shared prosperity. (\$\$ ↑)
- displaces workers erodes job security and amplifies economic inequality. (\$\$ ↓)

Study's Goal: Inform where and how to design/integrate AI that:

- Complements developers in their role responsibly
- Amplifies the values that make work meaningful
 - To enhance productivity and work quality
 - To foster appropriate trust and use of AI

RQ1: Where do developers seek or limit AI support, why, and to what extent?

RQ2: What design features do developers prioritize in AI to responsibly support SE?



Research Method: Survey

We studied software developers (N= 860) at Microsoft to answer RQs.



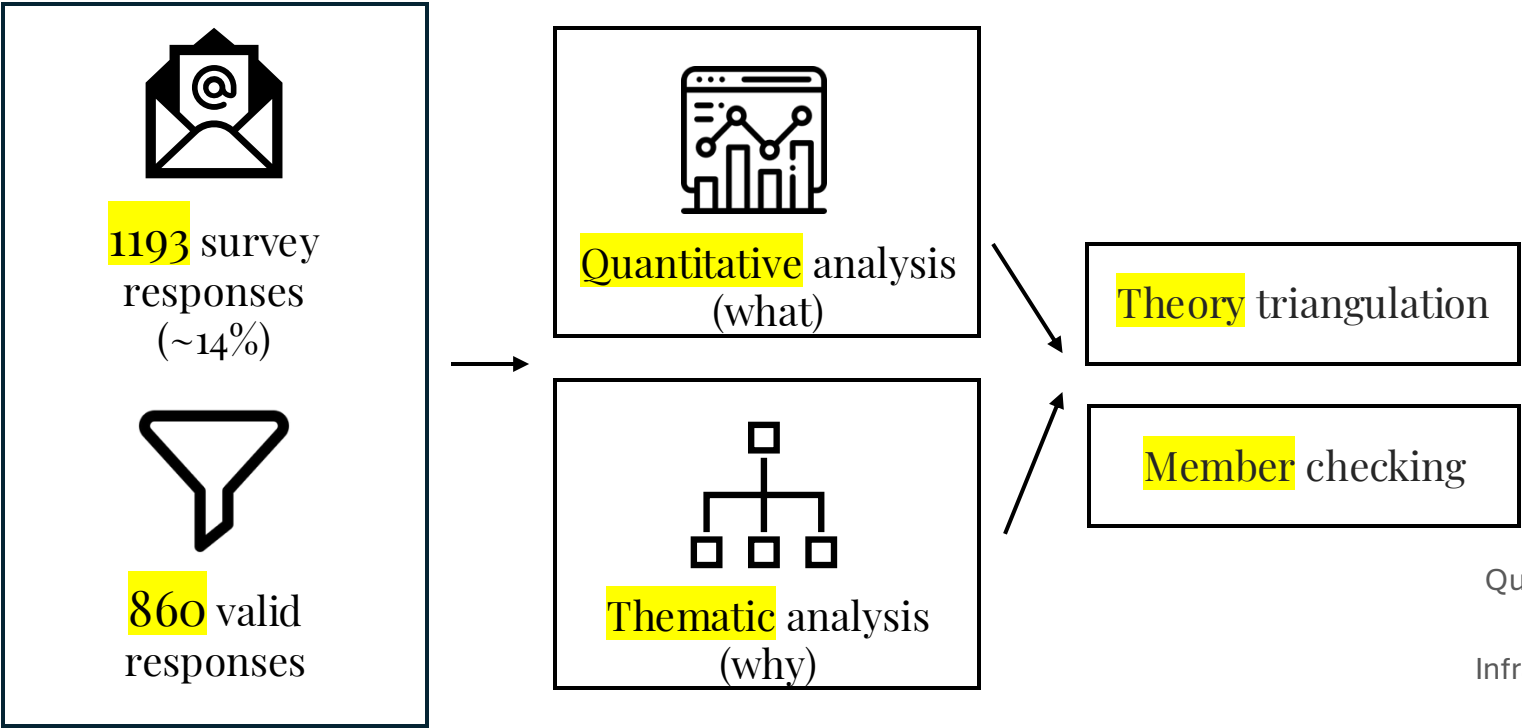
JULY 2025: 16TH – 25TH



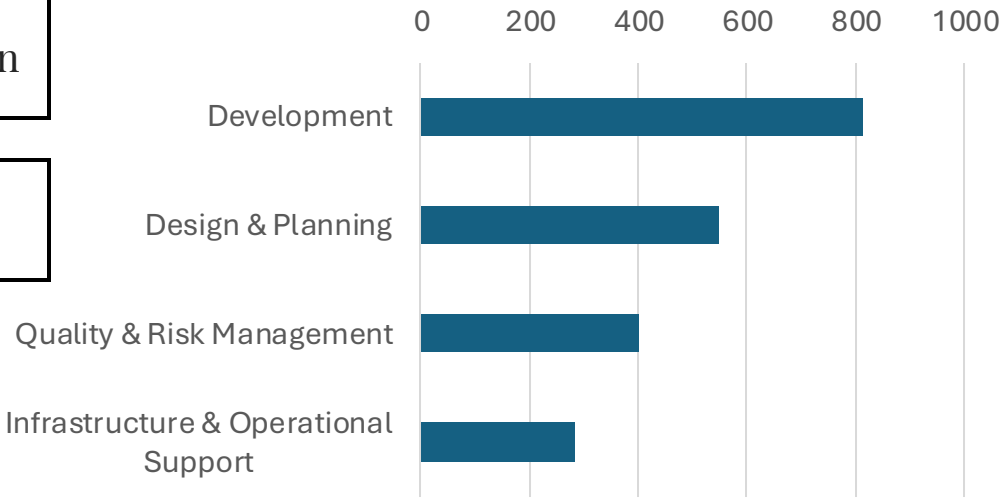
EMAIL INVITES: 9000
(~890 OOF + 120 NON-DELIVERY)



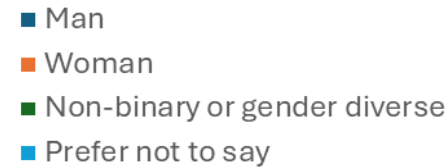
AVERAGE TIME: ~13 MINS



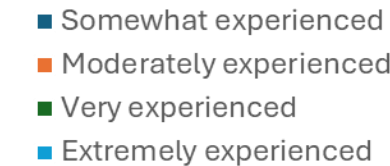
SE Responsibilities



Gender



AI Experience



SE Experience



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Why do they do what they do?

RQ₁: Where do developers seek or limit **AI support**,
why, and to what extent?

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RQ1 foundations: “Why do they do what they do?”

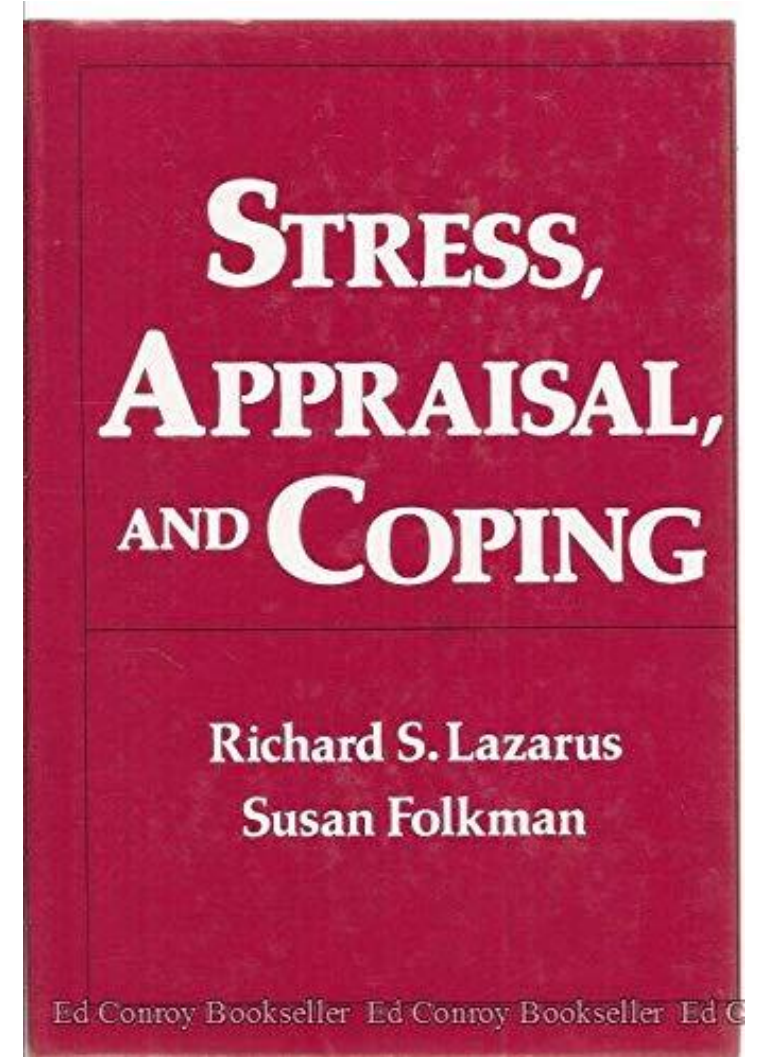
Individuals are meaning makers; we seek value in our experiences

At work, we evaluate tasks through a set of mental questions:

- ❑ *Is this important to me?* → **Task value**
 - ❑ *Does it align with what I want to do?* → **Task identity alignment**
 - ❑ *Am I responsible if it fails?* → **Task accountability**
 - ❑ *Can I handle its demands?* → **Task demands**
- } *Motivational*
- Social*
- Contextual*

— **Openness to AI support**
— **Reported AI usage**

Work satisfaction & Productivity



RQ1 foundations: “Why do they do what they do?”

Grounded taxonomy of SE tasks [1,2,3]

Category	Tasks
Development	Coding/Programming; Bug Fixing/Debugging; Performance Optimization; Refactoring, Maintenance & Updates; AI Integration
Design & Planning	System Design; Requirements Engineering; Task/Project Planning & Management
Quality & Risk Management	Testing & Quality Assurance; Code Review/Pull Requests; Security & Compliance
Infrastructure & Operations	DevOps(CI/CD)/Deployment; Environment Setup & Maintenance; Infrastructure Monitoring; Customer Support
Meta-work (Collaboration & Knowledge Building)	Documentation; Client/Stakeholder Communication; Mentoring & Onboarding; Learning; Research & Brainstorming

- Participants chose 2-3 **categories most relevant** to their work,
 - (quant.) **Rated** each task on **appraisals, AI openness, and AI use**
 - (qual.) **Described**, per category, **where they seek/limit AI support**
- We examine these to **understand aspects of SE work**

☞ use it as a lens to **investigate where AI is warranted**

[1] Meyer, A. N., Barr, E. T., Bird, C., & Zimmermann, T. (2019). Today was a good day: The daily life of software developers. *IEEE Transactions on Software Engineering*, 47(5), 863-880.

[2] Kumar, S., Goel, D., Zimmermann, T., Houck, B., Ashok, B., & Bansal, C. (2025). Time Warp: The Gap Between Developers' Ideal vs Actual Workweeks in an AI-Driven Era. *ICSE-SEIP*, 2025

[3] Choudhuri, R., Trinkenreich, B., Pandita, R., Kalliamvakou, E., Steinmacher, I., Gerosa, M., ... & Sarma, A. (2025). What Guides Our Choices? Modeling Developers' Trust and Behavioral Intentions Towards GenAI. *ICSE*, 2025

Task appraisals influence AI adoption

- Higher **Value, Accountability, and Demands** → more openness and use. (H1, H3, H4)
- Strong **Identity alignment** → protective of delegation (less openness) yet use to amplify expertise. (H2)

Higher **Value** tasks

- Heighten attention, but also anxiety
- Devs use AI to complement/increase efficiency, but retain control

Higher **Demands** tasks

- Heighten openness to cognitive aids
- AI used to offload effort-intensive components, maintaining momentum.

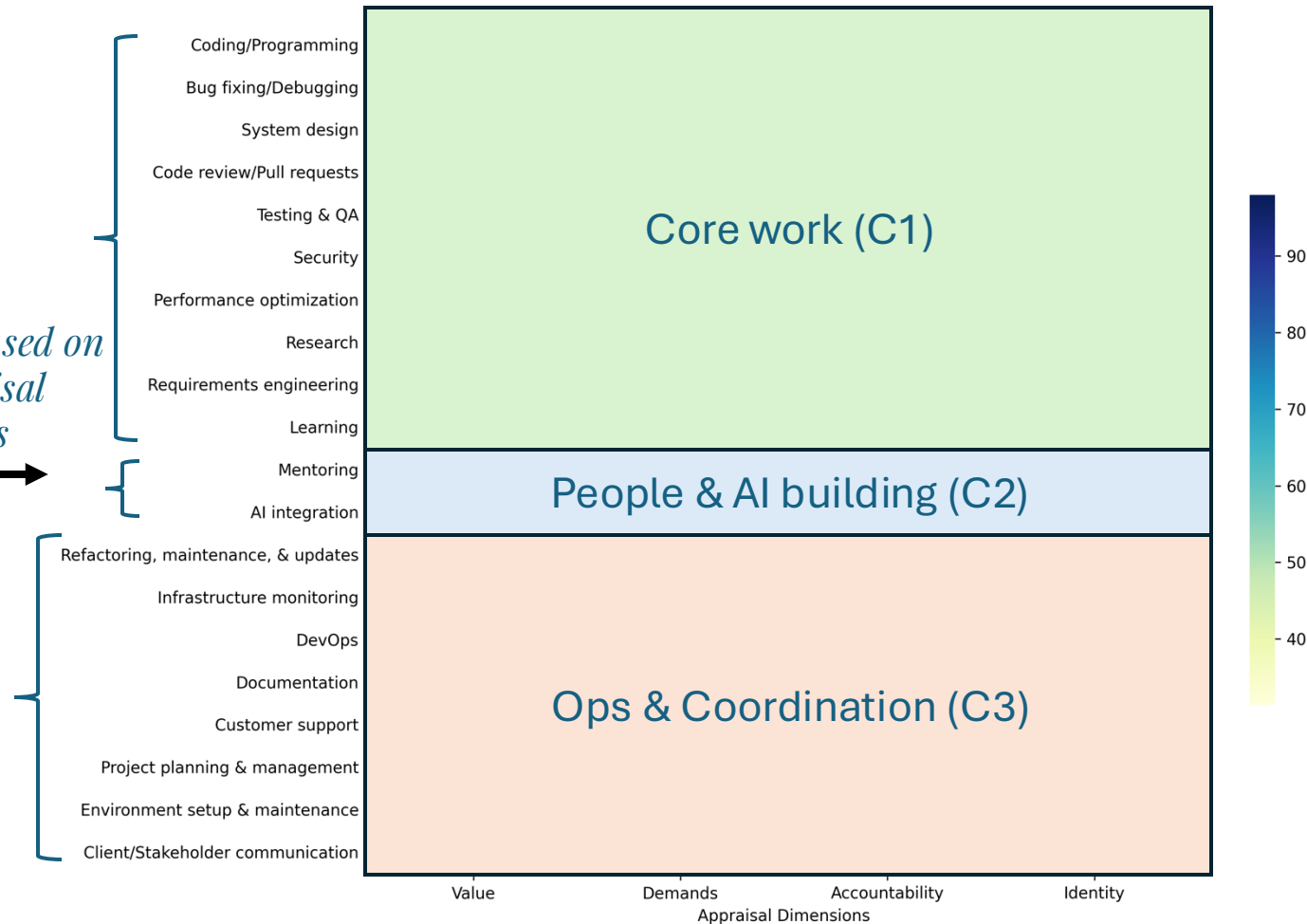
Higher **Accountability** tasks

- Drive reliance on safeguards.
- Reduce tolerance for automation bias; devs demand oversight & control

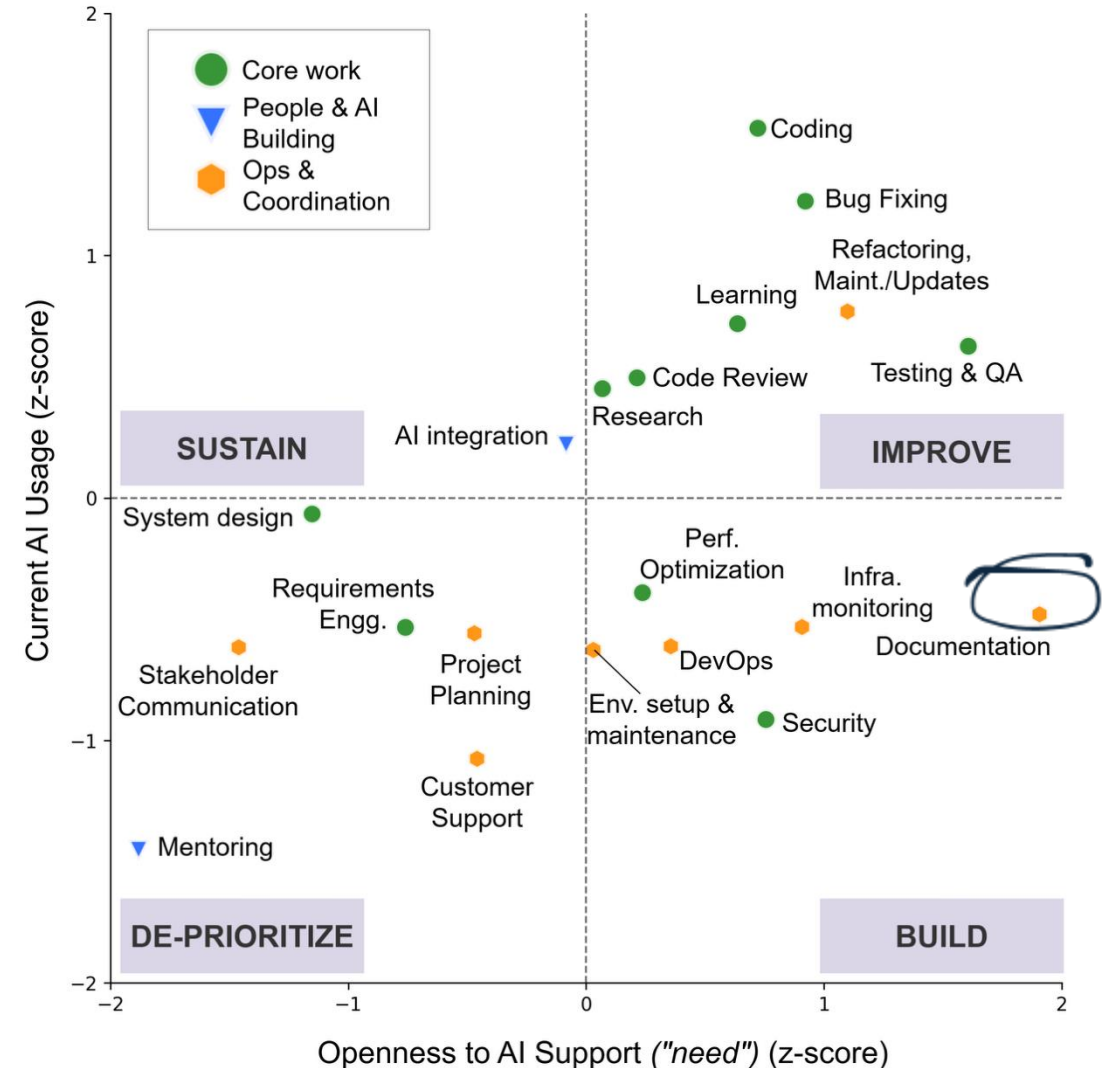
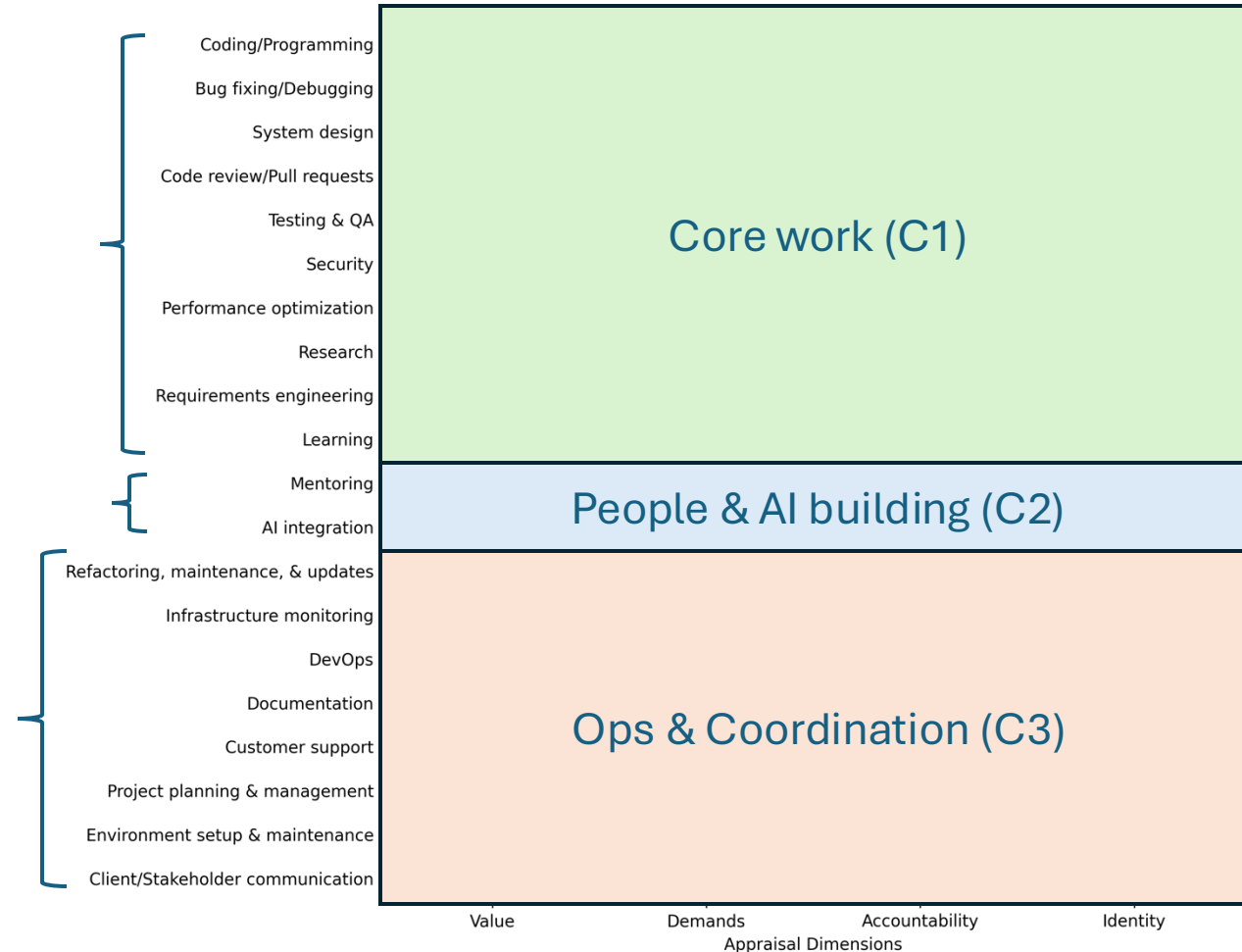
Stronger **Identity alignment**

- Resist delegation
- Yet, use AI where it serves to enact or amplify expertise

*Cluster tasks based on
their appraisal
signatures*

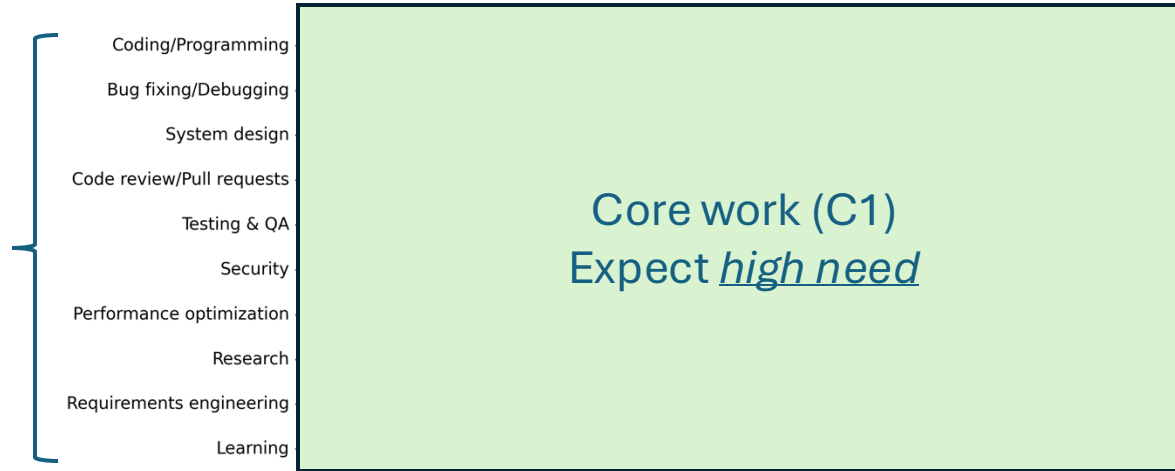


Task appraisals → Need vs Usage



Overview –C1

High value & demands, moderate-high accountability, moderate- strong identity alignment



Seek AI as a **collaborative assistant**:

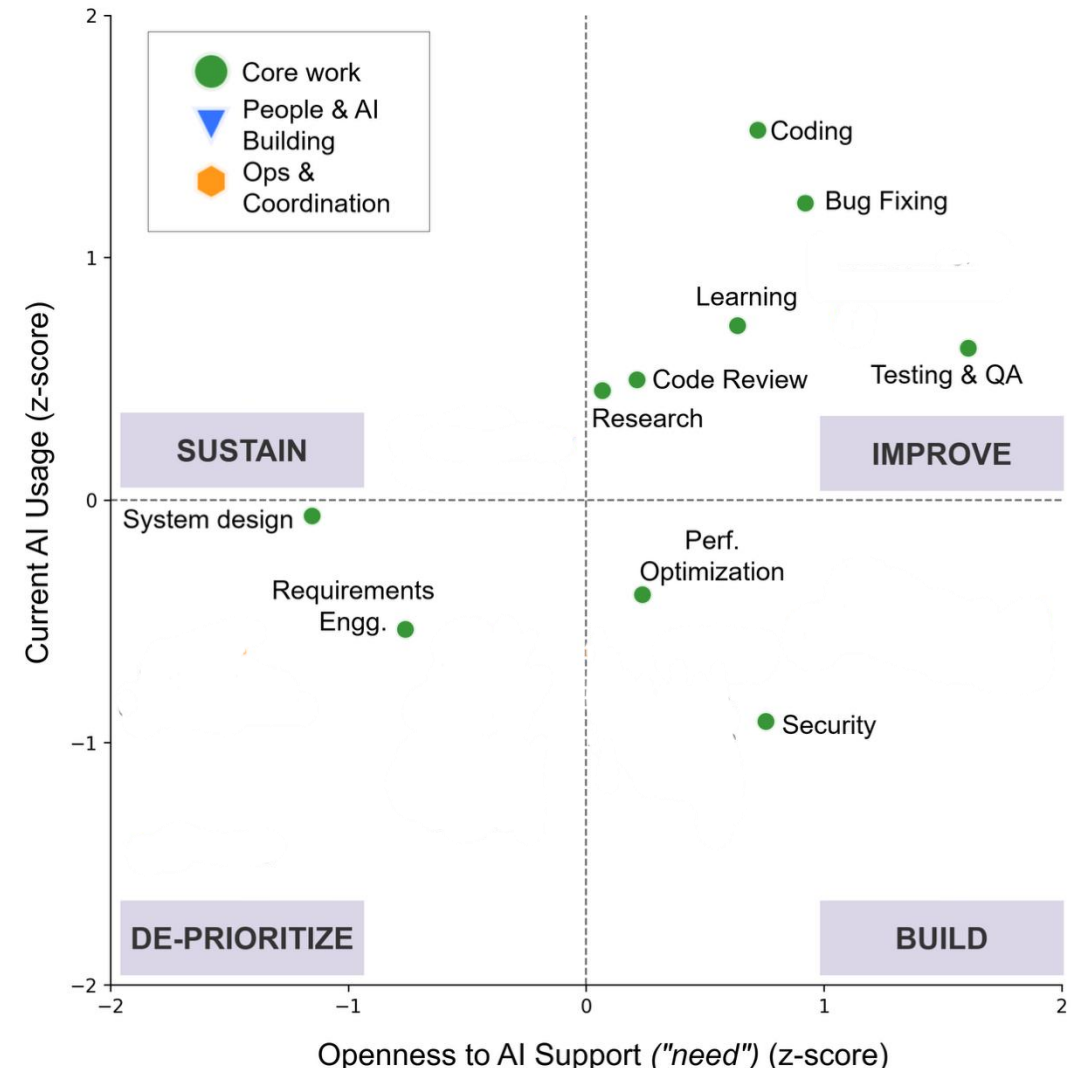
Enhance workflow efficiency, proactive performance and quality assurance, cross-context support, information retrieval and synthesis, scaffold for ideation, learning, & hands-on-practice “The focus should be on AI making ME better at my job” (P213).

Limit AI

Need to **retain oversight & decision control, professional identity and craft**; trust & quality concerns (hallucinations, lack of transparency, maintainability risks), wary of AI handling sensitive data.

“whether to ship something with known limitations or how to communicate a risk to leadership requires context, experience, and responsibility that AI can’t fully grasp” (P301)

Capability gaps & contextual misfit: “These decisions require deep domain knowledge and long-term vision that only experienced engineers can provide” (P213).



Overview – C2

*Moderate value & demands, moderate-high accountability, **strong** identity alignment*



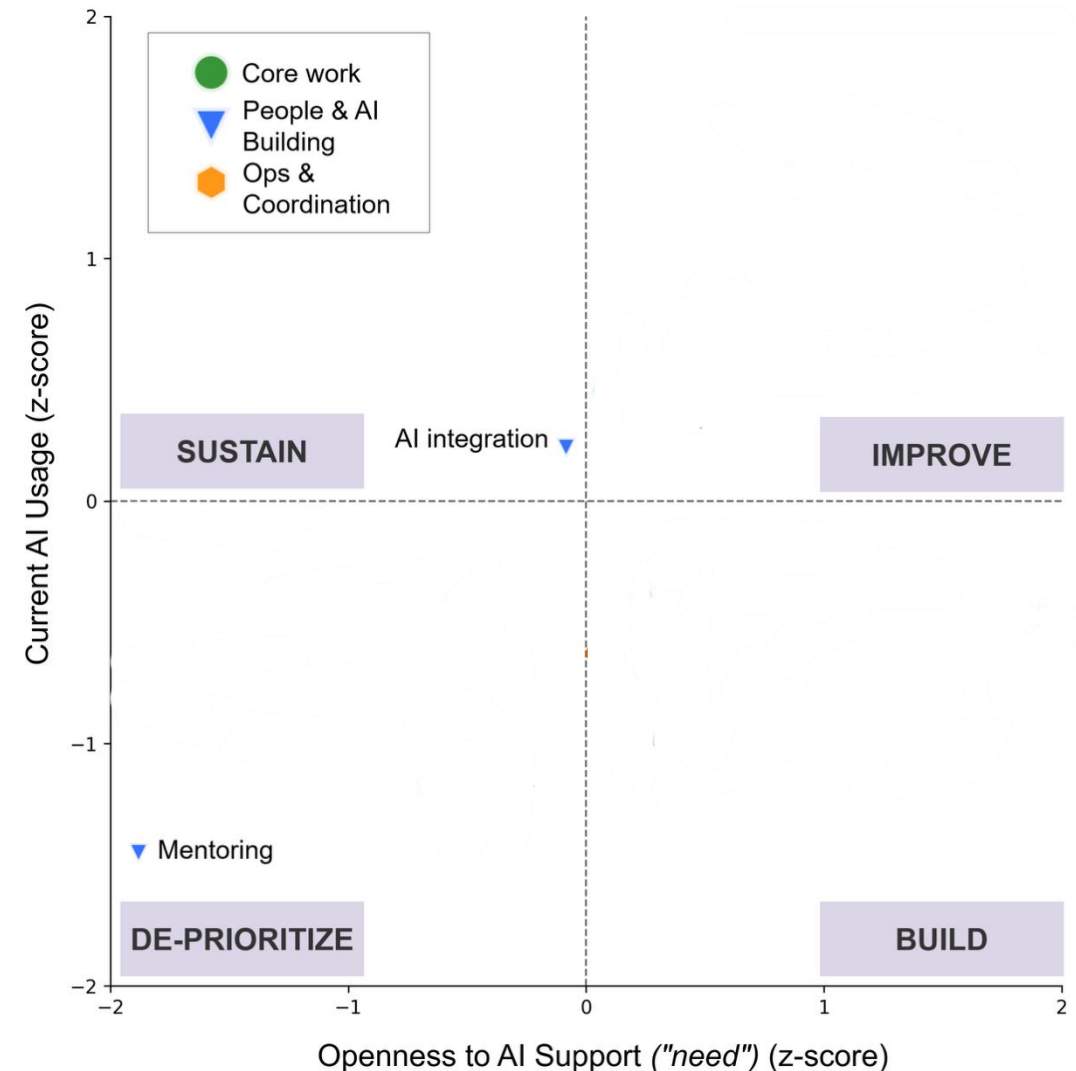
Limit AI *to preserve identity, relations, and craft.*

AI integration is intrinsically fun,

“I don’t want AI to handle AI development, as it brings satisfaction to my work and requires craftsmanship” (P285)

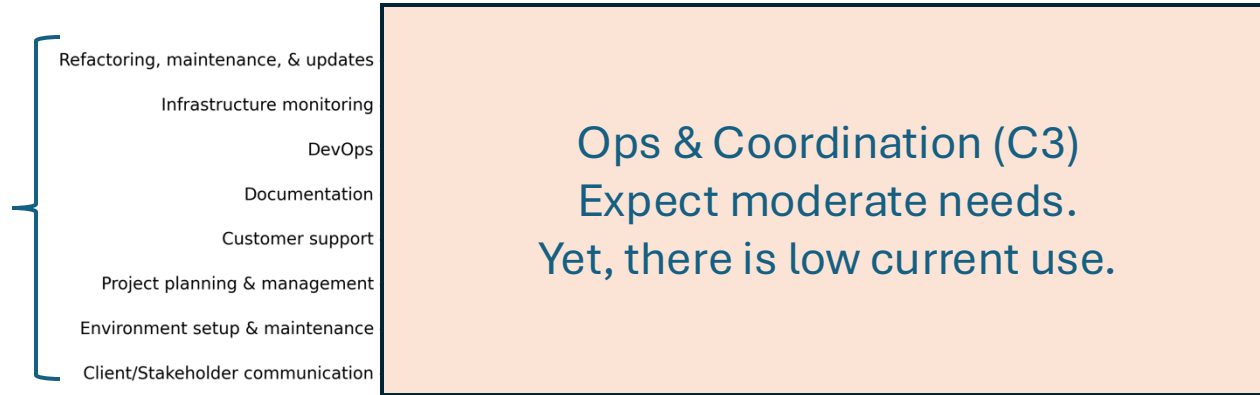
Mentoring is deeply interpersonal, AI misguidance harm mentees, seen as a personal growth opportunity.

“Mentoring someone teaches the mentor as well...humans need to do these activities to grow themselves” (P228)



Overview –C3

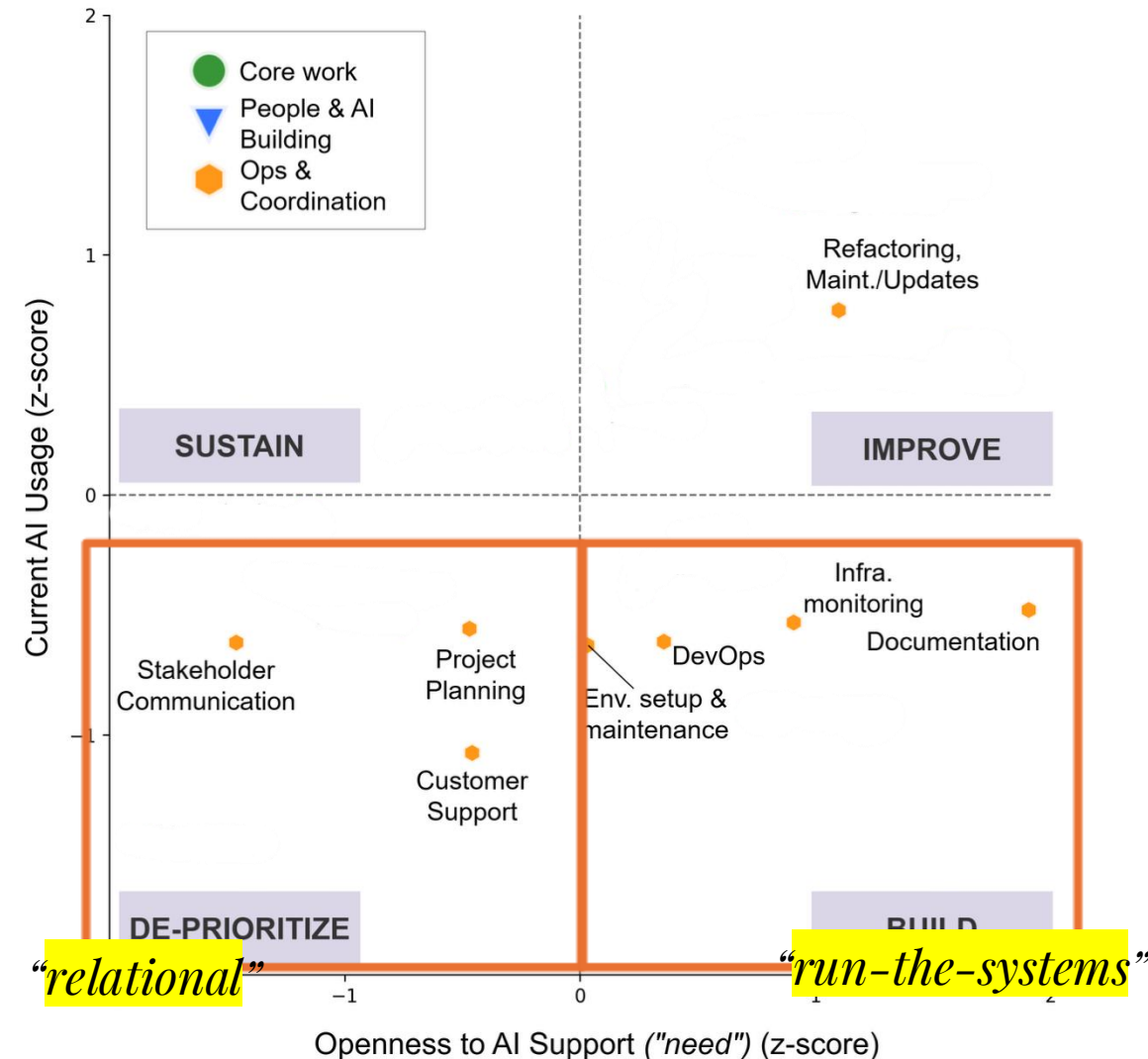
*Moderate-high value, demands, & accountability, **weak** identity alignment*



“run-the-systems” needs assistance for well-scoped tasks, but Trust, quality, and transparency issues and/or the lack of tooling hinder adoption. Devs want help **iff** AI deterministic, verifiable, and preserves human-gated change.

“relational” intuition, authenticity, empathy, & vision are not automatable → AI should stay backstage (summarizing, reviewing, scheduling), while **“humans hit send”** (P47).

Over-automation: “Engineers still need to learn how things work...I want AI to guide and assist engineers, not replace them or leave juniors without a pathway to operational knowledge” (P16) .



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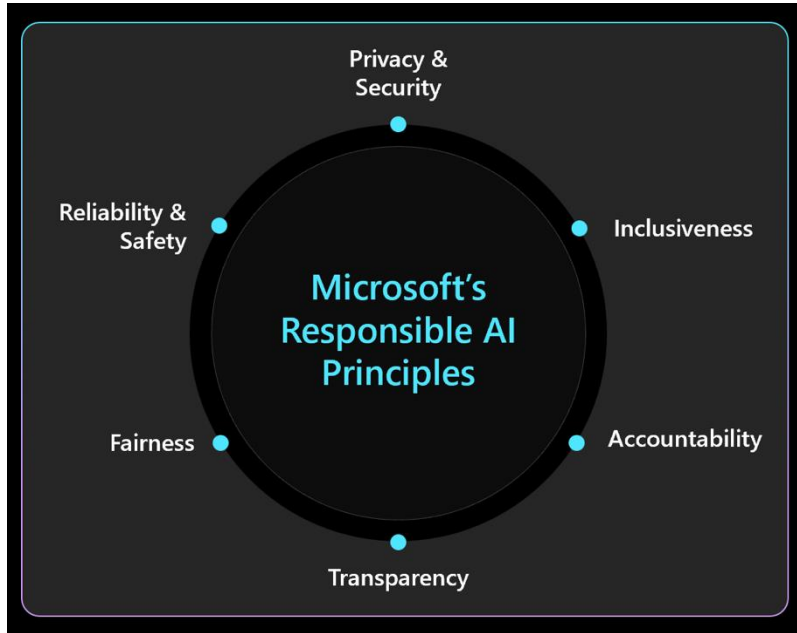
RQ2: What design features do developers want in AI
NOW to **responsibly** support SE?

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We made devs choose any 5/8 RAI principles

they considered most important for current AI-based tooling support in SE task categories

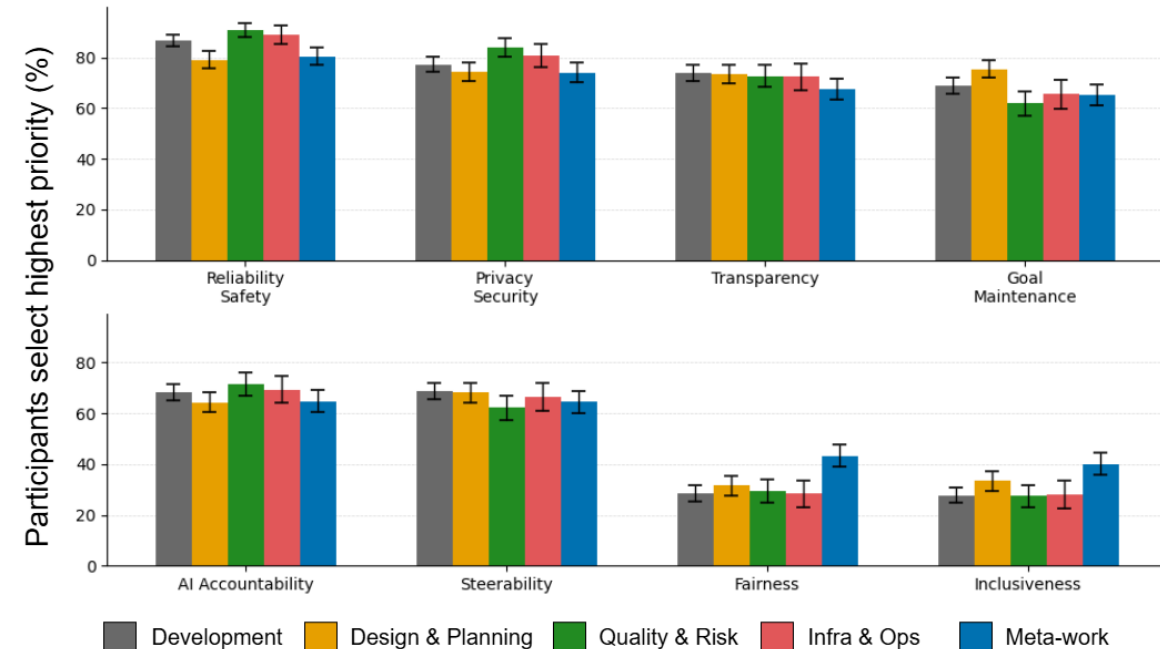
Our list had 6 RAI principles from MSFT:



And, widely emphasized:

- Goal maintenance (alignment)
- Steerability (user agency)

“Surely all of them are important but at which stage? Right now, the basics aren’t even done well, so those 5 that are basic I selected” (P43)



Interpretation guideline: These findings are participant preferences under a forced-choice design. These inform context-sensitive RAI choices in SE tooling, but do not prescribe policy or a specific course of action. **All RAI principles remain essential.**

Overview: How do priorities vary across tasks?

Systems-facing (development, infra/ops, quality/risk)

Reliability & Safety + Privacy & Security

- AI errors don't "net to zero"
- One privacy slip & trust collapses

Transparency

- Verify assumptions, justify (or revise) outputs

Goal Maintenance+ Steerability

+ AI Accountability

- AI chases tangents that causes rework
- Affordances to steer AI & trace errors

"AI MUST BE correct for it to be useful. Incorrect AI may as well be throwing spaghetti at a wall—it's more work to fix it" (P83)

"I feel accountable for my work, so I feel accountable for what AI has done. I want outputs to explain why a certain action was taken." (P36)

"...When it gets lost, it's hard to put it back on track and/or tell where it went wrong... I start new chats, which is frustrating, losing progress because the context is gone" (P495)

Design & Human-facing (design/planning, meta work)

"Creativity of AI is important; I'm willing to tolerate errors" (P180)

"Inclusiveness & fairness of AI features should be baked into design planning from the start...it needs a grasp of business requirements and diversity of audiences" (P653)

Tolerate lower reliability but need stronger alignment

- Creativity outweigh deterministic behavior

Inclusiveness + Fairness

- Broaden perspectives
- Avoid bias in collaborative/client-facing tasks

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“What does this tell me?”

Implications

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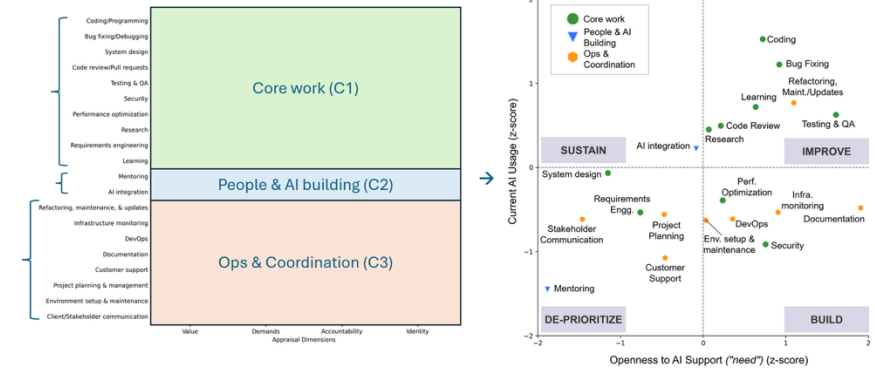
Future of Meaningful Work in SE with AI

Recall: value-aligned developer-AI collaboration.

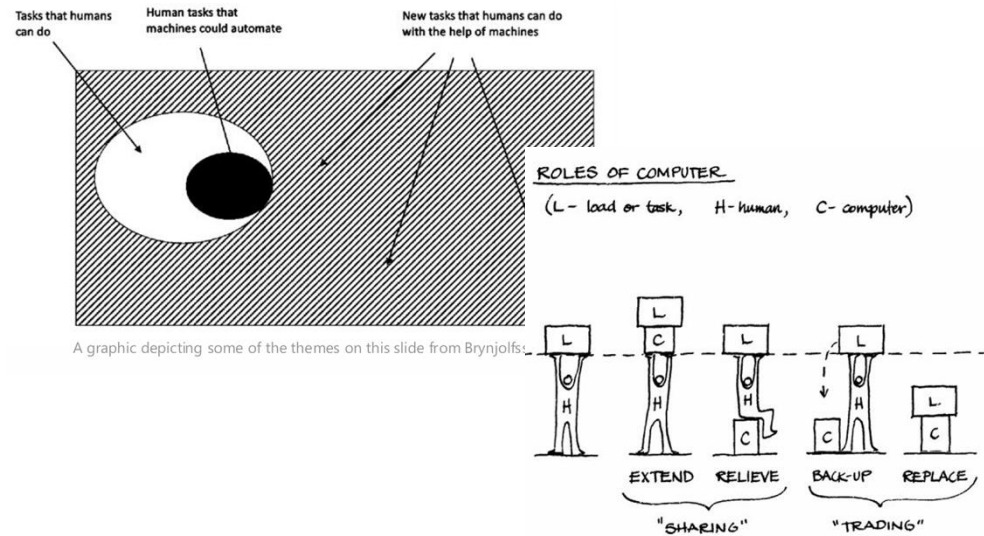
Design & Integrate AI to solve wicked problems, but ALSO

- Complement developers in their role responsibly
- Amplify the values that make work meaningful
 - To foster productivity, work quality, appropriate trust and use of AI

Task appraisals → Need vs Usage



Automation Innovation is key if done responsibly.



Distribution of task-load between humans and computers/automation (Sheridan & Verplank 1978)

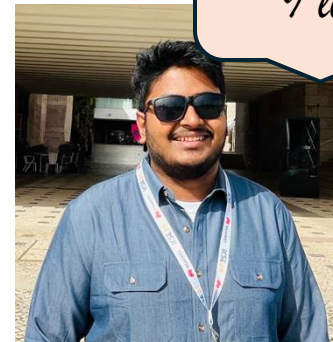
With AI, you can do (more) things (faster), that you couldn't before. Our:

- Devs want AI to be a cognitive collaborator on core work
 - Let them shift to higher-order knowledge work, BUT
 - Retain oversight (Transp./Provenance), security, decision control/agency, and craft
- Devs de-prioritize AI in aspects related to relational depth, and/or personal growth
 - Use AI as a peripheral scaffold here, at best
 - Avoid bias/exclusionary nature of AI. Fair and inclusive AI is key.
- Devs don't want straight out toil automation, toil shifts but never dies
 - Over-automation erodes intuition & skills
 - Focus on making AI a reliable, safe, and context aligned assistant to help out

OneNote-worthy team:



*Thanks peeps!
I'll miss you all*



THANK YOU!

QUESTIONS? *Ask copilot choudhru@oregonstate.edu*



The work will be shared here!

