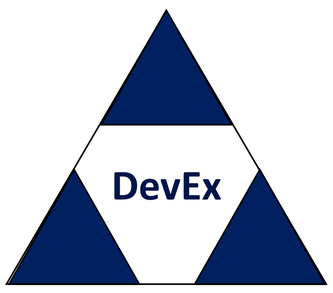
# Interactions with Generative AI: Wearables to Measure Developer Experience and Productivity Objectively

## Underlying Framework: The Core Dimensions of Developer Experience (DevEx)

**Flow state**
- Optimal state of productivity




**Feedback loops**
- Feedback from tools or people

**Cognitive load**
- Amount of mental processing required to perform a task


[1] Noda, A., Storey, M. A., Forsgren, N., & Greiler, M. (2023). DevEx: What Actually Drives Productivity: The developer-centric approach to measuring and improving productivity. *Queue*, *21*(2), 35-53.

[2] Forsgren, N., Kalliamvakou, E., Noda, A., Greiler, M., Houck, B., & Storey, M. A. (2023). DevEx in Action: A study of its tangible impacts. *Queue*, *21*(6), 47-77.


## Is Perceived Cognitive Load Reflected in Objective Physiological Activity?

Study 1

Research conducted at SAP Newport Beach, US


**Everyday work environment**

**Subjective** experience

**Objective** physiological activity

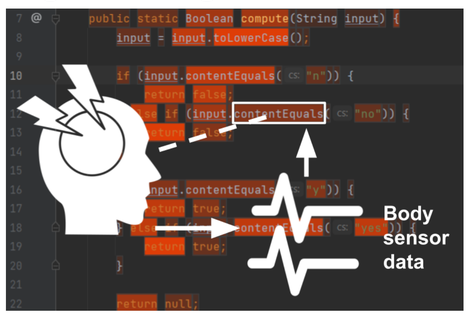

[3] Brandebusemeyer, C., Schimmer, T., Arnrich, B. (2025). Wearables to measure developer experience at work. In *IEEE/ACM 47th International Conference on Software Engineering: Software Engineering in Practice (ICSE-SEIP),* (pp. 23-33).


## How high is Cognitive Load During the Interaction with Code?

Study 2

Research conducted together with Fabian Stolp and master students at SAP Innovation Center Potsdam, SAP Berlin and SAP Signavio, Germany

**CognitIDE Plugin**




**Tasks**

- Writing code
- Debugging code
- Documenting code
- Write a text e.g. email

**Body sensors**


Eye-tracking

Brain activity

Heart activity, electrodermal activity & skin temperature


[4] Stolp, F., Stellmacher, M., & Arnrich, B. (2024, July). CognitIDE: An IDE plugin for mapping physiological measurements to source code. In *Companion proceedings of the 32nd ACM international conference on the foundations of software engineering,* (pp. 592-596).

[5] Stolp, F., Brandebusemeyer, C., Hradilak, F., Kursawe, L., Menger, M., Sauerwald, F., Arnrich, B. (2025). Using CognitIDE to Capture Developers' Cognitive Load via Physiological Activity During Everyday Software Development Tasks. In *2025 IEEE/ACM Second IDE Workshop (IDE),* (pp. 46-51).


## How Does the Interaction With Generative AI Affect a Developer?

Study 3

Research conducted at SAP Newport Beach, US

Cognitive load

Code quality

Work satisfaction

Productivity

**Developer** ⟷ **GenAI**

**Data from…**

- Physiological activity
- Questionnaires
- Screen recording (• REC)
- Code metrics


[6] Brandebusemeyer, C. (2025). Interactions with Generative AI: Wearables to Measure Developer Experience and Productivity Objectively. In *IEEE/ACM 47th International Conference on Software Engineering: Companion Proceedings (ICSE-Companion),* (pp. 148-150).


## Research Objectives

- Improve software developers' developer experience in firms by considering especially their cognitive load induced by working tasks and, more specifically, their cognitive load during the interaction with Generative AI (GenAI) tools
- A holistic mixed-method, real-life, developer-centered approach by considering objective, continuous physiological measures together with subjective self-reported experiences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Poster and Publications

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