Context in Programming: An Investigation of How Programmers Create Context

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Context affects how we see a problem

Campus map showing 5 architectural buildings.

Banner ad for ‘life’
Context affects how we see a problem

“New Vaccine Contains Rabies”

CDC releases Great New Vaccine OR CDC Fails to Maintain Standards
Context in Programming

Based on the context

• Interpret code differently

• Relevancy of artifacts vary

• Interactions vary
Context, so far…

• **Representational** view:
  [Abowd et al. 1999]
  - stable
  - artifacts
  - tasks
  - environmental factors

WHO?    WHAT?

WHEN?    WHERE?

[Gasparic et al. 2017, JSS]
• **Interactional** view:
  [Dourish 2004]
  • dynamic
  • relational property
  • objects or activities
  • vary for each activity

*Why do developers do what they do?*
Methodology
Task and Participants

Task

**Traffic Simulator App**
[Mangano et. al 2012]
- Design & Implement
- Simulate a traffic signal

Participants

6 Graduate students
- Professional Development Experience
- Think aloud
Data Collection and Processing

Screen Capture → Transcribe & Unitize

Activities

Artifacts

[Wang, 2017]
Results
Artifacts span heterogeneous medium

**Activity**

*Snapshot:*

Participant was trying to **build data structure** for the cross-roads

**Artifact**

\[ \text{time} \]
Artifacts span heterogeneous medium
When defining context (and how it is built), we need to also consider artifacts that are outside the IDE.
**Snapshot:**
Participant added new feature “toggle”, which required updating the code.
Activity guides interaction

Even in the same artifact, activities and their interactions vary.
Activity guides interaction

**Snapshot:** Participant wants to implement “draggable” function in JavaScript
Activity guides interaction

What we find **now**, sets the **context** for what we do **next**.
Evaluation-Reflection Loops

Long scrolling, highlighting

EVALUATION

STACK OVER. 1

FILE .JS

TERMINAL

O/P

FILE .JS

STACK OVER. 1

VIEW WEB

VIEW WEB

CODE

RUN

CODE RUN

VIEW WEB

CODE

Various personal styles
Summary

• Artifacts span heterogeneous medium

• Activity guides interaction

• Activity and interaction guide future activity

• Occurrence of Evaluation-Reflection Loops
Future Directions

• How developers **decompose their task**

• How developers **reflect on prior tasks**

• Patterns that emerge
  • **Problem solving stages**
  • **Types of task**
Summary

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