Presented at:

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Now presenting at:

SFSCON25
Bolzano, Italy

Towards Understanding Visualization Impedance Mismatch

A talk by Vannuccini Luca

Authors:
Vannuccini Luca,
Janes Andrea

Presentation Outline:

- Introduction And Motivation
- Objectives Of The Study
- Approach
- Outcomes And Solution
- Future Work

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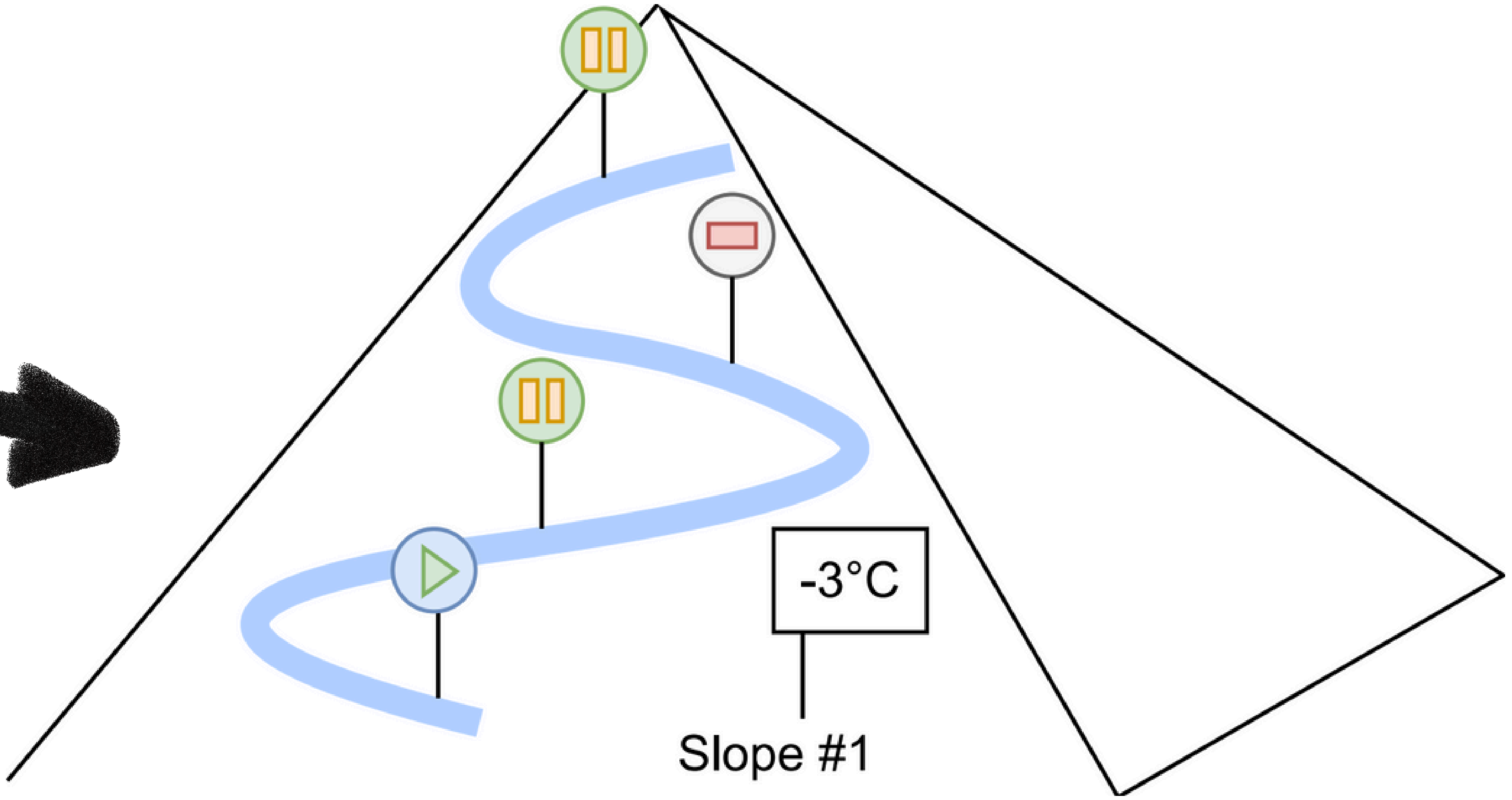
Case Study

Image generated by AI (OpenAI, 2025)



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What are the root causes?

(Simplified)

Primary causes

Role of UI patterns

Developers struggle to create “good” UIs?

Challenges

Detect UI/UX problems

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Problems

Confusion

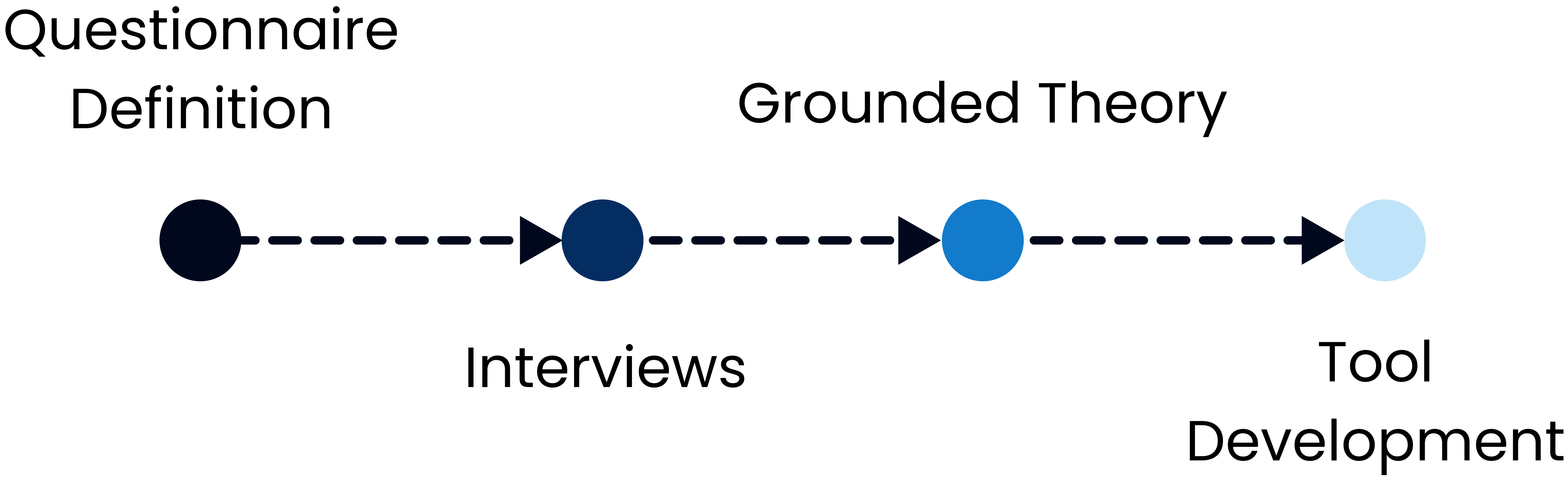
- Complexity
- Ambiguity

Frustration

- Slow understanding
- Impatience
- Low-quality feedback

Abandonment

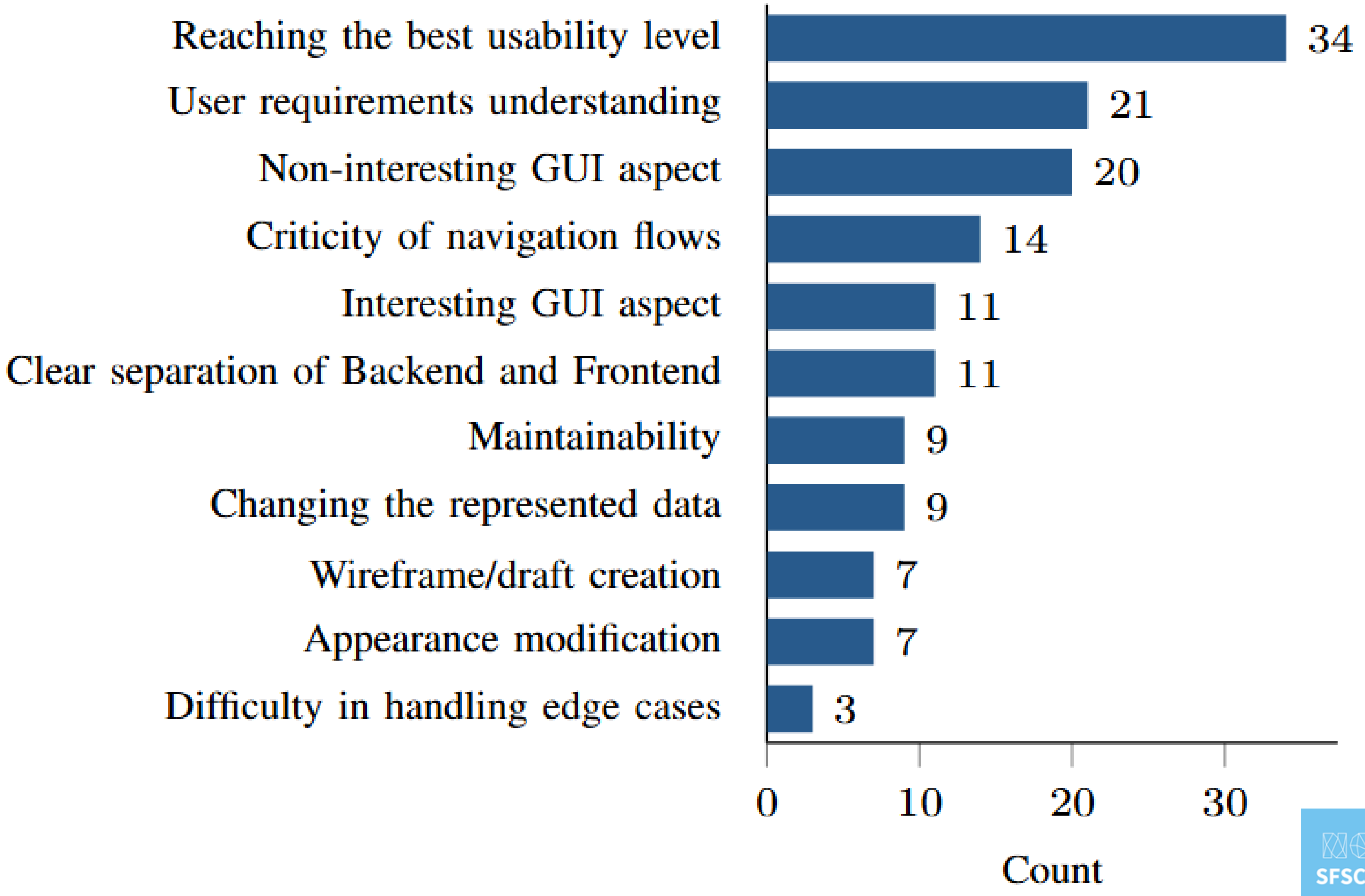
- Abandonment
- Disengagement


Questionnaire Definition
Interviews
Grounded Theory
Tool Development

Grounded Theory - Outcomes

Analysis

- Open coding,
- Axial coding, and
- Selective coding



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What is a pattern?

"...UI patterns are described as generic solutions (with multiple possible implementations) for recurrent GUI design problems..."

(Moreira, Paiva, Nabuco, & Memon, 2017)

Source: https://onlinelibrary.wiley.com/doi/abs/10.1002/stvr.1629

Extracted Patterns

- Immediate Visual Feedback
- Error Feedback
- Action Completion Tracking
- Contextual Messaging
- Confirmation
- Progress Indicator
- Autocomplete and Suggestion
- Error Prevention
- Success Feedback
- Decision Support
- Highlight Recent Changes
- Contextual Help
- Smart Search
- Logical Navigation
- Customisation

Error Feedback Pattern

- Identifies points where users frequently make mistakes
- Vague error messages → Repeated errors → User frustration
- Based on user and global preference thresholds

Tool classifies:
✅ Pattern implemented (error consistency < 80%)
🔴 Critical points for specific user class (error consistency for target ≥ 80%)
🔴 Critical points (error consistency ≥ 80%)

Customisation Pattern

- Detects frequent configuration repetitions by users
- Repeated choices → Missing personalization
- Based on user and global preference thresholds

Tool classifies:

✅ Pattern implemented (user consistency < 80%)
🔴 Personal default suggested (user consistency ≥ 80%)
🔴 Global preset suggested (≥ 51 % of users select the same value)

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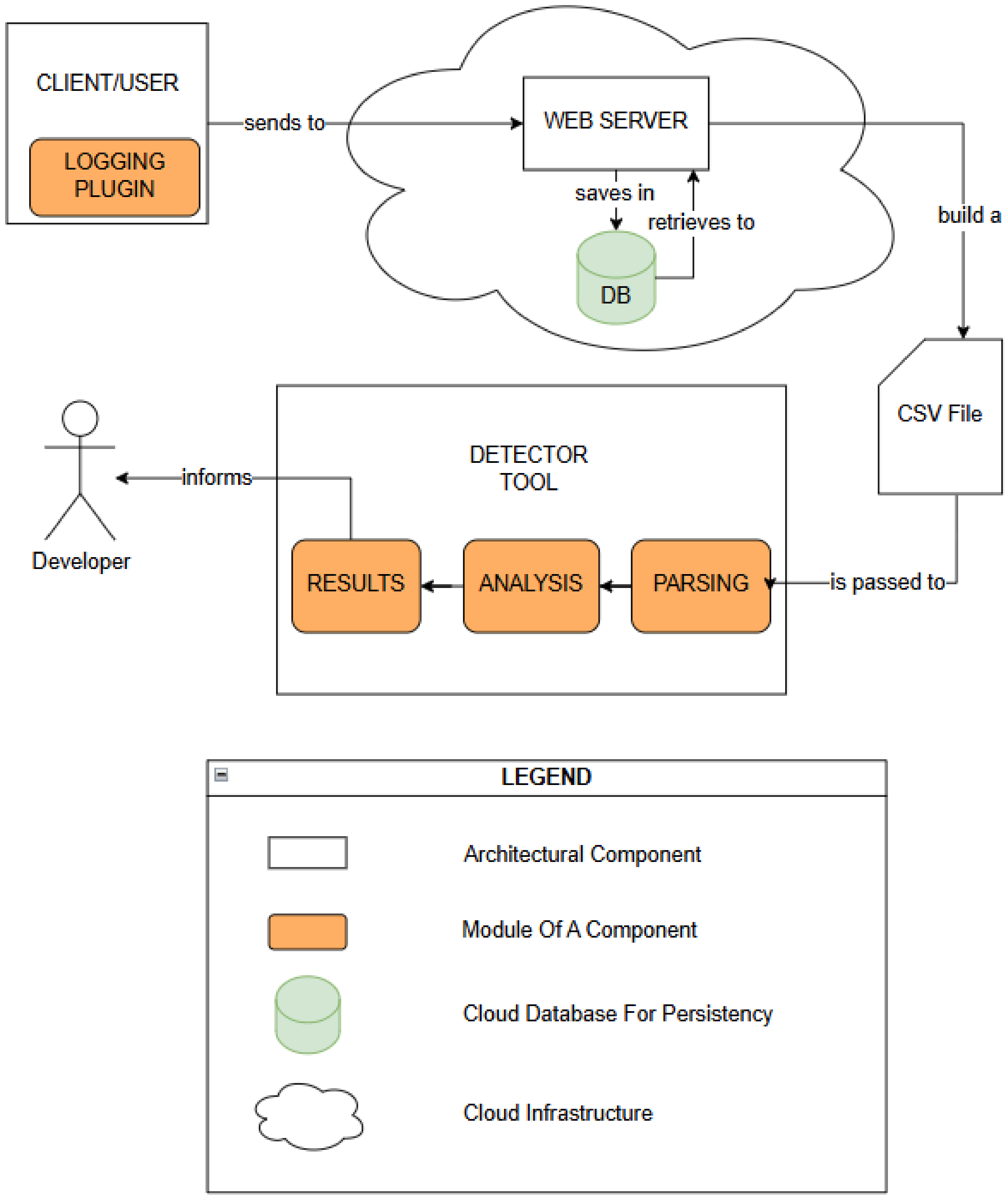
Example Tool



GitHub Link

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Future work

The next step to further enhance the research is:

- To conduct experiments to validate the effectiveness of the identified patterns in practical settings

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Thank you

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Q&A

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