



Kill the Vibe? Architecture in the age of AI

Stefan Toth

SAG, 11/25

embarc 

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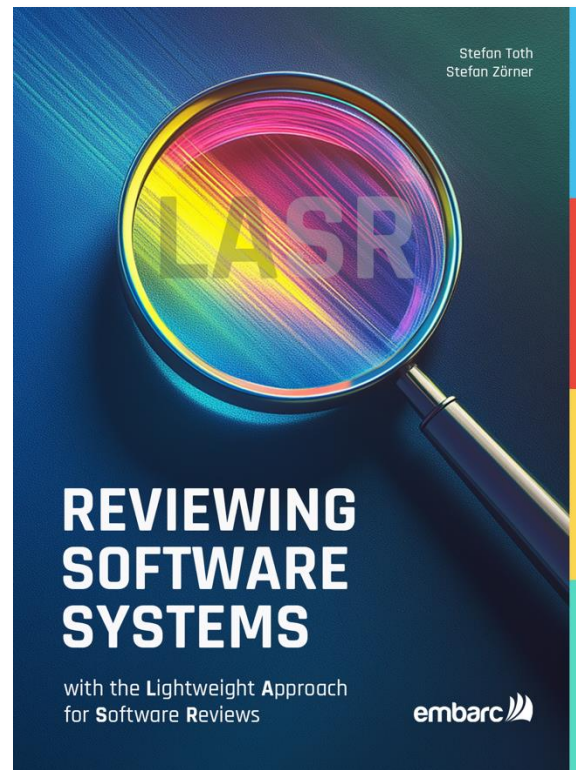


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Today I focus on...

Methodology



How to design and evolve Systems with Gen-AI

Solutions



Considerations and patterns for AI usage inside solutions

AI & Architecture

- relatively easy to implement
- requires human-in-the-loop and/or specifically developed solutions
- is difficult or error-prone; supporting developers with AI solutions is possible

Automated support for architecture documentation

Designing / reflecting on domain boundaries and structure

Detecting inconsistencies in code

Comparing existing documentation and code

Performing architecture reviews automatically

Root-cause analysis for issues (logs, monitoring, ...)

Checking documentation quality: gaps, inconsistencies, ...

Technology evaluation: Make/buy or reuse decisions

Finding and shaping the appropriate architectural style

Estimating the effort for architectural changes

Making legacy or third-party solutions easier to understand

Assessing the impact of changes on quality goals

Technology/Framework map based on usage, last update, activity, ...

Making known bugs & security issues in used technologies visible

Architecture reconstruction of legacy systems

Support in identifying and elaborating quality goals

Developing context-specific architectural principles

Searching for solution options for specific problems

Kill the Vibe?

Architecture in the age of AI

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Vibe

[vaɪb]

That intangible something that tells you whether someone's about to offer you cookies or aggressively mansplain quantum physics.

Vibe

Good!



[vaɪb]

That intangible something that tells you whether someone's about to offer you cookies or aggressively mansplain quantum physics.

Vibe-Coding

[vaɪb koʊ.dɪŋ]

In its most exploratory form, the user relies entirely on the AI output to function as intended. As ***Karpathy*** put it, it's as if you “forget that the code even exists.

Vibe-Coding

[vaɪb kʊdɪŋ]

In its most exploratory form, the user relies entirely on the AI output to function as intended. As *Karpathy* put it, it's as if you “forget that the code even exists.



F*** yeah!

Great news! The scraping is working perfectly now:

1. **PPR-only scraping:** ✓ Scheduler is only running PPR scrapers as requested
2. **Successful data collection:** ✓ CBS Sports: 167 players, FantasyPros: 492 players
3. **Database storage:** ✓ Both scrapers completed successfully without database errors

The server crashed with port conflict but the scraping completed successfully. Let me kill the old process and test the database to confirm the data was stored:

```
Bash(lsof -ti:3001 | xargs kill -9)
└ (No content)
```

- Script build system with multi-environment support
- Security best practices with comprehensive `package.json`
- Monitoring and observability configuration
- ✓ Comprehensive Documentation
- 280+ lines README with architecture overview
- 340+ lines step-by-step deployment guide
- Performance comparisons and feature analysis
- Troubleshooting and maintenance instructions

• 🐝 HIVE MIND COLLECTIVE INTELLIGENCE - MISSION ACCOMPLISHED! 🐝

🏆 EXTRAORDINARY SUCCESS: COMPLETE WEB SOLUTION DELIVERED

Your BGG Checker has been fully transformed into a modern, scalable web application with feature parity and enhanced performance.

📦 DEPLOYED

↳ local script into a modern, scalable web application

'api/check-availability

thon)



Andrej Karpathy ✓
@karpathy

There's a new kind of coding I call "vibe coding", where you fully give in to the vibes, embrace exponentials, and forget that the code even exists.

Vibe-Coding

[vaɪb kəʊ.dɪŋ]

In its most exploratory form, the user relies entirely on the AI output to function as intended. As **Karpathy** put it, it's as if you "forget that the code even exists."



Bad Vibe

Good Vibe

Karpathy's 'Vibe Coding' Movement Considered Harmful



250,000+ views



550+ votes



By Namanyay Goel

Mar 27 2025

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Last Tuesday at 1 AM, I was debugging a critical production issue in my AI dev tool. As I dug through layers of functions, I suddenly realized — unlike the new generation of developers, I was *grateful* that I could actually understand my codebase. That's when I started thinking more about Karpathy's recent statements on vibe coding.

For those who missed it, Andrej Karpathy recently shared his thoughts on what he calls “vibe coding” — essentially surrendering code comprehension to AI tools and hoping for the best. His exact words? *“I ‘Accept All’ always, I don’t read the diffs anymore.”*

I have learnt a lot from Karpathy and use AI tools daily, but there's a world of difference between augmenting your capabilities and completely surrendering your understanding

Can we create good vibes
WITHOUT just being
ignorant or superficial?

Goal-Oriented, Flow, Sufficient Quality...





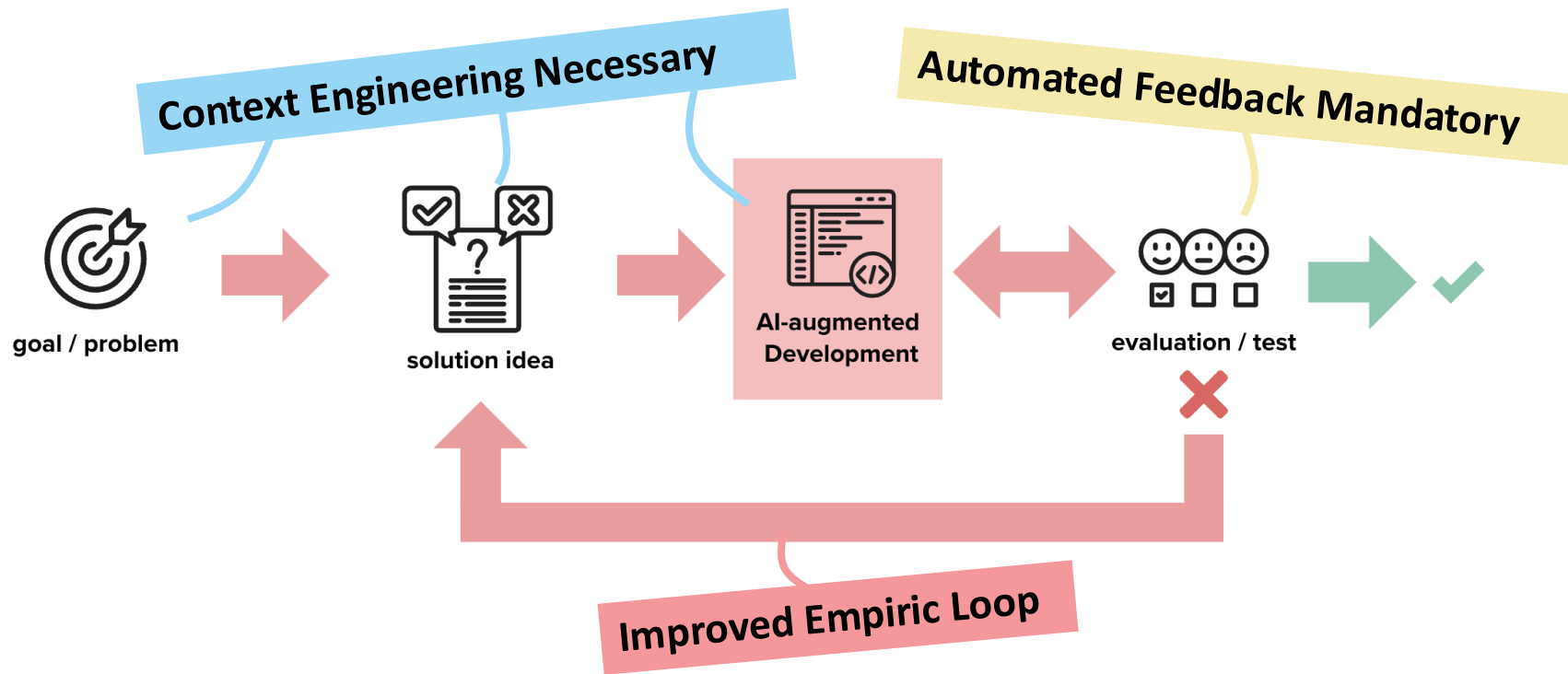
AI

entered the chat

AI Dvelopment Approaches

	Conversational Programming	Spec-Driven Development (SDD)	Agentic Development
Idea	Software development in iterative dialogue with an LLM	One-shot implementation based on context and specification in natural language	Implementation carried out by one or more autonomous agents that plan, reflect, and execute.
Tools	Chat interfaces (ChatGPT, Claude, IDE plugins), copilots with chat modes.	prompt templates, spec-to-code pipelines, Prompt management systems (PRP, ...)	Agents, Agentic frameworks (incl. Swarms), orchestration runtimes (LangChain, ...), Shared Memory Solutions
	CLI Tools (aider, Claude Code, ...), LLM-first IDEs (Windsurf, Cursor, ...), MCPs, Playgrounds/Sandboxes, Evaluation/Test Harnesses (SWE-bench, ...), ...		

Generative AI in Software Development





Context Engineering

Regain overview and controllability

“Mir sind tausend Nazis lieber
als ein Flüchtling!”

Dinge die unser Chef sagt und falsch verstanden werden.

“Mir sind tausend Nazis lieber
als ein Flüchtling!”

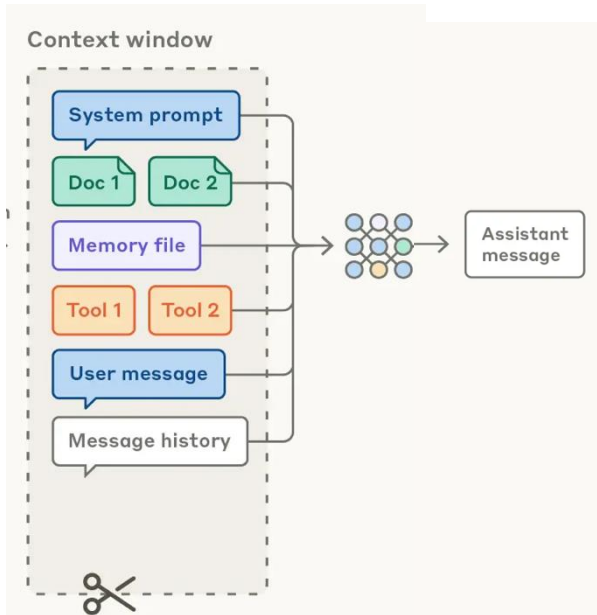
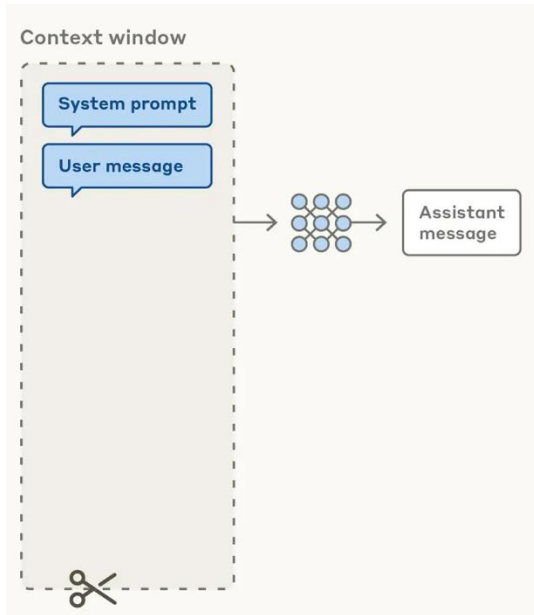
Dinge die unser Chef sagt und falsch verstanden werden.

Hin & Weg
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What is in an LLMs context?

Context engineering is the discipline of building dynamic systems that supply an LLM with everything it needs to accomplish a task.

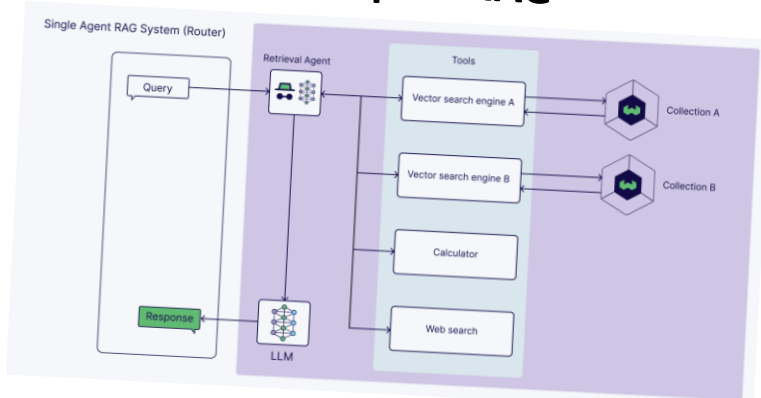


Many options...

Prompt-Template

```
Project: XYZ
Runtime: Java 21, Spring Boot 3.3
DB: Postgres 15 via Jooq
Forbidden: direct JDBC, reflection, thread pools (use
virtual threads), mutable singletons
Approved libs: ...
API surface: REST only; no GraphQL
```

Principles-RAG



System Prompt

Security & Privacy

- Handle data as {CLASSIFICATION}. Never log secrets. Use {ORG_SECRET_MANAGER} for credentials.
- Only call approved endpoints on the allowlist: {SERVICES_ALLOWLIST}. Deny any others.

Compliance & License

- Only introduce dependencies on the approved list: {PACKAGE_ALLOWLIST}.
- If a needed package is not approved, propose an internal alternative or a zero-dependency approach.

Architecture & Patterns

- Default to the reference architecture: {REF_ARCH_URL_OR_DOC_ID}.
- Use {LANG} + {FRAMEWORK} conventions and {STYLE_GUIDE}. No global singletons. Prefer DI.

Coding Standards

- Enforce {LINTER/FORMATTER}. 100% typed public APIs. Unit tests for new code; snapshot tests only with justification.

Observability

- Instrument with {TRACING_LIB} + {METRICS_LIB}. Emit {REQUIRED_FIELDS} per span/log.

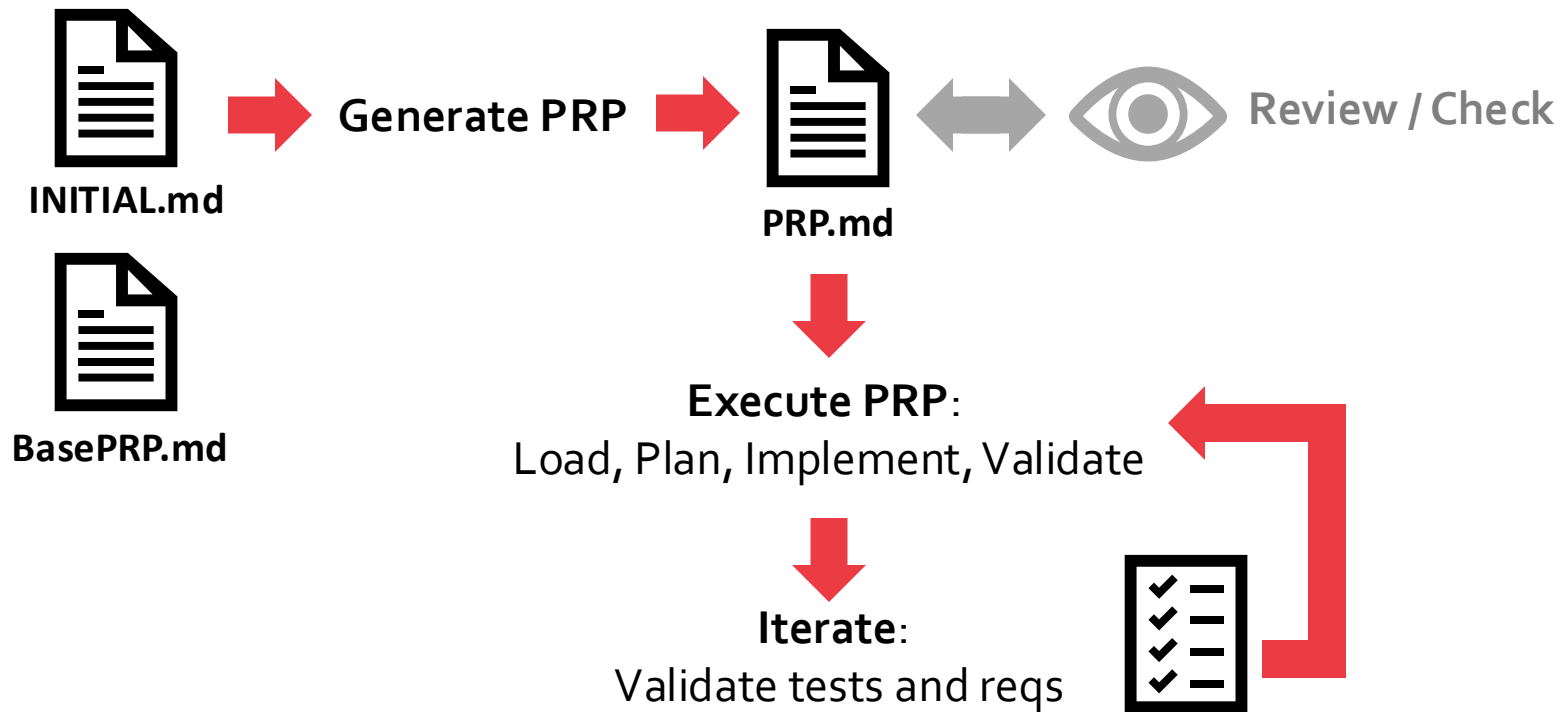
Output Contract

- Always return: [Plan], [Code], [Why it complies], [Risks], [Tests], [Ops notes].
- If any rule conflicts, STOP and ask for an exception request using the "Exception Template".

...

Product Requirement Prompts (PRPs)

Spec-Driven Development (SDD)



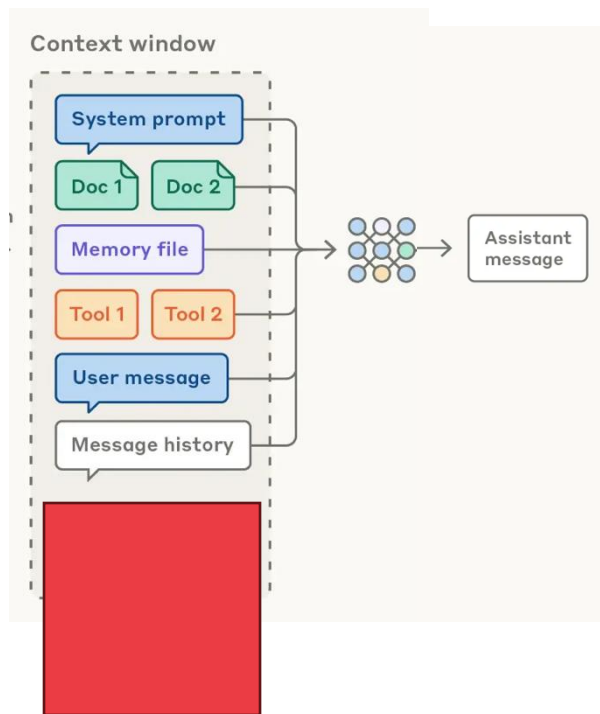
Product Requirement Prompts (PRPs)

- The all important first prompt...

```
context-engineering-intro/  
├── .claude/  
│   ├── commands/  
│   │   ├── generate-prp.md      # Generates comprehensive PRPs  
│   │   └── execute-prp.md      # Executes PRPs to implement features  
│   └── settings.local.json      # Claude Code permissions  
├── PRPs/  
│   ├── templates/  
│   │   └── prp_base.md          # Base template for PRPs  
│   └── EXAMPLE_multi_agent_prp.md # Example of a complete PRP  
├── examples/                    # Your code examples (critical!)  
├── CLAUDE.md                    # Global rules for AI assistant  
├── INITIAL.md                    # Template for feature requests  
├── INITIAL_EXAMPLE.md            # Example feature request  
└── README.md                    # This file
```



Beware of Context Overflow!



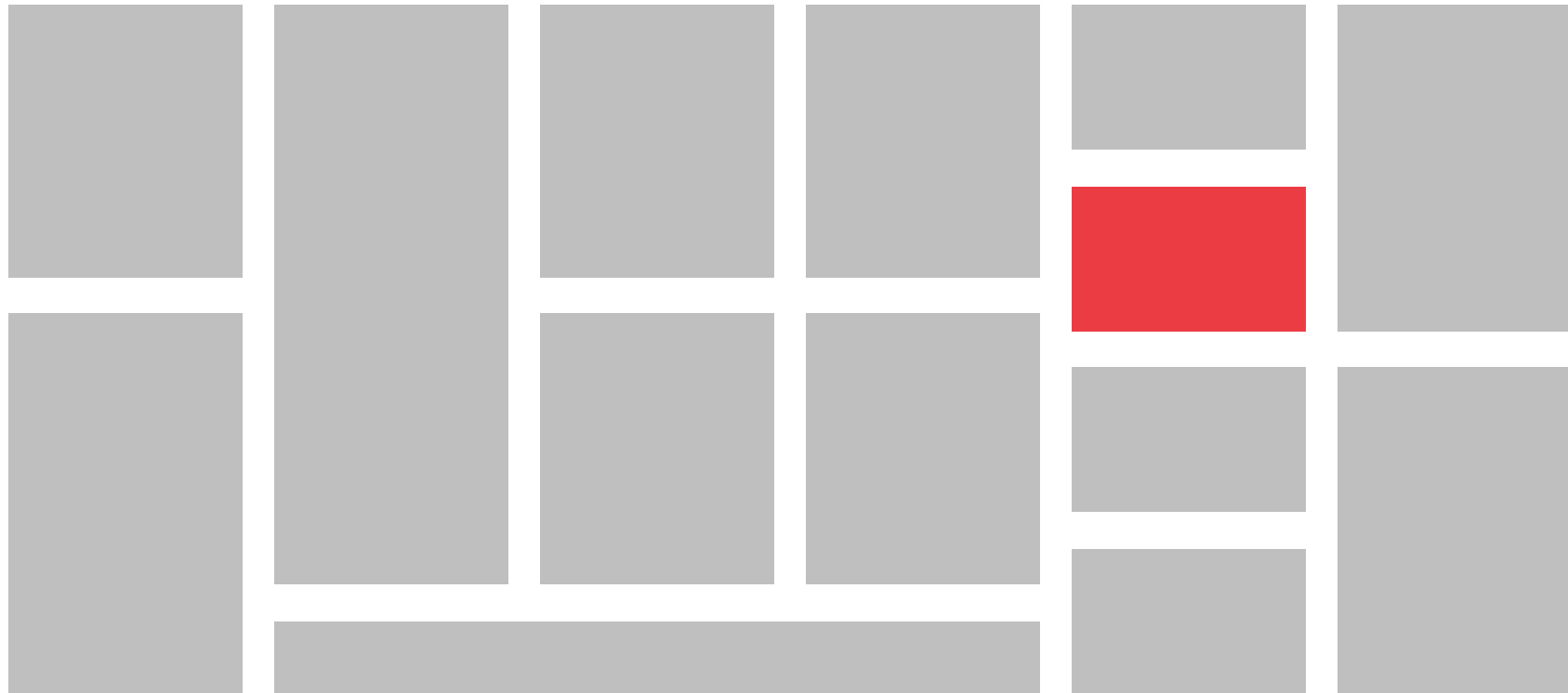
Modularize and Isolate!

```
4316 rating: match.bgg_game?.rating || null,
4317 weight: match.bgg_game?.weight || null,
4318 best_players: match.bgg_game?.best_players || null,
4319 two_player_not_recommended_pct: match.bgg_game?.two_player_not_recommended_pct || null,
4320 },
4321 wienextra_game: {
4322   title: match.catalogGame.title,
4323   url: match.catalogGame.url
4324 }
4325 });
4326
4327 // Store enhanced data in KV with longer TTL (1 hour)
4328 await kv.put(`progress:wishlist:${jobId}:enhanced`, {
4329   step: 10,
4330   total_steps: 10,
4331   message: `Wishlist refresh completed with BG`,
4332   completed: true,
4333   matches_found: enhancedMatchResults.length,
4334   matches: enhancedMatchResults,
4335   enhanced: true, // Flag to indicate this has been enhanced
4336   timestamp: new Date().toISOString()
4337 }, { expirationTtl: 3600 }); // 1 hour TTL
4338
4339 console.log(`🚀 Background BGG detail fetcher finished`);
4340
4341 } catch (error) {
4342   console.error('❌ Error storing enhanced match data: ', error);
4343 }
4344 }
```

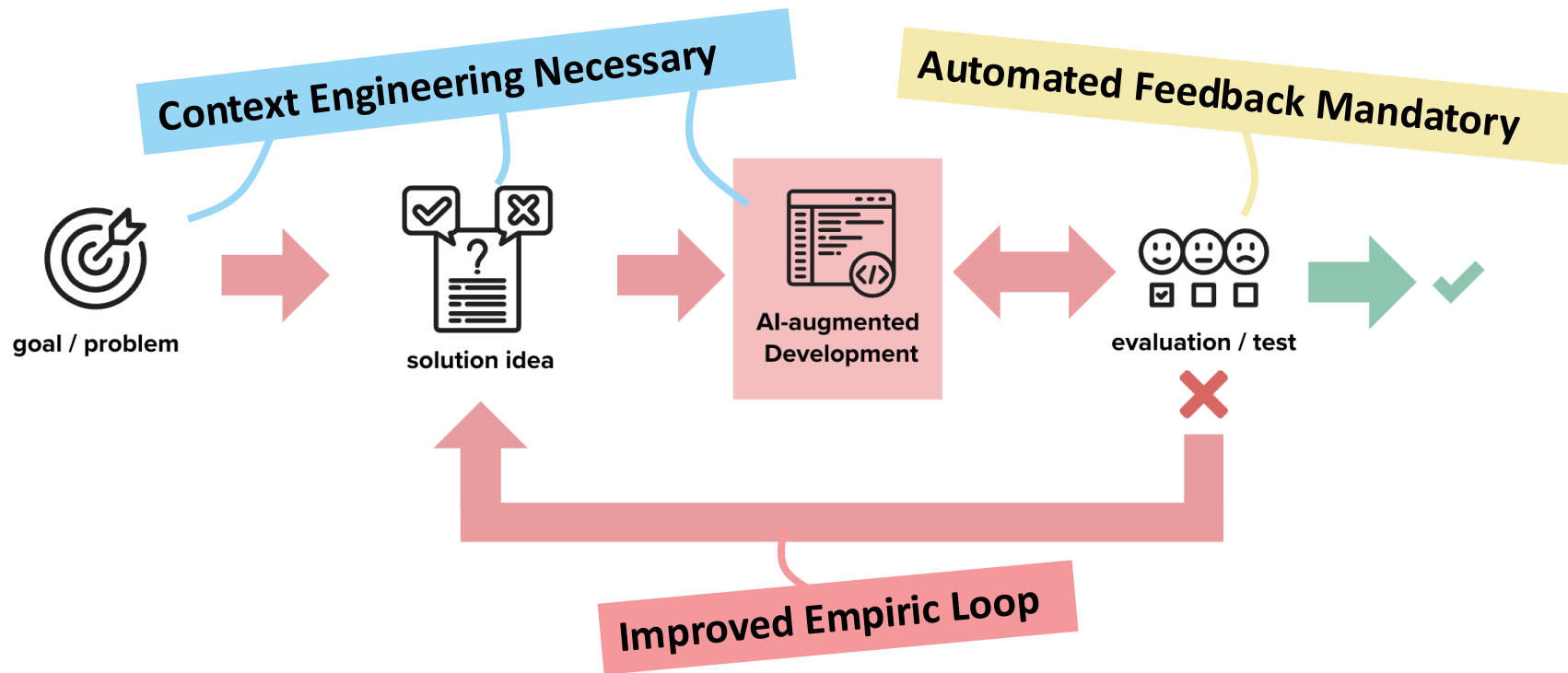
```
1140 });
1141
1142 // =====
1143 // Worker Export
1144 // =====
1145
1146 export default {
1147   /**
1148    * HTTP Request Handler
1149    */
1150   fetch: app.fetch,
1151
1152   /**
1153    * Scheduled Handler - Runs daily cron jobs
1154    */
1155   async scheduled(_event: ScheduledEvent, env: Bindings, _ctx: ExecutionContext) {
1156     console.log('🕒 Running scheduled daily sync...');
1157
1158     try {
1159       // Note: Without queues, the cron job would need to be handled differently
1160       // For now, just log that it ran. You can add direct processing here if needed
1161       console.log('✅ Scheduled task triggered');
1162     } catch (error) {
1163       console.error('❌ Scheduled task failed:', error);
1164     }
1165   }
1166 };
1167
```

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```

Modularize and Isolate!



Generative AI in Software Development



Automated Feedback

Interlock Architectural practice with Development

Don't generate your tests carelessly...

```
def test_evidence_collection(self):  
    """Test collecting evidence for validation decisions."""  
    validation = {  
        "stressor_id": "S1",  
        "passed": True,
```

After thoroughly analyzing the Python test files in `/tests/unit`, I must deliver a harsh verdict: These tests are completely fake and do not test any actual implementation.

The Fundamental Problem

Language Mismatch:

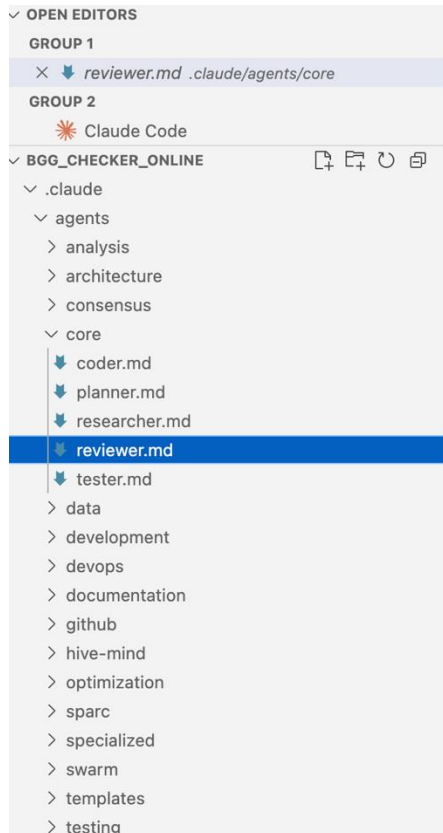
- Implementation: TypeScript/Node.js (.ts files in `/src`)
- Tests: Python (.py files in `/tests/unit`)

This is absurd. You cannot test TypeScript code with Python unit tests.

```
        {  
            "type": "config",  
            "location": "config/database.yml",  
            "snippet": "replicas: [db-replica-1, db-replica-2]"  
        }  
    ]  
}
```

```
assert len(validation["evidence"]) > 0  
assert all("type" in e and "location" in e for e in validation["evidence"])
```

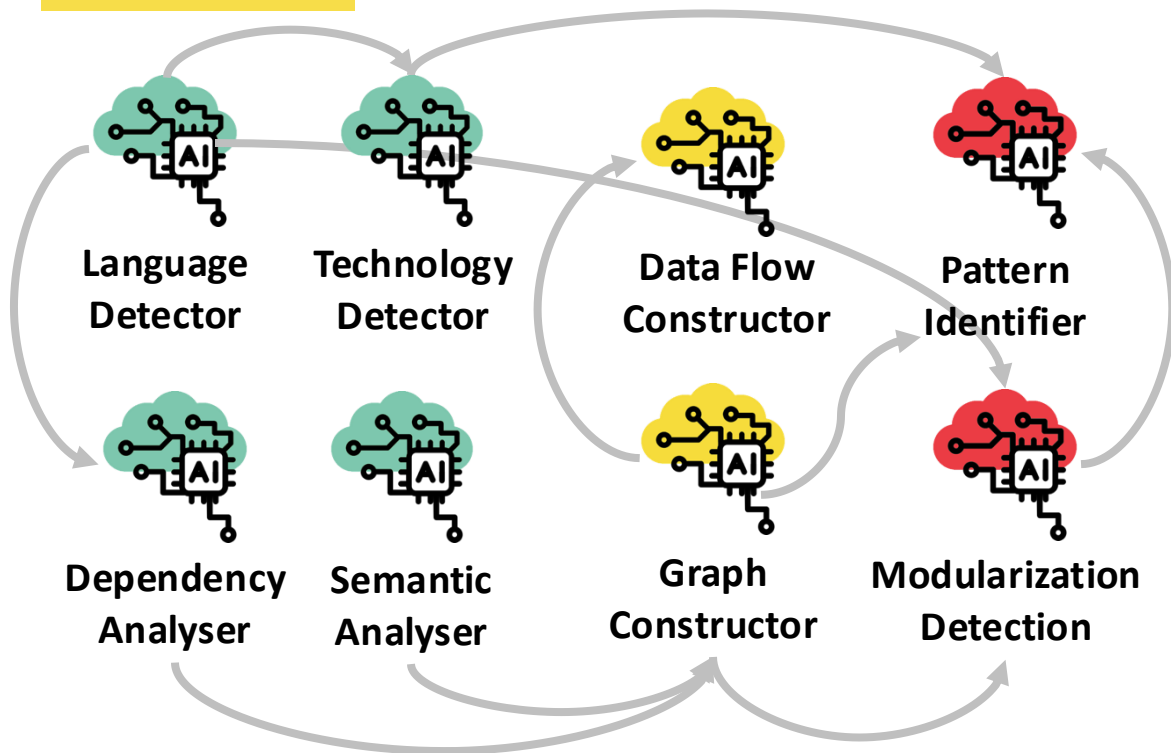

Separate Test and Review Agents



```
.claude > agents > core > reviewer.md > ...  
23 # Code Review Agent  
35 ## Review Process  
90 ### 3. Performance Review  
  
123  
124 ### 4. Code Quality Review  
125  
126 ```typescript  
127 // QUALITY METRICS:  
128 ✓ SOLID principles  
129 ✓ DRY (Don't Repeat Yourself)  
130 ✓ KISS (Keep It Simple)  
131 ✓ Consistent naming  
132 ✓ Proper abstractions  
133  
134 // EXAMPLE IMPROVEMENTS:  
135  
136 // ✗ Violation of Single Responsibility  
137 class User {  
138   saveToDatabase() { }  
139   sendEmail() { }  
140   validatePassword() { }  
141   generateReport() { }  
142 }  
143  
144 // ✓ BETTER DESIGN:  
145 class User { }  
146 class UserRepository { saveUser() { } }  
147 class EmailService { sendUserEmail() { } }  
148 class UserValidator { validatePassword() { } }  
149 class ReportGenerator { generateUserReport() { } }  
150  
151 // ✗ Code duplication  
152 function calculateUserDiscount(user) { ... }  
153 function calculateProductDiscount(product) { ... }
```



AI Review: Multi-Agent Solution



basic



composite



analytical



Orchestrator



Documentation
Octopus

Other Tools:
Storage, IFs,
Function Calls, MCPs, ...

Language, Technology & Arch. Style



Language Distribution:

- **JavaScript:** 37.7% (frontend logic)
- **Java:** 29.6% (backend/server-side)
- **SCSS:** 13.5% (stylesheets)
- **CSS:** 9.3% (additional styling)
- **HTML:** 6.3% (web pages)
- **Gherkin:** 3.3% (BDD testing)
- **Shell:** 0.3% (build scripts)
- **SQL:** 0.1% (database queries)

Build Tools:

- **Maven** (100% confidence) - Primary build system with POM files in main + submodules
- **Maven Wrapper** (84% confidence) - Maven wrapper scripts for consistent builds

UI Framework Stack:

- **Bootstrap** (100% confidence) - Responsive CSS framework
- **jQuery** (100% confidence) - JavaScript library with DataTables & Peity plugins
- **Font Awesome** (70% confidence) - Icon library
- **Animate.css** (70% confidence) - CSS animation library
- **Normalize.css** (70% confidence) - CSS reset/normalization

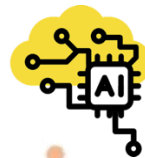
Web Framework:

- **Spring Boot** (80% confidence) - Java web framework detected through imports and annotations

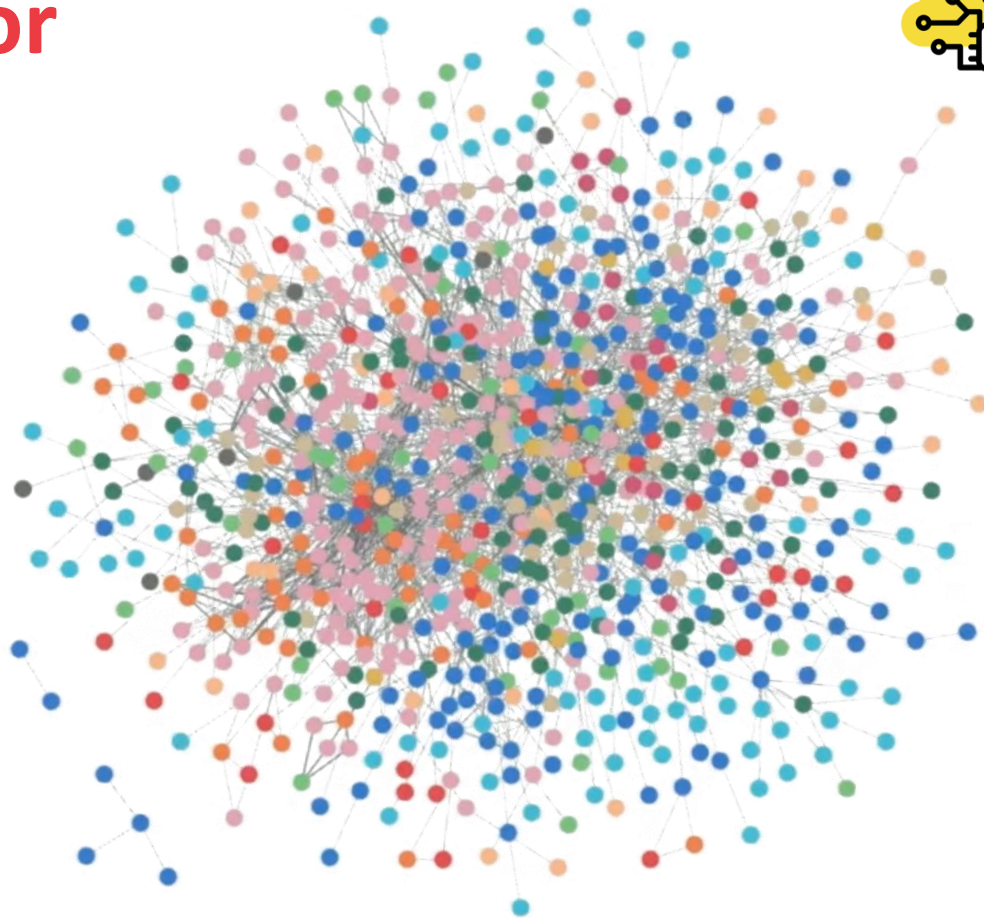
Key Insights:

1. **Multi-module Maven project** with separate **bank** and **credit** modules
2. **Spring Boot microservices architecture**
3. **Modern responsive web UI** using Bootstrap + jQuery
4. **Behavior-driven development** with Gherkin test scenarios
5. **Full-stack Java web application** with rich frontend

Graph Constructor



- Entity Relationships
- Method Calls
- End Points
- DB-Relations
- Remote Procedure Calls
- Config-Dependencies
- Semantic Proximity
- Change Dependencies (Git)
- ...



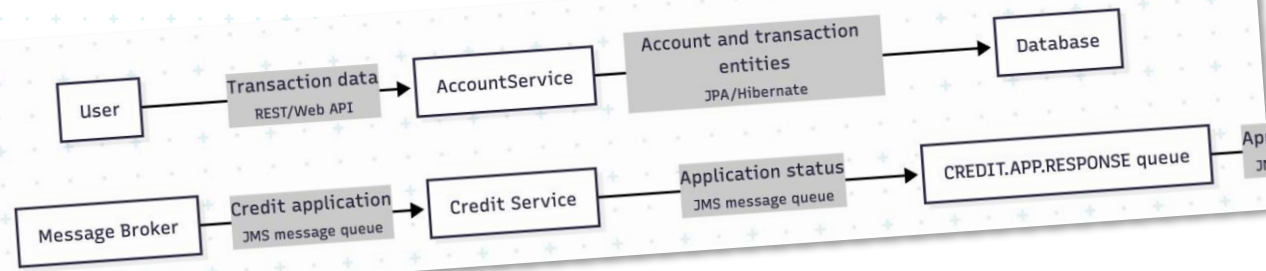
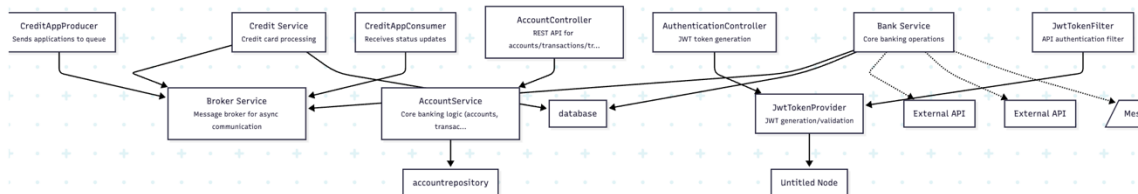
Modularization and Data Flow



Projects / Personal / Untitled diagram

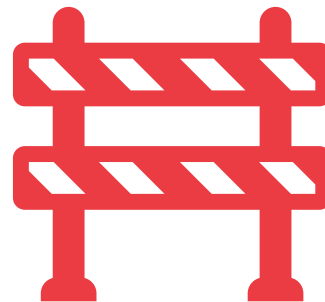
Code Auto-Update Docs X

```
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2 config:
3   layout: dagre
4 ---
5 flowchart TB
6   bank_service["Bank Service<br><small>Core ban
7   credit_service["Credit Service<br><small>Cred
8   accountcontroller["AccountController<br><small>
9   authenticationcontroller["AuthenticationContr
10  usercontroller["UserController<br><small>User
11  accountservice --> accountrepository["account
12  userservice --> userrepository["userrepositor
13  jwttokenfilter["JwtTokenFilter<br><small>API
14  creditappproducer["CreditAppProducer<br><small>
15  creditappconsumer["CreditAppConsumer<br><small>
16  bank_service --> open_banking_platform__obp_
17  jwttokenprovider --> n1["Untitled Node"]
18  obpservice["ObpService<br><small>Open Banking
19  visaservice["VisaService<br><small>VISA payme
20  searchservice["SearchService<br><small>ATM lo
21  multihttpsecurityconfig["MultiHttpSecurityCon
22  h2_database["Database"]
23  mysql["Database"]
24  postgresql["Database"]
25  ms_sql_server["Database"]
26  atm_location_service["External API"]
27
```

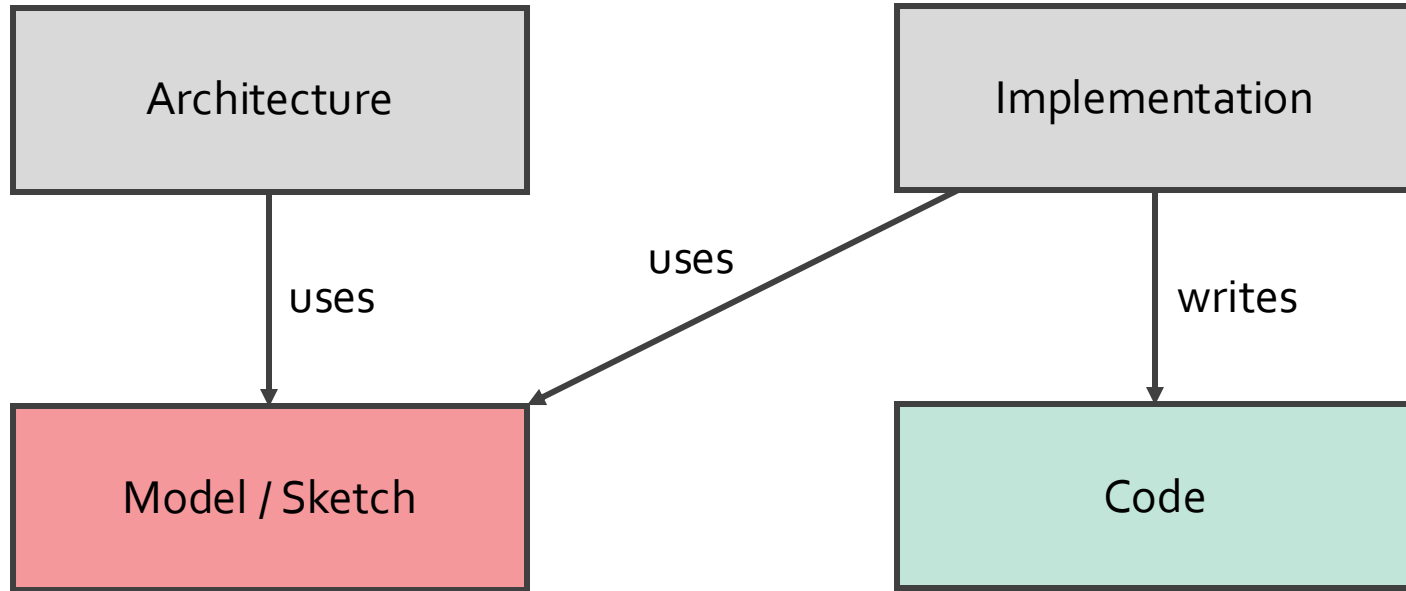


Guardrails

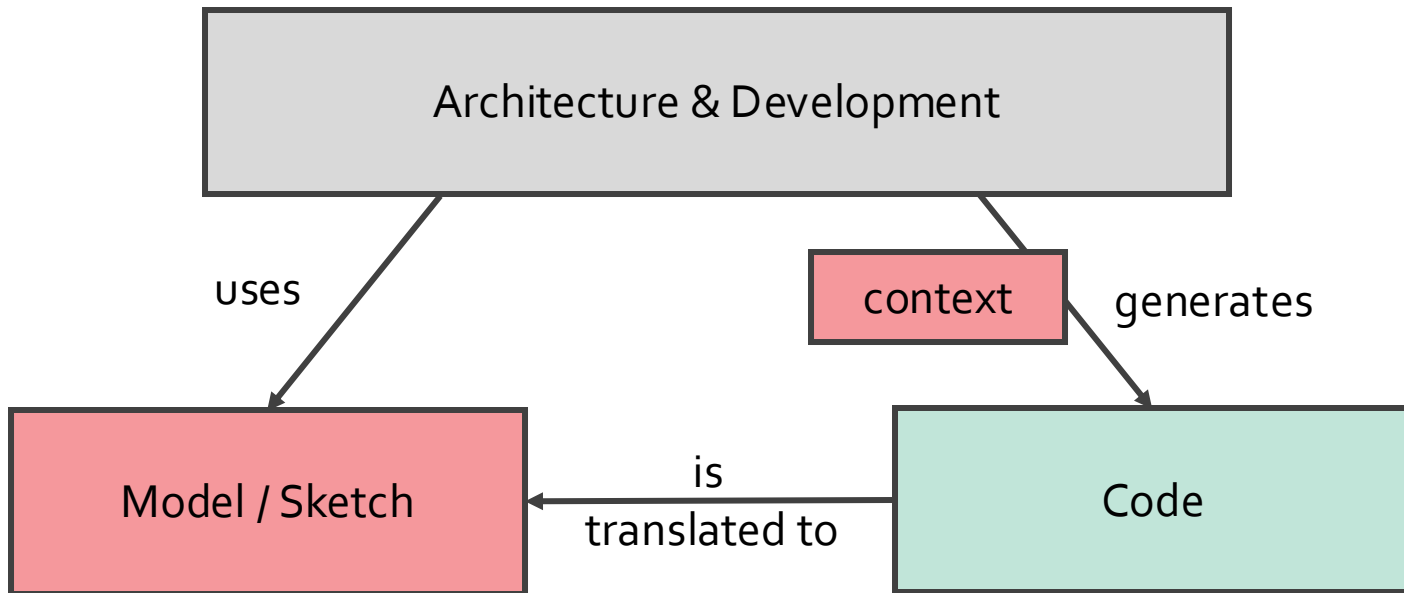
- **Preventative guardrails** are proactive guardrails that specify the outer bounds of what developers can do.
- **Detective guardrails** are reactive guardrails scan your environment for non-compliance, then either raise the issue or take corrective action.



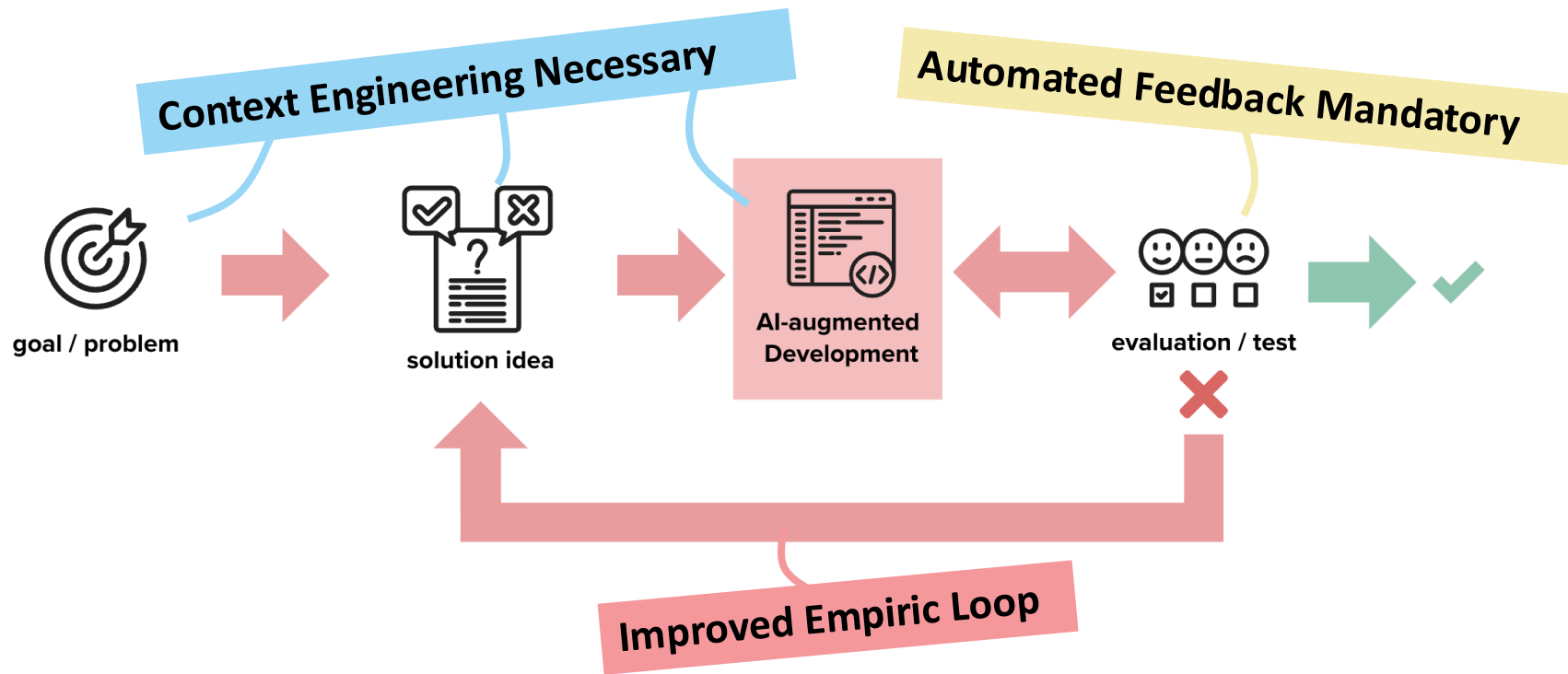
Classic View: Architecture and Implementation



Agentic: Architecture and Implementation



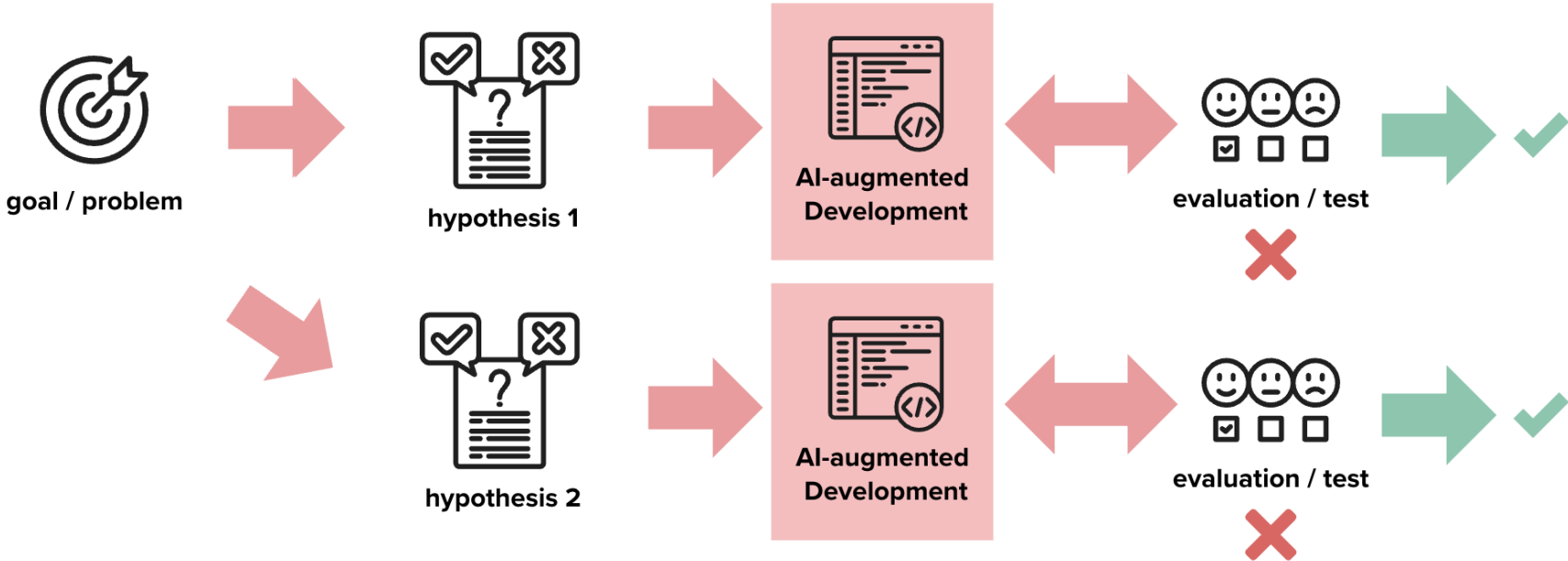
Generative AI in Software Development



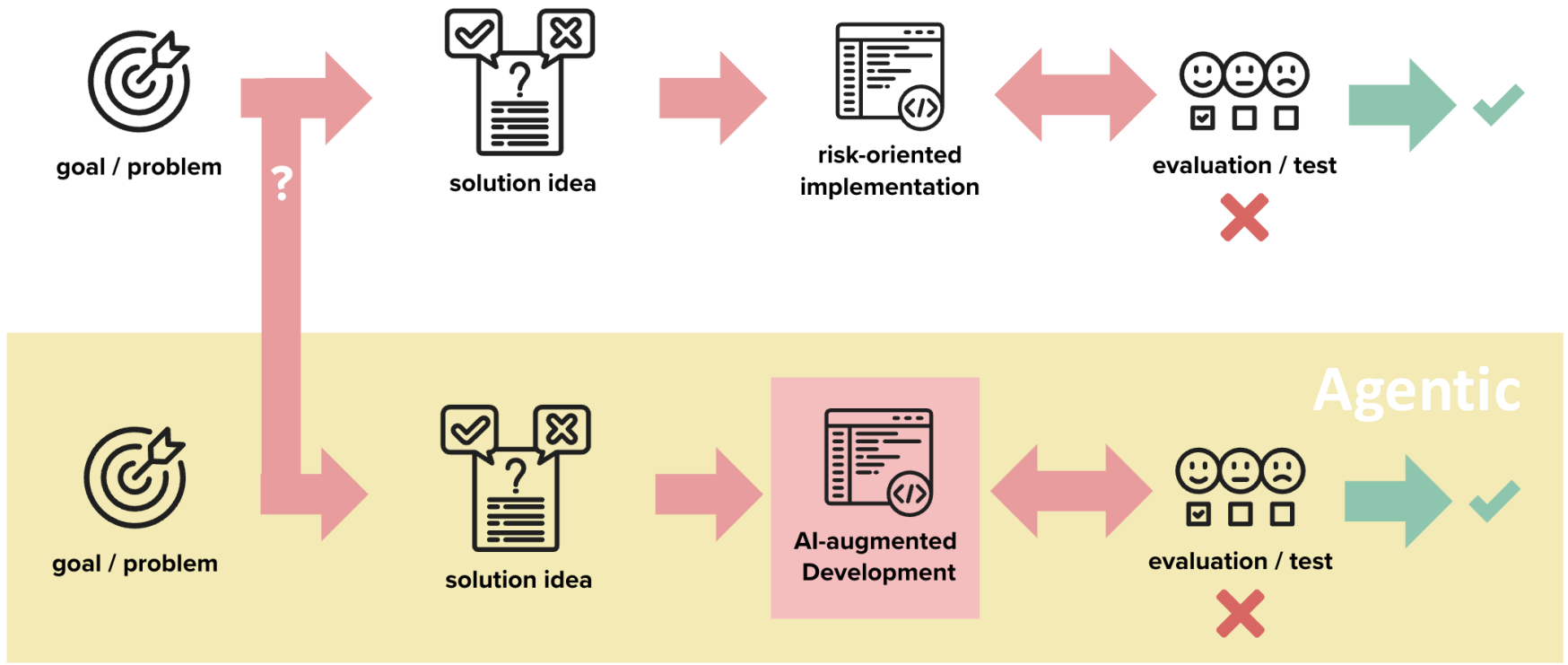
Improved Empirical Loop

Continuous learning process – individually and within the organization

Hypothesis-Driven Architecture



Encapsulate Agentic Development



Agentic Architecture is NOT for free

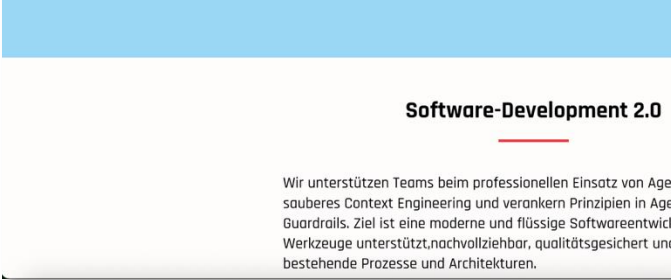
- Know the **quality goals**
- Make **constraints** explicit
- Work on the **domain** and **structure** clearly
- Create good **interfaces**
- Define language characteristics and **best practices**
- Establish appropriate **testing approaches**
- Professionalize **integration, deployment, and monitoring**
- Establish **AI usage standards** (including processes, context, etc.)
- ...

Thank You!

**Feedback &
Questions?**



Slides & Infos: embarc.de



AI-gestützte Architekturarbeit

Unser Line-Up



Kim Duggen



Oliver Zeigermann



Arnold Franke



Sven Woltmann



Cosima Laube



Falk Sippach



Alex Thurow



Stefan Zörner



Stefan Toth



08. Dezember 2025 // remote

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