Architecture: Design Docs

17-313: Foundations of Software **Engineering**

https://cmu-313.github.io

Michael Hilton and Josh Sunshine

Spring 2026

Administrivia

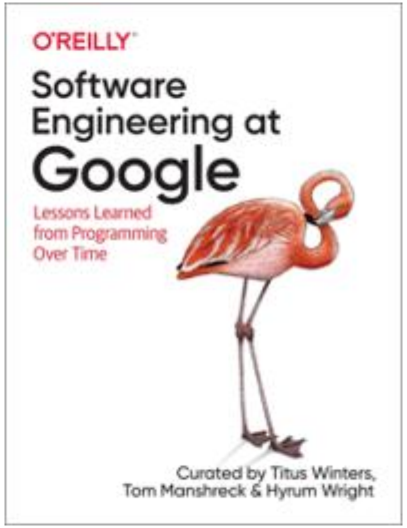
- Final Time:
  - Thursday, April 30, 2026 08:30am - 11:30am
  - Room TBD
- Midsemester grades Wednesday. Please ask if you have questions
- Project 3 released during Spring Break.

Smoking Section

- Last full row

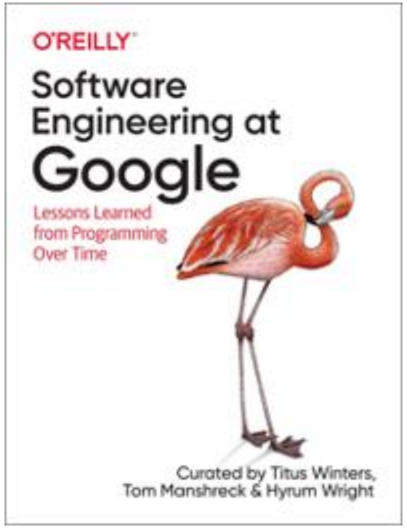
Types of documentation

- Reference documentation (incl. code comments)
- Design documents
- Tutorials
- Conceptual documentation
- Landing pages


O'REILLY
Software Engineering at Google
Lessons Learned from Programming Over Time
Curated by Titus Winters, Tom Manshreck & Hyrum Wright

Design documents

- **Code review before there is code!**
- Collaborative (Google Docs)
- Ensure various concerns are covered, such as: security implications, internationalization, storage requirements, and privacy concerns.
- A good design doc should cover
  - Goals and use cases for the design
  - Implementation ideas (not too specific!)
  - Propose key design decisions with an emphasis on their individual tradeoffs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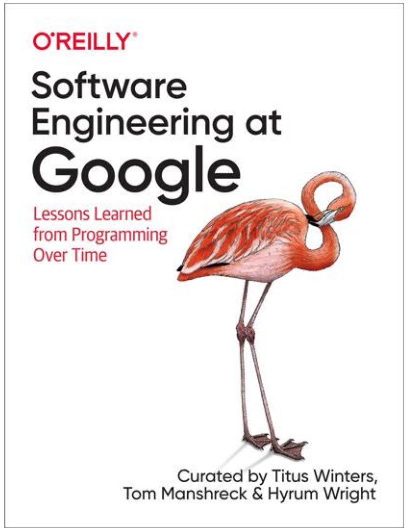
Design Documents

- The *best* design docs suggest design goals, and cover alternative designs, documenting the strengths and weaknesses of each.
- The *worst* design docs accidentally embed ambiguities, which cause implementors to develop contradictory solutions that the customer doesn't want.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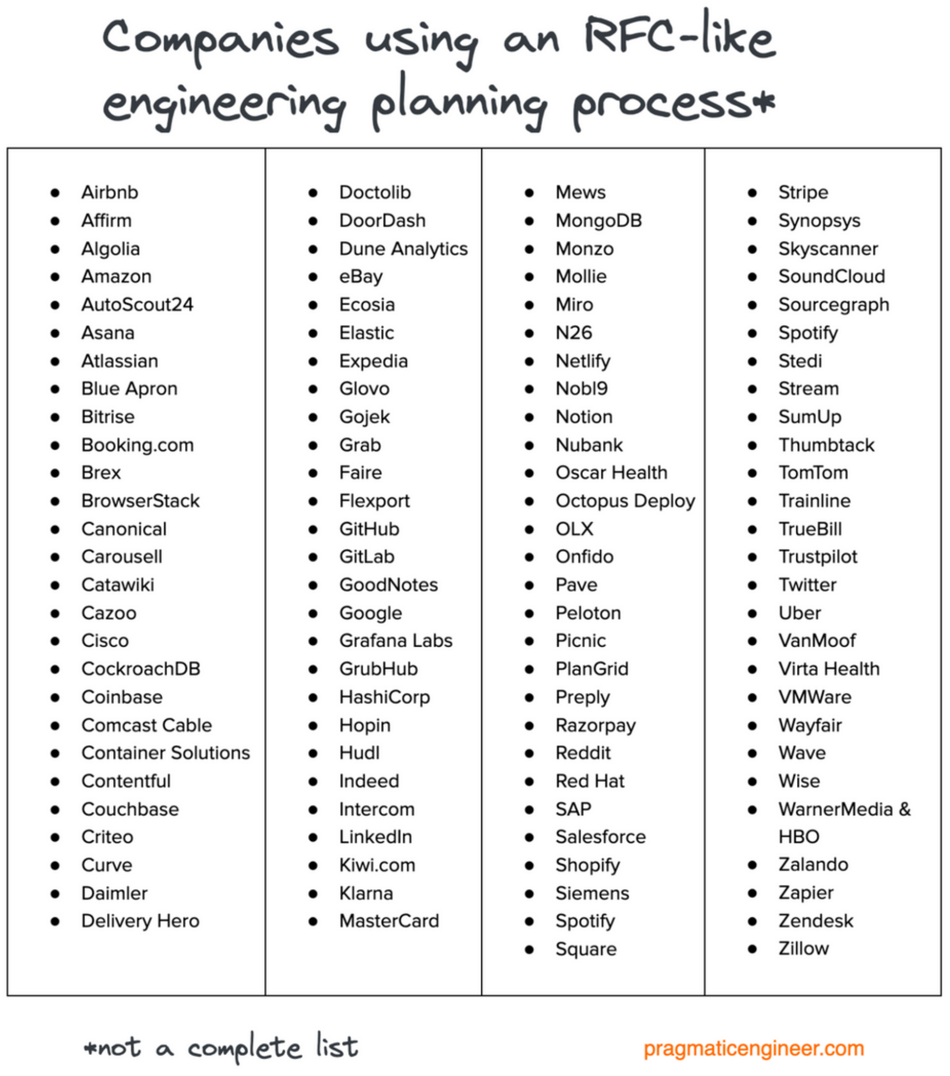


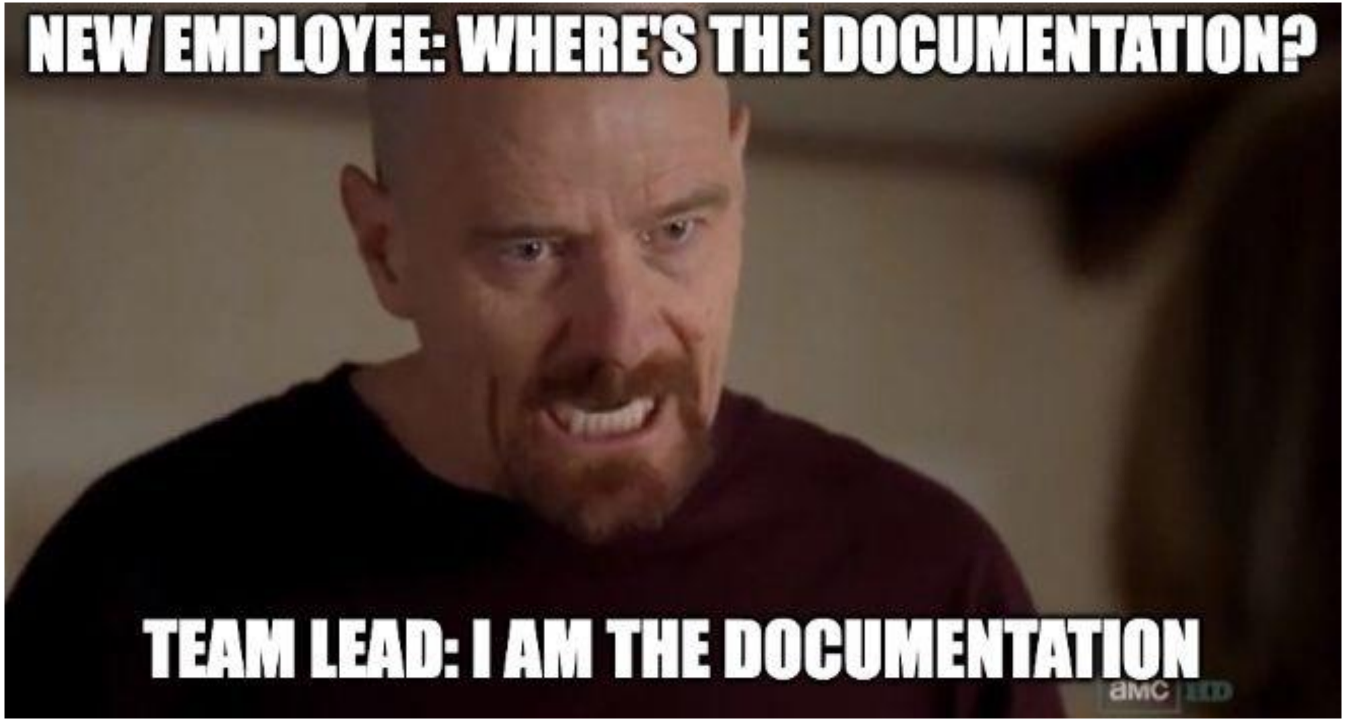
Companies using an RFC-like engineering planning process*

- Airbnb
- Affirm
- Algolia
- Amazon
- AutoScout24
- Asana
- Atlassian
- Blue Apron
- Bitrise
- Booking.com
- Brex
- BrowserStack
- Canonical
- Carousell
- Catawiki
- Cazoo
- Cisco
- CockroachDB
- Coinbase
- Comcast Cable
- Container Solutions
- Contentful
- Couchbase
- Criteo
- Curve
- Daimler
- Delivery Hero
- Doctolib
- DoorDash
- Dune Analytics
- eBay
- Ecosia
- Elastic
- Expedia
- Glovo
- Gojek
- Grab
- Faire
- Flexport
- GitHub
- GitLab
- GoodNotes
- Google
- Grafana Labs
- GrubHub
- HashiCorp
- Hopin
- Hudl
- Indeed
- Intercom
- LinkedIn
- Kiwi.com
- Klarna
- MasterCard
- Mews
- MongoDB
- Monzo
- Mollie
- Miro
- N26
- Netlify
- Nobl9
- Notion
- Nubank
- Oscar Health
- Octopus Deploy
- OLX
- Onfido
- Pave
- Peloton
- Picnic
- PlanGrid
- Preply
- Razorpay
- Reddit
- Red Hat
- SAP
- Salesforce
- Shopify
- Siemens
- Spotify
- Square
- Stripe
- Synopsys
- Skyscanner
- SoundCloud
- Sourcegraph
- Spotify
- Stedi
- Stream
- SumUp
- Thumbtack
- TomTom
- Trainline
- TrueBill
- Trustpilot
- Twitter
- Uber
- VanMoof
- Virta Health
- VMWare
- Wayfair
- Wave
- Wise
- WarnerMedia & HBO
- Zalando
- Zapier
- Zendesk
- Zillow

*not a complete list

pragmaticengineer.com

Why is this important?


NEW EMPLOYEE: WHERE'S THE DOCUMENTATION?
TEAM LEAD: I AM THE DOCUMENTATION
amc HD

Common parts/templates

1. Metadata: *version, date, authors*
2. Executive Summary: *problem being solved, project mission*
3. Stakeholders (and non-stakeholders)
4. Scenarios / User Stories
5. User Experience

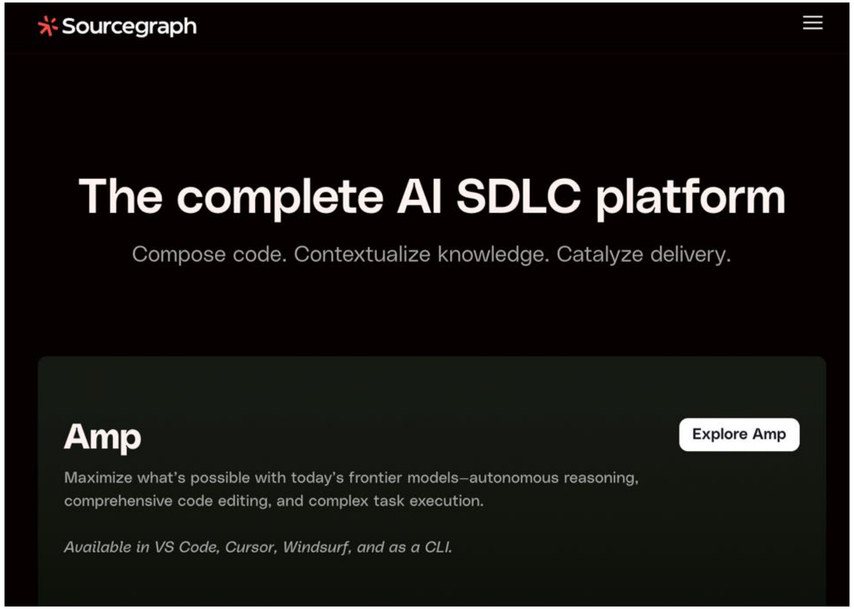
1. High-level Requirements: *Functional*
   - Global Requirements: *Quality, Security, Privacy, Ethics*
2. Features and Operations
3. Design Considerations and Tradeoffs
4. Non-Goals
5. Roadmap / Timeline
6. Open Issues

Examples: SourceGraph RFCs

Requests for Comment

https://about.sourcegraph.com/handbook/communication/rfcs

Sourcegraph


Sourcegraph

The complete AI SDLC platform

Compose code. Contextualize knowledge. Catalyze delivery.

Amp

Maximize what's possible with today's frontier models–autonomous reasoning, comprehensive code editing, and complex task execution.

Available in VS Code, Cursor, Windsurf, and as a CLI.

When to use an RFC:

Sourcegraph

- You want to frame a problem and propose a solution.
- You want thoughtful feedback from team members on our globally-distributed remote team.
- You want to surface an idea, tension, or feedback.
- You want to define a project or design brief to drive project collaboration.
- You need to surface and communicate around a highly cross-functional decision with our formal decision-making process.

Don’t use an RFC when

Sourcegraph

- You want to discuss personal or sensitive topics one-on-one with another team member.
- You want to make a decision to change something where you are the decider. In the vast majority of cases, creating an RFC to explain yourself will be overkill. RFCs should only be used if a decision explicitly requires one of the bullets in the previous page.

RFC Labels

Sourcegraph

- **WIP**: The author is still drafting the RFC and it's not ready for review.
- **Review**: The Review label is used when the RFC is ready for comments and feedback.
- **Approved**: When the RFC is for the purpose of making a decision, the Approved label indicates that the decision has been made.
- **Implemented**: When the RFC is for the purpose of making a decision, the Implemented label indicates that the RFC's proposal has been implemented.
- **Closed**: When the RFC is for the purpose of collaboration or discussion but not necessarily to make a decision or propose a specific outcome that will eventually become Implemented, the Closed label indicates that the RFC is no longer an active collaborative artifact.
- **Abandoned**: When the RFC is for the purpose of making a decision, and there are no plans to move forward with the RFC's proposal, the Abandoned label indicates that the RFC has been purposefully set aside.

Observe Design Docs

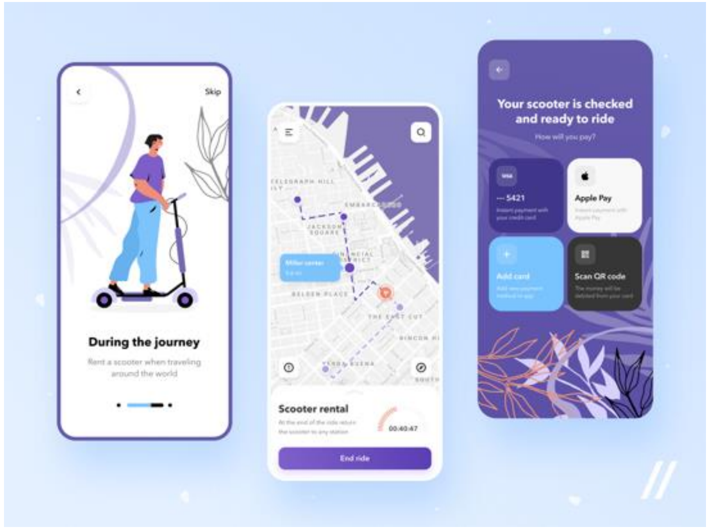
https://datatracker.ietf.org/doc/html/rfc8925

https://rust-lang.github.io/rfcs/0019-opt-in-builtin-traits.html

- Let's take a look at a few!

Exercise

- 4 Proposed Features:
    - Add Payment Method
    - More Secure Authentication
    - Add Android Support
    - Internationalization (i18n)



Time to write our own design docs! (No Gen AI for this task)

- Divide up into 4 sections –NOTE: you should be signed in w/Andrew to google
- Your mission:
  - Brainstorm a feature to add to a scooter app and write a design spec, together, in real time!
  - Review the design doc, collaborate around text
  - Review another team's design doc, ask questions/leave comments

bit.ly/4s17IdW | bit.ly/3PcVBMp | bit.ly/47zbQJU | bit.ly/40oWaFl

Early Course Feedback

- bit.ly/4bhOp9g