

Rehearsing the Future

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Great engineers don't just solve today's problem. They mentally rehearse what happens next.

When making an engineering decision, run five thought experiments:

1. ASSUMPTIONS

What has to be true for this to work?

Surface hidden assumptions about users, data, dependencies, scale, teams, and technology.

2. FAILURE

What happens when those assumptions are wrong?

Don't only ask whether the happy path works. Imagine partial failures, bad inputs, dependency failures, misuse, and recovery.

3. SCALE

What changes at 10×?

Scale isn't only traffic. Consider data, complexity, teams, customers, operational burden, and rate of change.

4. HUMANS

How will people actually interact with this?

Users misunderstand things. Operators make mistakes. Teams change. Incentives matter. The technical system lives inside a human system.

5. TIME

What does this decision look like later?

Ask what becomes difficult to change, what debt accumulates, what future teams inherit, and whether today's abstraction survives tomorrow's requirements.

The practice

For an important decision:

Predict → Decide → Observe → Reflect

Before acting, write down what you expect to happen.

Afterward, compare reality with your prediction.

The gap between the two is where judgment develops.

Engineering judgment is not predicting the future perfectly. It is getting better at rehearsing possible futures before reality chooses one.

The Engineering Judgment Loop

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Judgment isn't intuition you either have or don't have. It develops through repeated cycles of prediction and reflection.

OBSERVE

Understand the system, users, constraints, and context.



MODEL

Form a mental model of how the pieces interact.



REHEARSE

Ask what if?

Simulate failures, scale, human behavior, second-order effects, and alternative decisions.



DECIDE

Make the best decision possible with incomplete information.

Be explicit about assumptions and trade-offs.



OBSERVE REALITY

What actually happened?



REFLECT

Where was your mental model right? Where was it wrong?



UPDATE

Carry the improved model into the next decision.

Why experience matters

A Principal Engineer may have run this loop thousands of times.

That's why experienced engineers sometimes say:

"I've seen this movie before."

They aren't necessarily smarter. They have a larger library of patterns, failures, consequences, and trade-offs to draw from.

The opportunity

We can't manufacture 15 years of production experience overnight.

But we **can accelerate the loop** through:

- real engineering case studies
- incident reviews
- architecture critiques
- thought experiments
- prediction before implementation
- reflection after outcomes
- exposure to how experienced engineers reason

Experience produces events. Reflection converts events into judgment.

Accelerating Engineering Judgment

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Traditional engineering development often looks like:

Learn fundamentals → Write code → Build systems → Experience failures → Accumulate judgment over years

AI changes the speed of implementation.

So the question becomes:

Can we become more deliberate about developing the judgment that experience used to teach slowly?

A different apprenticeship

FOUNDATIONS

Learn how computers and software systems actually work.

↓

CASES

Study real systems, architectural decisions, incidents, migrations, and failures.

↓

REHEARSE

Before learning what happened, ask:

What would I do? What could fail? What assumptions am I making?

↓

COMPARE

Study what experienced engineers actually chose—and why.

↓

EXPERIENCE

Build and operate real systems.



REFLECT

Compare predicted outcomes with reality.



UPDATE

Improve the mental models used for the next decision.

What we should deliberately practice

Technical reasoning

Does it work?

Systems thinking

What else does it affect?

Human understanding

How will people behave?

Communication

Can I express intent, assumptions, and trade-offs precisely?

Decision-making

What should we do given incomplete information?

Reflection

What did reality teach me?

We can't compress twenty years into twenty weeks. But we can become much more intentional about what those twenty years were supposed to teach.