user manual · illustrated edition

FIRST PRINCIPLES

a field manual for thinking from the ground up

the way it's always been → *break it down to atoms* → *rebuild it better*

QUESTION EVERYTHING ONCE.

Contents

How to use this manual: read chapters 1–2 for the idea, 3–7 when you are actually working a problem, and keep chapter 10 open beside you.

01

THE IDEA

Why bother?

Most thinking is reasoning by analogy: *this looks like X, so do what worked for X*. It is fast, cheap, and usually fine. But it can only ever produce variations of what already exists.

First-principles thinking breaks a problem down to its most basic, verifiable truths and reasons back up from there. It costs more time and effort, but it can find answers that copying never will.

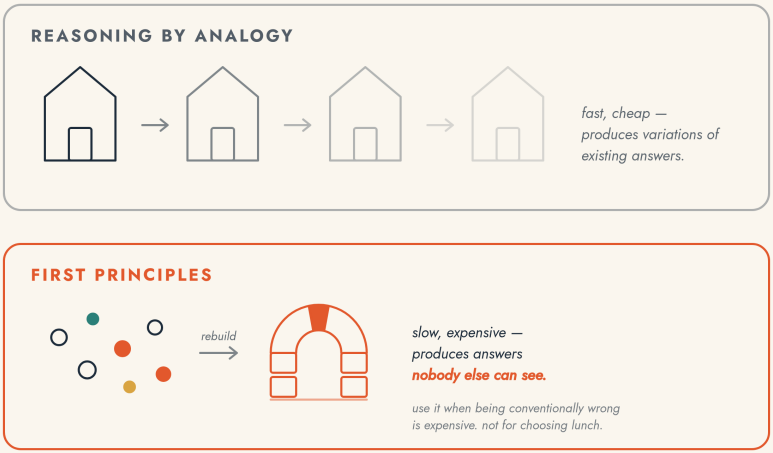

Fig. 1: Analogy copies. First principles rebuilds.

Use it when a conventional mistake would cost you a lot, not for everyday choices.

02

OVERVIEW

The method at a glance

Five steps, one loop. Each of the next five chapters covers one step.

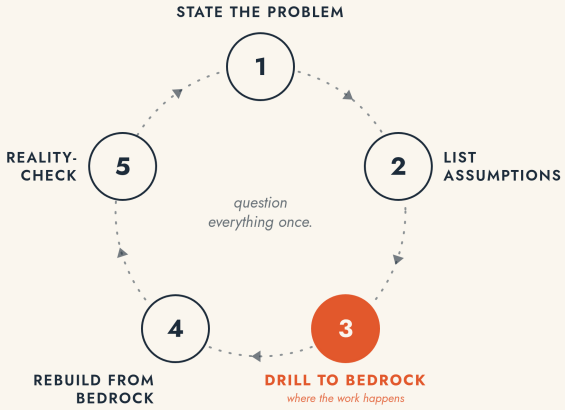

Fig. 2: The five-step loop. Step 3, the drill to bedrock, is where most of the work happens.

03

STEP 1

State the problem

Write the problem as a single sentence. Then check: is it the actual problem, or a solution in disguise?

“We need a faster horse” is a solution dressed up as a problem. “People want to travel between cities faster” is the problem.

The test: if your problem statement contains a specific method or tool, it is a solution. Ask “why do we want that?” and restate one level deeper.

✗ Solution in disguise	✓ Actual problem
“We need more meetings to align”	“Decisions are slow and contested”
“We need a bigger battery”	“The car needs 500 km of range”
“We should be on TikTok”	“Under-30s never hear about us”

Fig. 3: Problem statements before and after removing the embedded solution.

04

STEP 2

List your assumptions

Write down everything you believe about the problem, especially the beliefs that seem too obvious to mention. Those usually carry the most weight.

Prompts that surface hidden assumptions:

- What would an intelligent alien find strange about how we do this?
- Which constraints am I inheriting from how it was done before?
- What am I assuming about cost, time, physics, people, rules?
- If I had to defend each belief in court, which lack evidence?

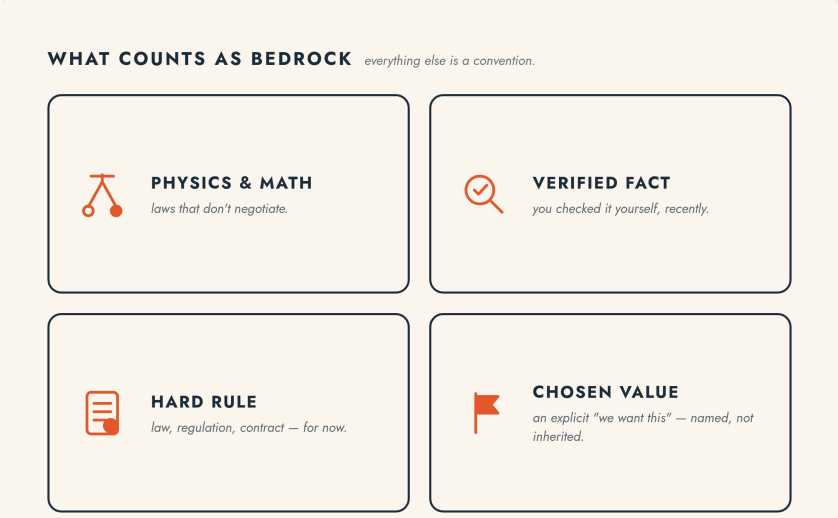

Fig. 4: A preview of step 3. Only four things will count as bedrock.

05

STEP 3

Drill to bedrock

For each assumption, ask **“why is this true?”** repeatedly until you hit physics, a verified fact, a hard rule, or an explicit value. Everything that stops short of that is a **convention**: a choice someone once made, possibly for reasons that no longer apply.

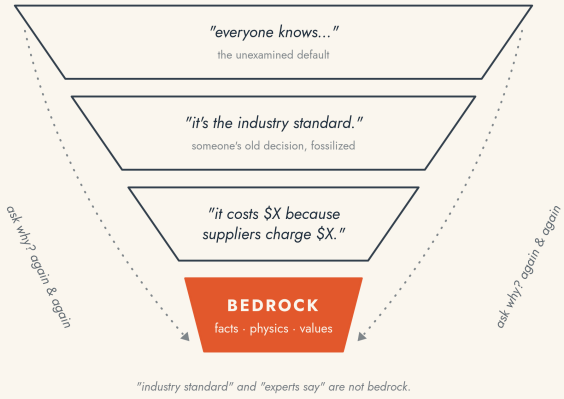

Fig. 5: Layers of belief. “Industry standard” and “experts say” are not bedrock.

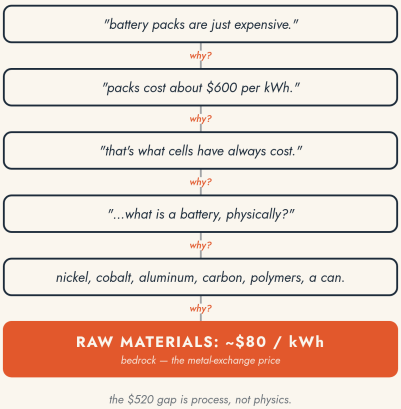

Fig. 6: The drill in action on the classic battery example.

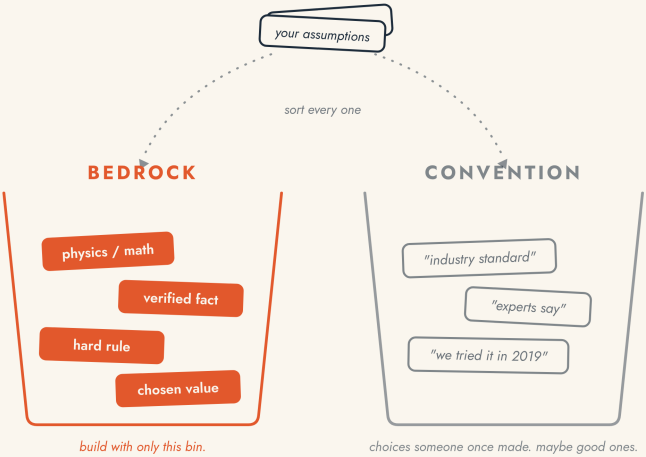

Fig. 7: The end state of step 3, with every assumption sorted into one of two bins.

06

STEP 4

Rebuild from bedrock

Design a solution using **only** the bedrock bin. Pretend the conventions do not exist. Ask: if we started today with no history, what would the best possible solution look like?

Three useful moves:

- **Cost floor.** Compute the theoretical minimum in materials, time, and energy. The gap between that floor and the current cost is the opportunity.
- **Inversion.** Ask what guarantees failure, then eliminate it.
- **Constraint removal.** For each convention, ask what becomes possible if it were false.

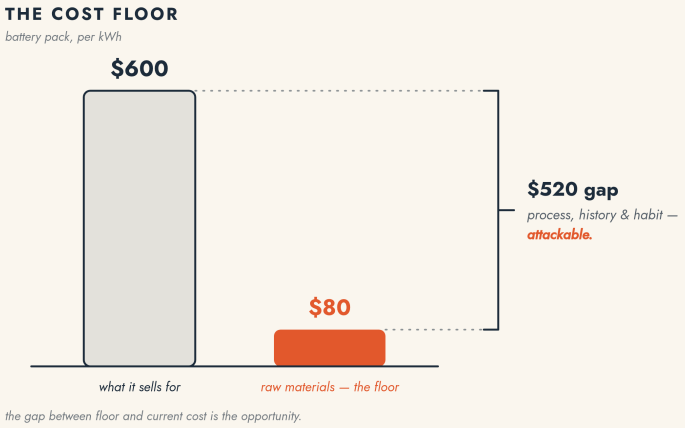

Fig. 8: The cost-floor move on the battery example.

Fig. 9: The inversion move. A short list of killers beats an endless list of maybes.

07

STEP 5

Reality-check the rebuild

First-principles reasoning fails in two ways: your “bedrock” was wrong, or a step in the chain contained a hidden leap. Both are invisible from the inside.

- Have someone motivated to disagree attack every premise and every inference.
- Apply Chesterton's Fence to every convention you discarded (Fig. 10).
- Prototype the smallest test that could prove the reasoning wrong.

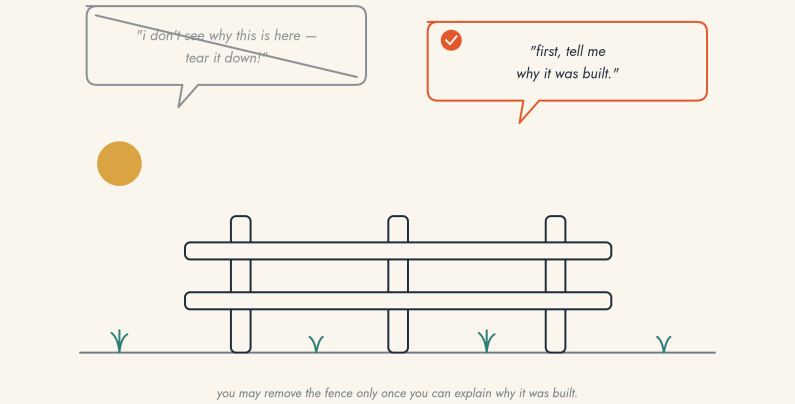

Fig. 10: You may only remove the fence once you can explain why it was built.

08

MEETINGS

Worked example

A full pass of the method on an everyday complaint: *“meetings are killing our productivity.”*

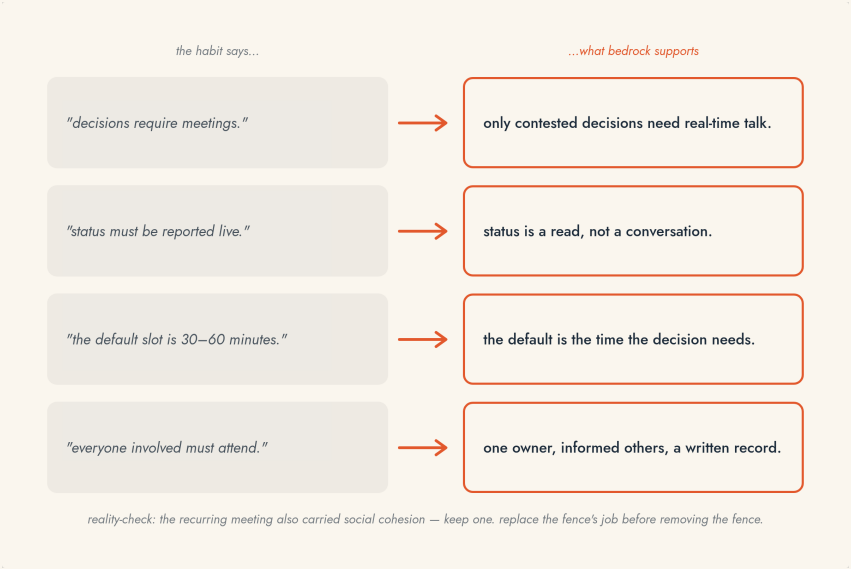

Fig. 11: Each habit, drilled down and replaced by what bedrock actually supports.

Reality-check: why did the recurring meetings exist at all? Partly for social cohesion, which is a real function. Keep one meeting for that, and replace the fence's job before removing the fence.

09

WARNINGS

Failure modes

Five mistakes cause most of the trouble with this method.

Fig. 12: The five classic failure modes.

The most tempting is fake bedrock. An appeal to authority feels like a fact, but it is only a pointer to someone else's reasoning, which you have not checked.

10

PRACTICE

Exercises & checklist

Exercises

1. Take a bill you pay. What is the theoretical cost floor of what you actually buy? Where does the gap come from?
2. Pick one rule at work. Trace it to bedrock or convention. If convention: does the original reason still hold?
3. If a product you use daily were invented today, with no legacy, what would it look like?
4. Run the alien test on your morning routine: which steps are reasons, which are inherited habit?

Pre-flight checklist

- ■ Problem stated in one sentence, no embedded solution
- ■ All assumptions written down, including the “obvious” ones
- ■ Each assumption traced to bedrock or labeled convention
- ■ Solution rebuilt using the bedrock bin only
- ■ Every discarded convention's original purpose explained
- ■ Reasoning chain attacked by a skeptic
- ■ Smallest falsifying test designed and scheduled

Question everything once, then build.