

The Great Company Adventures · Book 47 of 50

TSMC
**THE
INVISIBLE CITY**



A curious girl, three wise mentors, and the microchip printed by a company nobody can name.

"Discovering the businesses that built the modern world"

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THE GREAT COMPANY ADVENTURES

Discovering the businesses that built the modern world.

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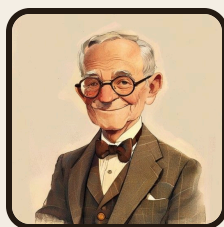
Illustrations were created with AI image tools; the text was written with AI assistance. All content is reviewed and edited by our editorial team.

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MEET THE CHARACTERS



SIRI



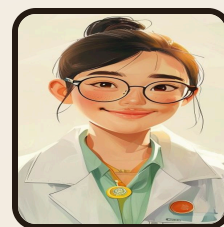
BEN



WARREN



CHARLIE



LING

A curious girl named Siri, a wise old teacher named Ben, and his student Warren with Warren's partner Charlie — together discovering the businesses that built the modern world, one adventure at a time.

THE GLOBAL 50

One great company per volume · Fifty adventures, one modern world

SPACE & EXPLORATION

1. SpaceX — *“The Fire That Comes Back”*

MANUFACTURING & ENGINEERING

2. Toyota — *“The River That Builds Cars”*
3. Siemens — *“The Factory That Builds Factories”*
4. Caterpillar — *“The Machines That Move Mountains”*
5. Boeing — *“The Bird With Six Million Pieces”*
6. Airbus — *“The Plane Four Countries Built”*

ENERGY & INDUSTRY

7. Shell — *“The Sunlight Buried at Sea”*
8. ExxonMobil — *“The Ancient Sunlight Machine”*
9. GE Vernova — *“The Wheel That Makes Lightning”*

COMMUNICATION

10. AT&T — *“The Voice Inside the Wire”*
11. Qualcomm — *“The Whisper in the Air”*
12. Ericsson — *“The Towers That Talk”*

TRANSPORTATION

13. Tesla — *“The Car With No Engine”*
14. John Deere — *“The Machine That Feeds the World”*
15. UPS — *“The Promise in a Brown Truck”*

INFRASTRUCTURE

16. ABB — *“The Arms That Never Tire”*
17. Schneider Electric — *“The Guardian of the Grid”*

MATERIALS

18. Corning — *“The Thread of Light”*
19. DuPont — *“The Inventors of Almost Everything”*

SCIENCE & TOOLS

20. 3M — *“The Factory of Ten Thousand Ideas”*
21. Bosch — *“The Spark in Every Machine”*
22. Honeywell — *“The Dial That Tames the Weather”*

MEDICINE & BIOTECHNOLOGY

23. Pfizer — *“The Shield in a Tiny Vial”*
24. Roche — *“The Detectives of the Blood”*

25. Novo Nordisk — *“The Key to a Billion Locks”*

26. Johnson & Johnson — *“The Little Bandage That Grew”*

FOOD & AGRICULTURE

27. Nestlé — *“The Cup That Wakes the World”*
28. Cargill — *“The Invisible Harvest”*

FINANCE & COMMERCE

29. Visa — *“The Handshake Inside the Card”*
30. Mastercard — *“The Two-Second Trust Machine”*
31. Walmart — *“The Store That Never Runs Out”*
32. Costco — *“The Treasure Warehouse”*
33. FedEx — *“The Race Against the Sun”*

CONSUMER INNOVATION

34. Disney — *“The Factory of Dreams”*
35. LEGO — *“The Brick That Builds Anything”*
36. Sony — *“The Pocket Full of Music”*
37. Coca-Cola — *“The Secret in the Red Can”*
38. Nike — *“The Shoe That Learned to Fly”*

LUXURY & CRAFTSMANSHIP

39. Rolex — *“The Heartbeat on Your Wrist”*
40. LVMH — *“The Suitcase That Conquered the World”*

COMPUTING & DIGITAL CIVILIZATION

41. Apple — *“The Glass That Thinks”*
42. Microsoft — *“The Invisible Machine”*
43. Google — *“The Library With No Walls”*
44. Amazon — *“The Box That Crossed the World”*
45. NVIDIA — *“The Brain Made of Sand”*
46. Intel — *“The First Thinking Chip”*
47. TSMC — *“The Invisible City”*
48. ASML — *“The Machine That Prints With Light”*
49. OpenAI — *“The Machine That Learned to Talk”*

THE FINAL DISCOVERY

50. The Company Yet to Be Built — *“The Adventure You Will Build”*

THE NAME NOBODY KNEW

Midnight. Homework: unfinished. And Grandpa Ben's old brass compass? Spinning like crazy.

SPIN

It's never done THIS before...

The needle locked onto the family's old phone — the broken one. Siri lifted the back cover off.

There's a whole tiny CITY in here.

One little black square sat in the middle. Smaller than her fingernail. Colder than a spoon.

Who even MADE you? I've never heard the name.

The magic diary flipped open by itself. Fresh ink. Grandpa's handwriting.

"The world's finest chips are printed by one quiet company most people cannot name. Go and find the invisible city."

★ WORTH REMEMBERING

Here is a strange fact: the company whose brains run your phone probably did not **build** that chip. Designing a chip and manufacturing one are two completely different jobs — and almost nobody can do the second.

The chip glinted once. A whirlpool of violet light grabbed her.

WHOOSH



Here we GOOO!



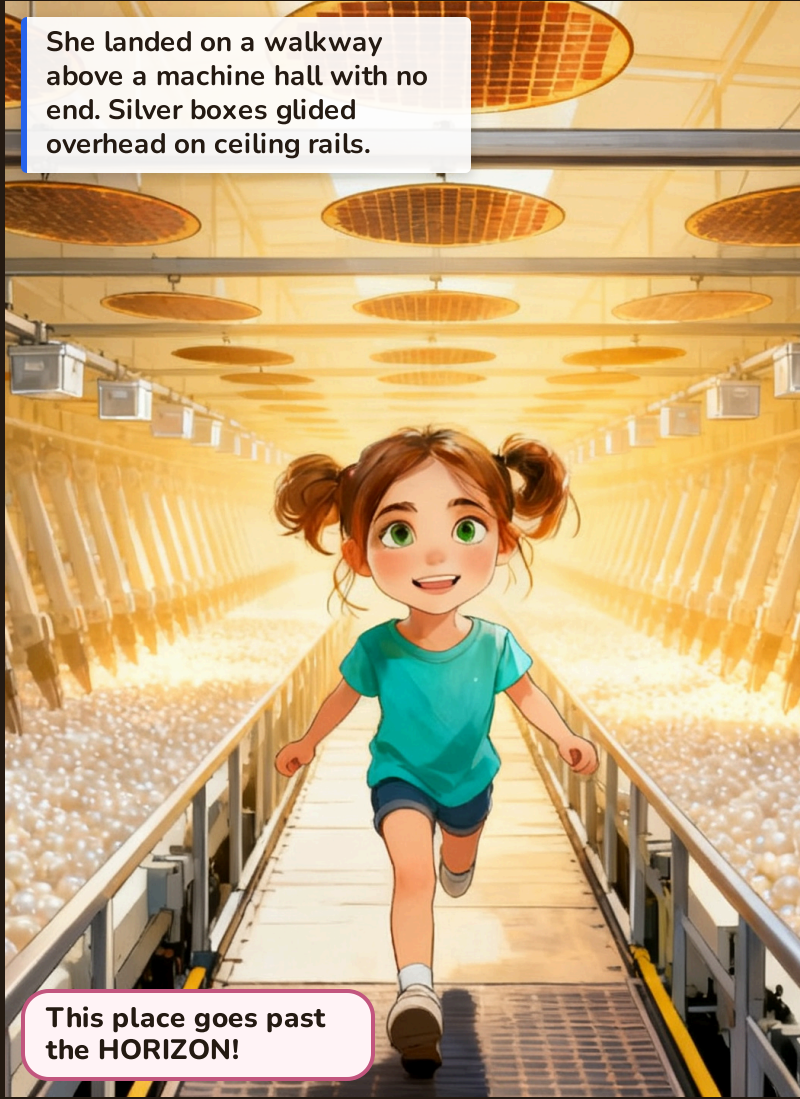
SIRI'S SECRET NOTEBOOK

New mystery! ☐

- ① Who actually MAKES the chips, if not the company on the box?
- ② Grandpa says one quiet company prints the finest ones on Earth. Find them, compass.

THE FACTORY THAT SELLS NOTHING

She landed on a walkway above a machine hall with no end. Silver boxes glided overhead on ceiling rails.



This place goes past the HORIZON!

An engineer waved from below. *"I'm Ling. I help run a foundry — a factory that prints other people's chips."*



Best. Job. EVER.

"Think of a great kitchen. Cooks arrive with their own recipes. We cook every order perfectly — and sell nothing of our own."



You don't have your OWN chip?

Not one. That's the whole point.

★ WORTH REMEMBERING

A **foundry** makes chips designed by other companies. Because it never competes with its customers, rivals can safely queue at the same door — and their orders together pay for machines no single one of them could afford.

📖 SIRI'S SECRET NOTEBOOK

A **FOUNDRY** = a factory with no product of its own. 🔍 Ling says the secret is the not-competing part. First up: what's actually printed on that little square?

THE INVISIBLE CITY

3a Streets too small to see

Ling magnified the chip until it filled the wall. Copper avenues. Blocks of towers. Sparks racing like traffic.

"Lay one human hair down. Across its width you could park thousands of these little buildings."

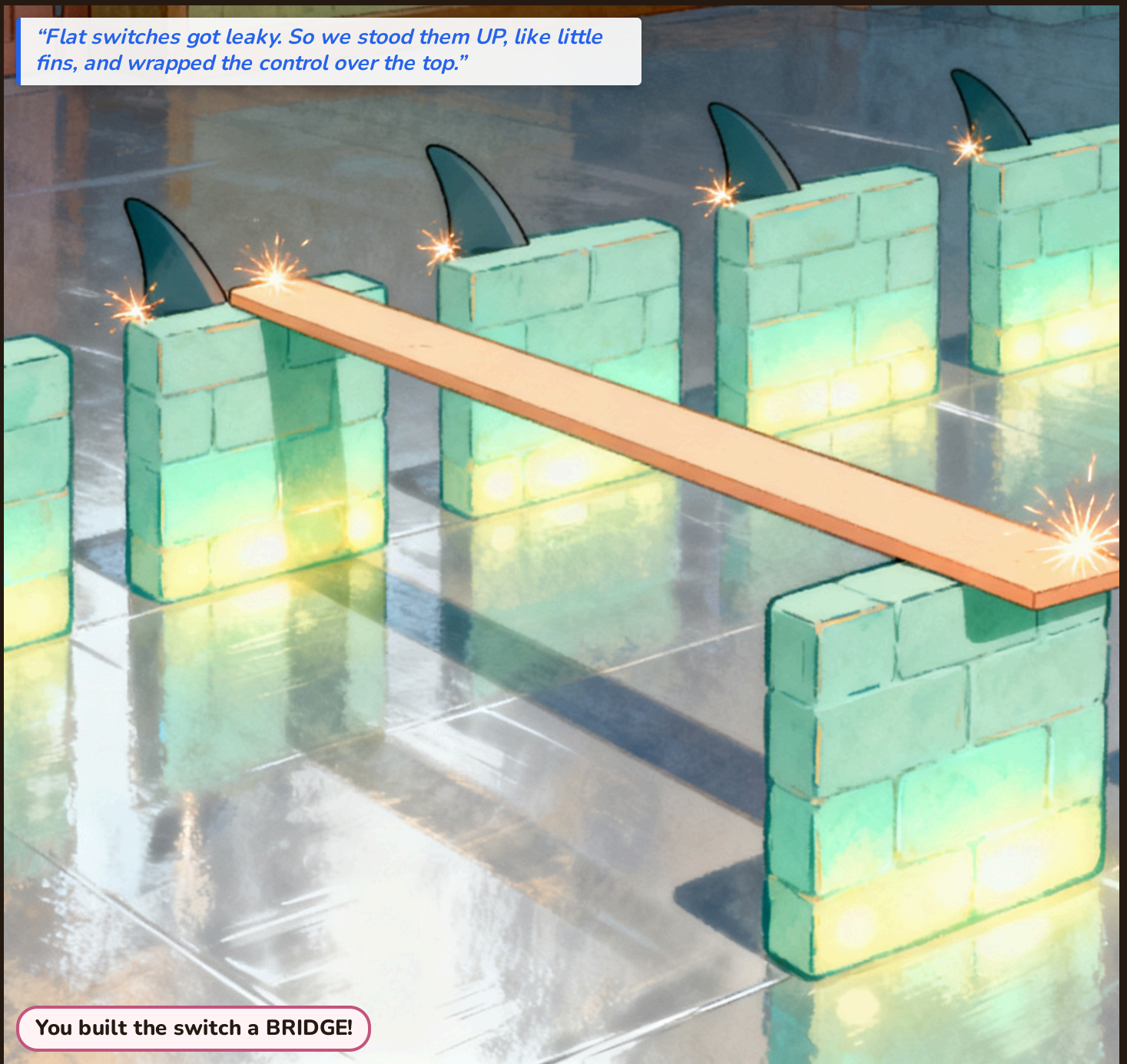
There are **STREETS** in here!

A whole city on a **HAIR?!**

★ WORTH REMEMBERING

A leading chip carries **tens of billions of transistors** — switches thinner than a virus — in a space smaller than a postage stamp. Nobody will ever see this city. It is built entirely for electricity to walk through.

"Flat switches got leaky. So we stood them UP, like little fins, and wrapped the control over the top."



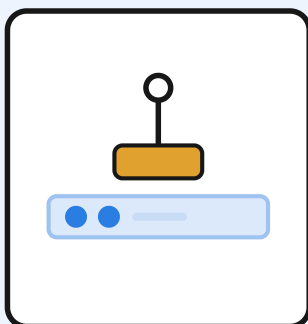
You built the switch a **BRIDGE!**

★ WORTH REMEMBERING

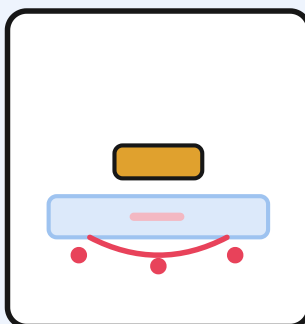
Small switches leak electricity when the gate can only touch one side. Standing the channel up as a fin — later, stacking it as ribbons — lets the gate wrap around it and shut it off properly. Geometry beat leakage. 🧠



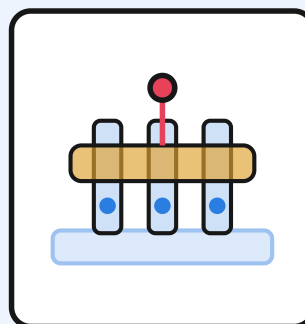
WHY SWITCHES STAND UP



FLAT SWITCH
gate touches one side



TINY: IT LEAKS
sparks sneak underneath



FIN: WRAPPED
gate hugs three sides



SIRI'S SECRET NOTEBOOK

- ① A chip = a city of tens of billions of switches, thinner than a virus. 
- ② Flat switches leak → stand them UP as fins → the gate wraps around and shuts them properly.
Shape is a superpower! ⚡

PRINTING WITH IMPOSSIBLE LIGHT

"You can't carve something this small," said Ling. "So we don't carve. We PRINT — light through a stencil."



The light IS the chisel!

The real machine was the size of a bus, firing light through giant lenses that shrank a huge drawing smaller... and smaller.



Draw the city BIG, then shrink it TINY!

★ WORTH REMEMBERING

This is **photolithography**. A pattern is drawn on a mask, shrunk through lenses onto a coated wafer, and hardened by light so the rest can be washed and etched away. Print, bake, etch, wash — then do it again.

"And for the finest lines we make our own light: a tin droplet, struck by a laser, bursting into a violet star."

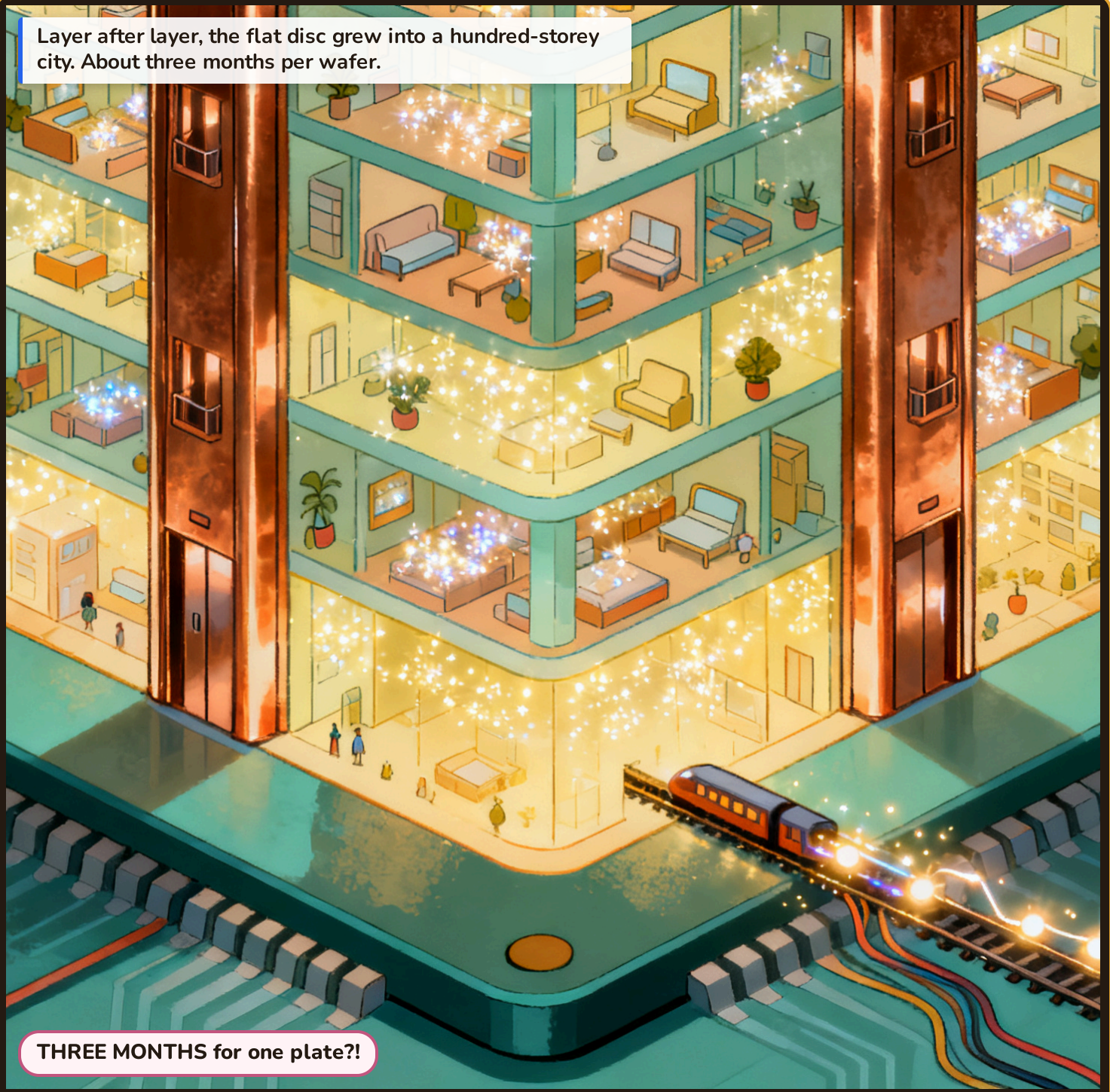


You built a STORM to print a BRAIN.

★ WORTH REMEMBERING

Extreme ultraviolet light is swallowed by glass and even by air — so the whole machine works in vacuum and steers the light with mirrors polished so smooth that, blown up to the size of a country, the biggest bump would be a few millimetres.

Layer after layer, the flat disc grew into a hundred-storey city. About three months per wafer.



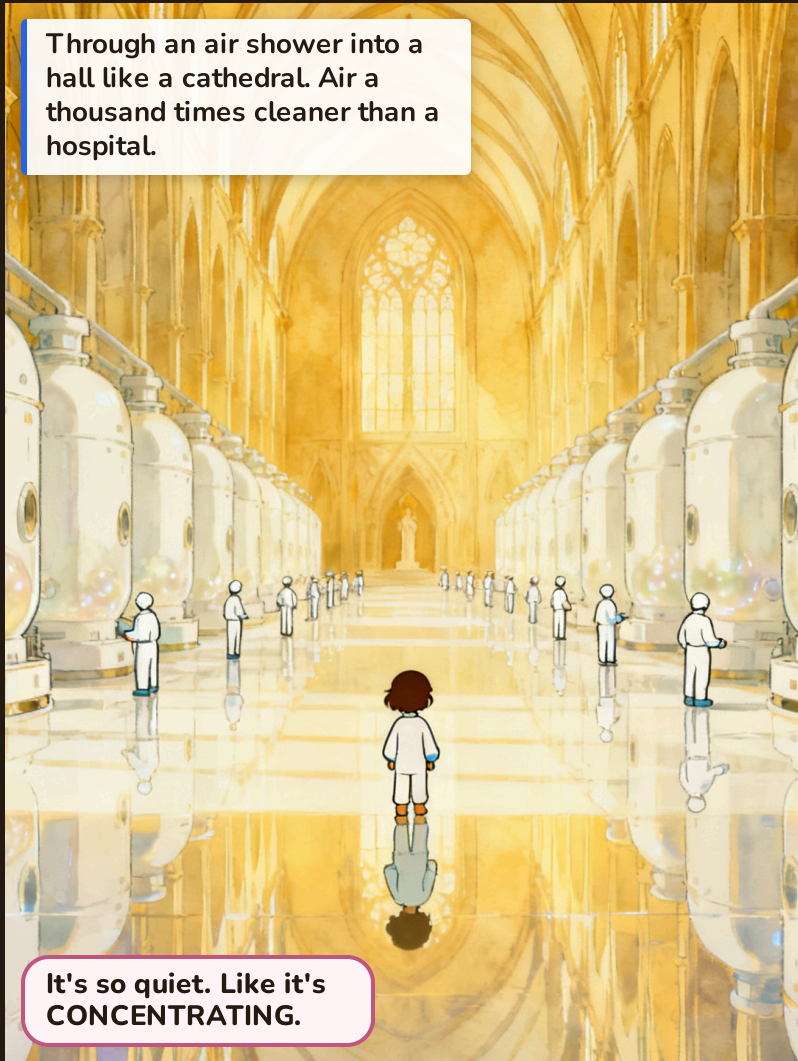
THREE MONTHS for one plate?!

SIRI'S SECRET NOTEBOOK

Don't carve the invisible — PRINT it. Violet light from exploding tin droplets, bounced off impossibly smooth mirrors, in a vacuum, layer after layer, for 3 months. 

THE CATHEDRAL OF CLEAN

Through an air shower into a hall like a cathedral. Air a thousand times cleaner than a hospital.



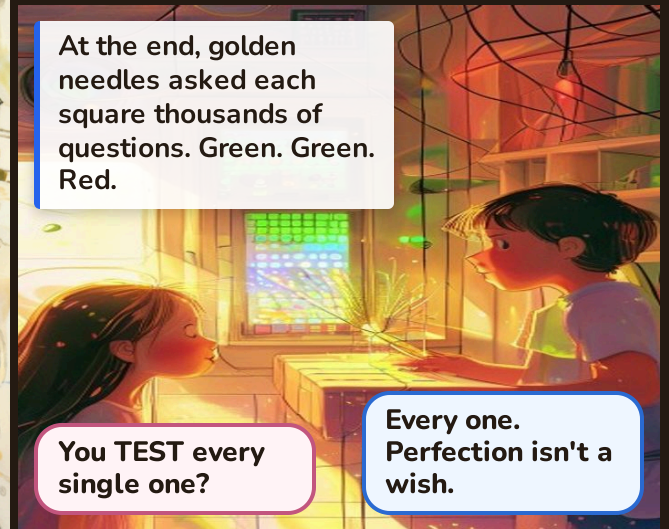
It's so quiet. Like it's **CONCENTRATING**.

"Here a speck of dust is a falling mountain. One speck in the wrong street and that little city never wakes up."



A whole city, killed by **DUST!**

At the end, golden needles asked each square thousands of questions. Green. Green. Red.



You **TEST** every single one?

Every one. Perfection isn't a wish.

★ WORTH REMEMBERING

The share of chips that work is called **yield**, and it is the quiet heart of this business. Two factories can run the same recipe and one earns far more, simply because more of its cities wake up.

★ WORTH REMEMBERING

Yield comes from ten thousand tiny tricks learned the hard way — which is why a working recipe is copied between factories exactly, down to the layout of the pipes. Humility, written as an operating rule.



SIRI'S SECRET NOTEBOOK

Cleaner than a hospital. Dust = a falling mountain. YIELD = how many chips wake up = who makes money. And the recipe is copied EXACTLY, because nobody knows which detail is the magic one. 🧪

WHY THE WORLD COMES TO ONE DOOR

Ling showed her studios full of designers — brilliant teams with big screens and no factory at all.



They design chips...
in a ROOM?

"Before foundries, if you wanted a chip you needed a factory. Now you need an idea and a partner."



So a small team
can build a BRAIN!

★ WORTH REMEMBERING

Companies that design chips but own no factory are called **fabless**. The foundry did not just serve that world — it made it possible. Lowering the price of trying is one of the most powerful things a business can do.

*"And every customer's design is locked in its own vault.
Rivals in the same building, and neither can peek."*



Trust is a WALL?

The strongest one we have.

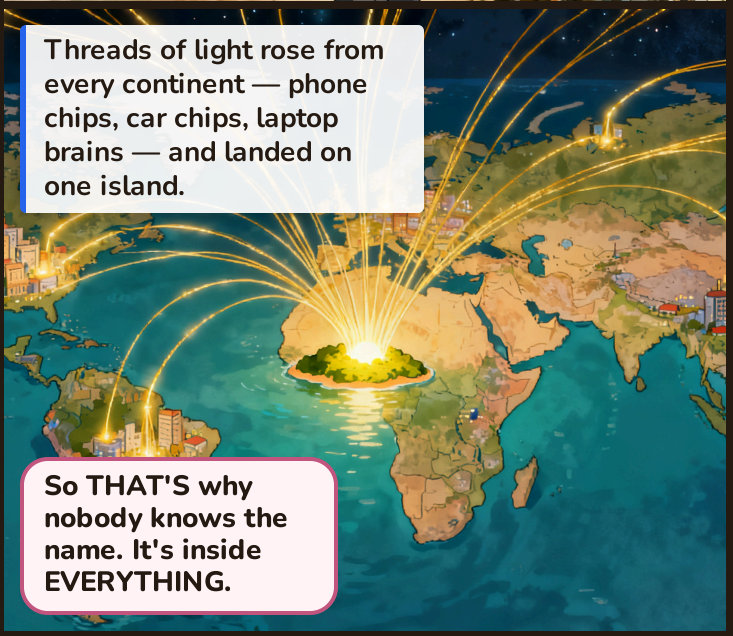
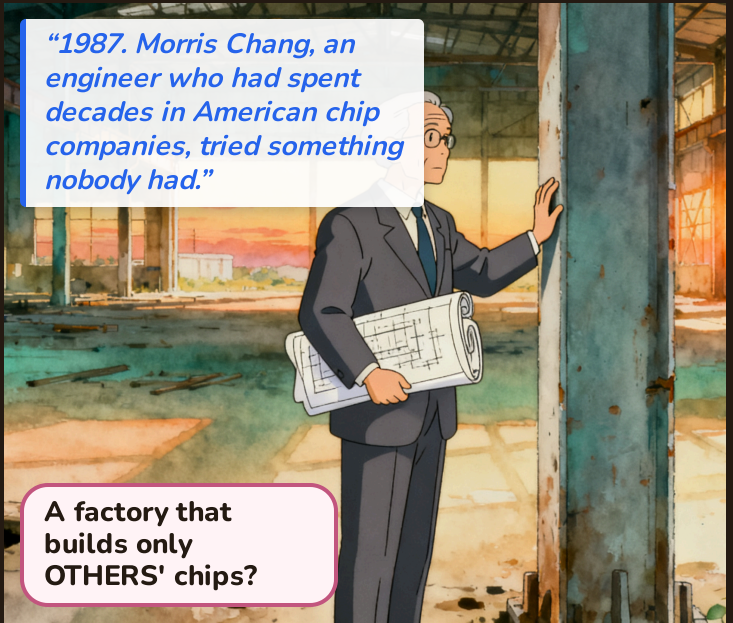
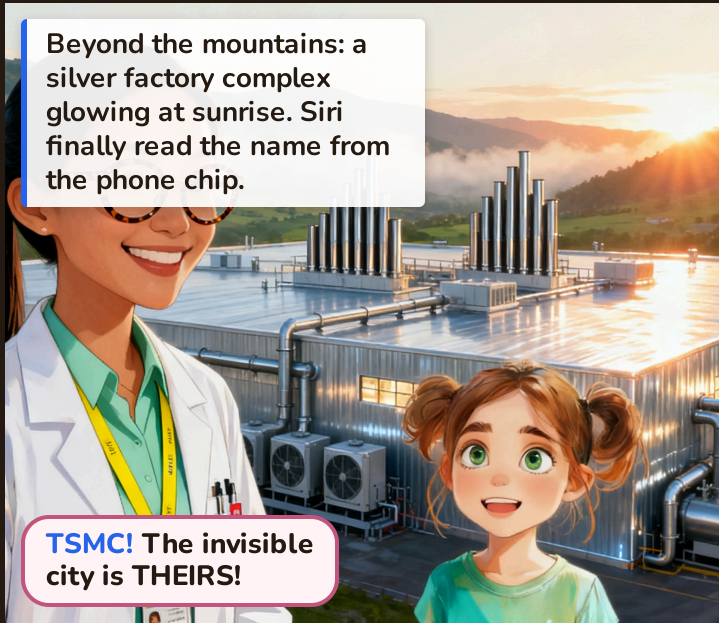
★ WORTH REMEMBERING

Why bring your secret plans to a stranger? Because the stranger never launches a competing product. A foundry that stayed out of the product business turned neutrality itself into its deepest moat. 🙌

📖 SIRI'S SECRET NOTEBOOK

Fabless = design a chip, own no factory. The foundry made small teams possible. And its best wall isn't a machine — it's NOT COMPETING with its own customers. 🔒

THE COMPANY THAT PRINTS FOR EVERYONE



★ WORTH REMEMBERING

The founder's insight was not a machine. It was a **business shape**: separate designing from manufacturing, and both halves get better. Designers stop paying for factories; the factory serves everyone and gets more practice than anyone.



THE STORY IN TIME

1987

Morris Chang founds TSMC as the first pure-play foundry.

1990s

Fabless design companies flourish because someone else will build.

2000s

Foundry capacity becomes the industry's shared backbone.

2011

Leading-edge phone chips move to the foundry model at scale.

2018

EUV printing enters volume production.

2020s

Advanced packaging stacks chips for AI systems.

Today

Fabs rising in Taiwan, Japan, the United States and Europe.

Always

The rule that started it: never compete with your customer. 

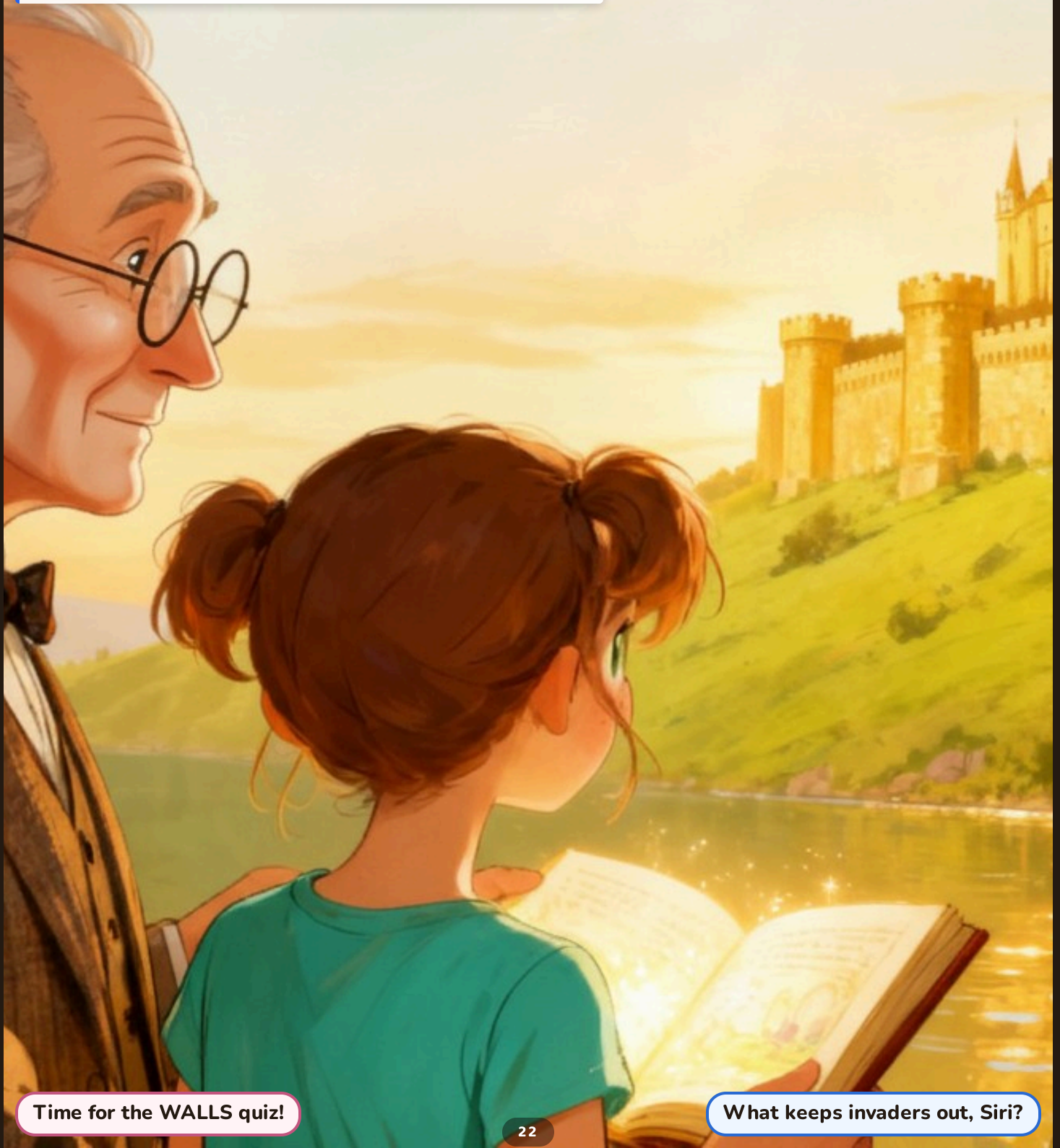


SIRI'S SECRET NOTEBOOK

TSMC. 1987, Morris Chang. The idea: **SPLIT** designing from building. Designers get freedom, the factory gets practice. The most important company I'd never heard of. 

THE CASTLE OF LIGHT

A warm glow. A smell of cherry cola. Warren and Charlie, the partners from Omaha, stood before a shining castle.



Time for the WALLS quiz!

What keeps invaders out, Siri?



THE CASTLE WALLS • WHY RIVALS CAN'T COPY IT



Wall One: Factories Few Can Build

A leading fab costs more than an airport and takes years to fill. Wanting to compete is easy; funding it every single year is not.



Wall Two: Ten Thousand Small Tricks

Yield comes from a decade of learning, copied exactly and improved monthly. You can buy the machines. You cannot buy the decade.



Wall Three: Neutral On Purpose

It sells no product of its own, so fierce rivals trust it with their deepest secrets. Neutrality is a wall competitors cannot copy while selling.



Wall Four: The Whole Village Nearby

Design tools, packaging, testing and thousands of suppliers grew up around it. Moving to a new partner means moving a village.



The Cracks in the Silicon

Enormous new fabs must be paid for years before they earn. Customers dream of second sources. And a factory this important sits where the world's weather — political and literal — can shake it. Castles need defending — daily.

Charlie tapped his glasses. *"Don't ask how to WIN. Ask what would DESTROY it. Then don't do that. Invert, always invert."*



Find the ways to lose... then don't!

★ WORTH REMEMBERING

Charlie's checklist for ruining a foundry: fall behind by one generation. Break a customer's trust once. Build fabs nobody needs. Now — simply never do those. Worry, turned into a to-do list.

Warren raised his cola. *"Some businesses charge a toll on a bridge. This one poured the bridge — and keeps pouring a new one every two years."*



So the treasure isn't the chip. It's the **FACTORY**.



SIRI'S SECRET NOTEBOOK

Walls: fabs 🏢 + hard-won recipes 🍴 + staying neutral 🤝 + a whole village of suppliers 🌐. Cracks: hungry new fabs, customers wanting spares, one very important island. Charlie: INVERT. Warren: some castles get rebuilt forever. 🏰

THE NEXT THIRTY YEARS

"Last question," said Ling. "What does this become in thirty years?" Data halls, quiet cars, helper lights on desks.



Everything is going to want a BRAIN.

On a rooftop at dusk, Siri thought it through the way Grandpa taught her.



Don't bet on the gadget. Bet on the NEEDS.

★ WORTH REMEMBERING

The visible currents: switches stacked as ribbons instead of fins, small chiplets packaged together like bricks, machines printing with even shorter light, fabs rising on several continents, and AI eating more computing than anything before it. 🌐

📖 SIRI'S SECRET NOTEBOOK

2056 watchlist: ribbon switches, chiplet stacks, shorter light, fabs everywhere, AI eating computing. Rule: bet on needs, not shapes. (Also: the most important factory on Earth has no logo on my phone.)

COMING HOME

Her own bed. Morning. The compass: quiet. The house: somehow different.

Was it real? It FELT real...

One fresh line dried on the diary's glowing page.

"The modern world is not magic. It is millions of ordinary people doing small hard things, together, for a long time."

At breakfast the little chip lay beside the milk. Violet light. Fins. Three months. Golden needles.

You're the biggest team project in human history.

She hugged the diary tight. Far away, past misty mountains, a silver factory caught the morning sun.

Show me the next one, Grandpa. ♡

★ WORTH REMEMBERING

Feel the unlock: a city no eye will ever see, printed with storm-light in a vacuum, tested one square at a time, by a company that promised never to compete with the people it serves. **Nothing, from now on, is just anything.**



SIRI'S SECRET NOTEBOOK · WHAT I LEARNED

- ① Designing and building chips are different jobs.
- ② A foundry prints other people's designs.
- ③ Switches stand up as fins so they stop leaking.
- ④ Chips are printed with violet light, in vacuum, for months.
- ⑤ Yield decides who wins.
- ⑥ Neutrality can be a moat.
- ⑦ Invert! And rebuild the castle every two years.





OUR PHILOSOPHY

We believe the greatest gift we can give a child is the ability to think.

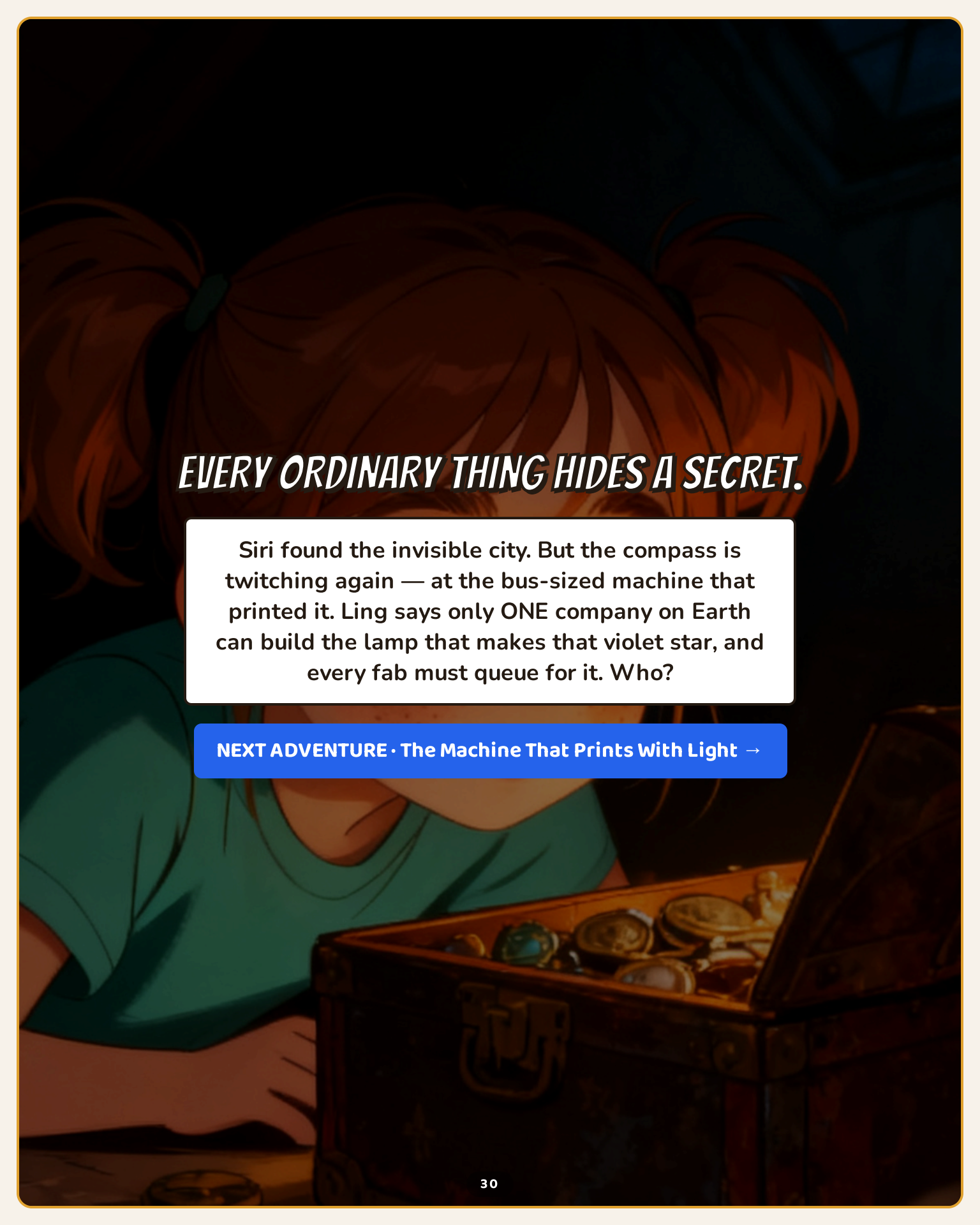
Inspired by the multidisciplinary thinking of [Charlie Munger](#) and the rational, long-term philosophy of [Warren Buffett](#), our comics connect science, technology, business, history, and human behavior to show how the real world works.

Every story begins with a scientific idea and follows its journey into innovation, industry, and the businesses that create value for society. Along the way, children learn that great companies are built on curiosity, experimentation, integrity, and long-term thinking.

Our goal is not to teach children how to invest, but to help them build the mental models needed to understand the world, ask better questions, and think independently.

The companies featured in *The Great Company Adventures* are educational case studies—not investment recommendations. They show how knowledge, innovation, and perseverance turn ideas into products, services, and enduring businesses.

LEARN THE SCIENCE. • UNDERSTAND THE BUSINESS. • THINK FOR LIFE.

A girl with red hair in pigtails, wearing a green shirt, is looking into an open wooden treasure chest filled with gold coins and jewels. The scene is dimly lit, with a warm, golden glow emanating from the chest.

EVERY ORDINARY THING HIDES A SECRET.

Siri found the invisible city. But the compass is twitching again — at the bus-sized machine that printed it. Ling says only ONE company on Earth can build the lamp that makes that violet star, and every fab must queue for it. Who?

NEXT ADVENTURE • The Machine That Prints With Light →