

99% of Big Projects Fail. His Fix Starts With Legos

By Ben Cohen



One way to learn how the world's biggest building projects work—or don't—is to start with some of the smallest building blocks: Legos.

In the 1950s, when Lego decided to make one product the centerpiece of its business, the Danish company went looking for a single toy that could be the foundation of an empire. It picked the colorful plastic bricks that have captured the imagination of children ever since. It was a wise choice. It was also a fitting corporate strategy: Lego turned a small thing into something much bigger.

"That's the question every project leader should ask: What is the small thing we can assemble in large numbers into a big thing?" says University of Oxford economist Bent Flyvbjerg. "What's our Lego?"

He understands the power of Legos better than anybody, and not just because he is also Danish. Bent Flyvbjerg is an expert in the planning and management of "megaprojects," his name for huge efforts that require at least \$1 billion of investment: bridges, tunnels, office towers, [airports](#), [telescopes](#) and even the [Olympics](#). He's spent decades wrapping his mind around the many ways megaprojects go wrong and the few ways to get them right, and he summarizes what he's learned from his research and real-world experience in a new book called "How Big Things Get Done."

Spoiler alert! Big things get done very badly.

They cost too much. They take too long. They fall too short of expectations too often. This is what Dr. Flyvbjerg calls the Iron Law of Megaprojects: "over budget, over time, under benefits, over and over again."

The Iron Law of Megaprojects might sound familiar to anyone who has survived a home renovation. But when Dr. Flyvbjerg dug into the numbers, the financial overruns and time delays were more common than he expected. And worse. Much worse.

His seminal work on big projects can be distilled into three pitiful numbers:

- 47.9% are delivered on budget.
- 8.5% are delivered on budget and on time.
- 0.5% are delivered on budget, on time and with the projected benefits.

It's brutal enough that 99.5% miss the mark in one way or another. But even those stats are misleading. The outcomes are bleaker than they look. Dr. Flyvbjerg has found that the complexity, novelty and difficulty of megaprojects heighten their risk and leave them unusually vulnerable to extreme outcomes.

"You shouldn't expect that they will go bad," he says. "You should expect that quite a large percentage will go *disastrously* bad."

His quest to understand megaprojects began close to home in the 1990s. Denmark was busy with the most expensive construction undertaking in the country's history, the Great Belt megaproject, which consisted of two bridges and a tunnel connecting the nation's most populous islands. It was a big thing that went badly. Deadlines were blown. Plans were obliterated.

Dr. Flyvbjerg was inspired.

But when he asked a basic question about megaprojects, he couldn't find a satisfactory answer. "Despite the fact that trillions of dollars had been spent around the world on projects like this," he said, "nobody knew if they stayed on schedule or budget." The only way to find out was to gather the data for himself.

Over the next five years, he compiled a list of 258 major infrastructure projects, including the Holland Tunnel in New York, the Bay Area Rapid Transit system in California and the Channel Tunnel connecting England and France. What he learned was enough to convince him that Denmark was not an outlier. It turned out that awful performance was perfectly normal.

He wasn't done with the subject after publishing one paper. Dr. Flyvbjerg's unanswered question became an obsession. That [first study](#) became [dozens](#). The original 258 became 16,000 skyscrapers, airports, museums, concert halls, nuclear reactors, roads and hydroelectric dams across 136 countries—not just megaprojects, but projects of all shapes and sizes.

He was eager to put his findings into practice when project leaders consulted him for help.

"I didn't want to be the type of scholar who only writes for academic journals," Dr. Flyvbjerg said. "I wanted that research to be out there in the real world."

What he tells them is that people struggle with megaprojects for a simple reason: They're people.

Humans are optimistic by nature and underestimate how long it takes to complete future tasks. It doesn't seem to matter how many times we fall prey to this cognitive bias known as the planning fallacy. We can always ignore our previous mishaps and delude ourselves into believing this time will be different. We're also subject to the power dynamics and competitive forces that complicate reality, since megaprojects don't take place in controlled environments, and they are plagued by politics as much as psychology. Take funding, for example. "How do you get funding?" he said. "By making it look good on paper. You underestimate the cost so it looks cheaper, and you underestimate the schedule so it looks like you can do it faster."

So how *do* big things get done?

The only thing that fascinates him more than the failings of the 99.5% is why the 0.5% succeed. Dr. Flyvbjerg's lessons that apply to any kind of project, mega or not, include two especially valuable pieces of advice.

The first one: Think slow, act fast.

The irony of megaprojects is that many are late because *not enough* time is spent planning, which is the most efficient way to minimize uncertainty and shrink risk. You don't want to start digging before you know exactly what you're doing. After he landed the job of building the Guggenheim Museum Bilbao in Spain, Frank Gehry experimented with designs and tinkered with models in his studio for two years. [Dr. Flyvbjerg says](#) that meticulous planning was the reason the architectural wonder opened in 1997 on time and under its \$100 million budget.



Guggenheim Museum Bilbao in Spain

But doing big things doesn't require Frank Gehry poring over blueprints. You could just play with Legos.

"It's remarkable what you can do with blocks of Lego," Dr. Flyvbjerg writes. "A block of Lego is a small thing, but by assembling more than 9,000 of them, you can build one of the biggest sets Lego makes."

That's his second piece of advice: Find the Lego that simplifies your work and makes it modular.

"Modularity is a clunky word for the elegant idea of big things made from small things," he writes. "Look for it in the world, and you'll see it everywhere." Everywhere includes "software, subways, hardware, hotels, office buildings, schools, factories, hospitals, rockets, satellites, cars and app stores," he writes. "They're all profoundly modular, built with a basic building block. They can scale up like crazy, getting better, faster, bigger and cheaper as they do."

Tesla's so-called gigafactories and Apple's headquarters are good examples of modular design, Dr. Flyvbjerg says, but the more delicious one is a wedding cake. Bake one layer. Then another. Then another. Then stack them—just like Legos.

"Repeat, repeat, repeat," he writes. "Click, click, click."

One person who saw the promise of modularity before there was a word for it was Godtfred Kirk Christiansen, who ran Lego between 1957 and 1973, a period when the business founded by his father patented the classic block that became an international sensation.

Lego was known for its 265 toys at the time. Mr. Christiansen felt that was 264 too many. He wanted to concentrate Lego's resources and create a *system* around one toy. "One product that was unique and lasting, that could be developed into a wider range of toys that were easy to play with, easy to produce

and easy to sell,” writes Jens Andersen in another recent book, “The Lego Story.” And he knew just the one.

Lego’s bricks were modular. Lego’s business would be, too.

Dr. Flyvbjerg was a child in Denmark whose life was changed by that decision. In fact, whenever he needs to buy a baby gift today, he always looks for the same present.

It’s a small thing to welcome people into a world where they can do big things. “I want to be the first person in their life to give them Lego,” he said.

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