Megaprojects and Risk: A Conversation with Bent Flyvbjerg

Renia Ehrenfeucht

Bent Flyvbjerg is professor of planning at the Department of Development and Planning at Aalborg University, Denmark. He was twice a Visiting Fulbright Scholar at UCLA. His most recent books are *Megaprojects and Risk: An Anatomy of Ambition* (Cambridge University Press 2003), *Making Social Science Matter* (Cambridge University Press 2001) and *Rationality and Power: Democracy in Practice* (The University of Chicago Press 1998). He works as an advisor on questions of megaprojects and risk.

As megaprojects have become ubiquitous, their real benefits and costs have come under increased scrutiny. We interviewed Bent Flyvbjerg, who has extensively studied megaproject development. Flyvbjerg has found systematic problems in the development process: by intentionally misrepresenting information and deliberately disregarding risks, proponents instigate projects that result in fewer benefits and higher costs than promised.

Ehrenfeucht: To begin, what is a megaproject?

Flyvbjerg: A megaproject is a very big project looked at in the context of where it is being planned or built. What is very big? In general, I would say anything above half a billion dollars is a megaproject. If you are talking about a city like New York City, you might need something bigger. A town in the Midwest would consider something much smaller a megaproject. You cannot define a megaproject independent of the context in which the specific project is being planned or built.

Ehrenfeucht: Why might we be interested in megaprojects? What is different now?

Flyvbjerg: I think there are two reasons. More and larger projects of this type are being built. And they have larger and larger impacts.

The question is why is this happening? One reason is that technologically it is becoming possible to build bigger projects. So there is a technological driver. Second, megaprojects are politically attractive because they are tangible and monumental. That's a political driver. Third, large projects have always presented an opportunity to various groups to make large sums of money. For megaprojects these sums are mega-large. This is an economic driver.

Finally, there's an increase in wealth in many countries around the globe. Before you would mainly see megaprojects in Europe and North America. Now other geographical areas are getting into a position where they can pay for this type of project. That's another economic driver and it means that megaprojects are now also being built in substantial numbers in South America, in China, in Southeast Asia and in Russia.

Ehrenfeucht: You have looked at transportation megaprojects, in particular, from which you and your co-authors wrote *Megaprojects and Risk*. How would you characterize megaproject development?

Flyvbjerg: Because of their empirical track record, I have come to think of megaprojects as disaster-prone. It may sound a bit dramatic and I would like to stress at the outset that not all projects turn out to be disasters. But just considering cost overruns, nine out of ten projects end up with problems. Ninety percent! Add to this revenue shortfalls and problems with environmental and social impacts and the picture quickly turns quite dismal.

Why would so many projects end up with problems? Because a "disaster gene" has been built into them. It goes like this. When a megaproject is proposed and appraised, promoters typically overestimate the benefits that will derive from the project and they similarly underestimate the costs. This creates enormous risks with projects. Underestimated costs come back as a boomerang to haunt projects as cost overruns. Overestimates of benefits similarly backfire as benefit shortfalls. In this way, you get a doubly negative effect. On the one hand, cost overruns, on the other hand, benefit shortfalls. In short, risks to the second degree.

I should stress that when I say risks, I mean a wide range of different types of risks. These can be financial risks. They can be environmental and social risks. They can also be safety risks. The safety risks are particularly important for projects where human safety is at stake, like space exploration or the rebuilding of Iraq, if we look at these as megaprojects. The same holds for health and environmental projects in a more indirect fashion.

So the disaster gene is the underestimation of costs and overestimation of benefits that is often built into projects at an early stage, when projects are first proposed. The disaster happens when the gene kicks in during implementation and cost underestimation comes back as overruns and benefit overestimation as shortfalls. The consequences can be dire, as we have seen in both the space program and Iraq. In other megaprojects, fortunately, the disaster does not directly place human lives at risk but is instead limited to financial disaster. But the basic pattern is the same. Ask Bostonians about the Big Dig, or the French and the British about the Channel tunnel.

Ehrenfeucht: Why do you think this is occurring?

Flyvbjerg: We have done research on this, which is reported in the *Journal of the American Planning Association*. There are two main reasons. One is psychological, related to over-optimism, or optimism bias, which has been documented as characteristic of hu-

man decision making. Humans generally have a more rosy view of the future than is warranted by experience. Psychologists call it a cognitive bias. This is an explanation you often see in the literature. Psychologist Daniel Kahneman of Princeton University won the 2002 Nobel Prize in economics developing such explanations. They are certainly valid and may in part explain the megaproject disaster gene.

Even so, psychological explanations are insufficient in my analysis. They are too optimistic in themselves. They look at human beings as well-intentioned, but faulty, and that's nice. But it is not always like that with megaprojects. Working as a researcher and adviser, I come across instances again and again of what is called strategic misrepresentation. "Strategic misrepresentation" is the Orwellian euphemism planners and planning researchers like to use for deception and lying. This is not cognitive bias; it is calculated. So you also have politicians and planners involved in strategically misrepresenting projects in order to get the go-ahead to build them. A project brings immediate benefit to many people, including engineers and architects who develop the projects, planners who plan them, land owners, land developers, construction companies, lawyers, politicians who cut the ribbon. Stakeholders may have an interest in letting a project go ahead, even if it was completely useless, which projects rarely are. But even if a project was completely useless once built, many people would stand to benefit from just building it.

I'm not saying that promoters care only about building projects, but there are strong incentives to misrepresent the costs, benefits and risks of projects in order to get them built, for instance because different groups of promoters are competing against each other for limited federal funds. Therefore, psychological explanations do not fully account for the disastrous outcome of many megaprojects—political explanations are needed as well to account for strategic misrepresentation.

Ehrenfeucht: Why aren't politicians more wary of megaprojects if they have cost overruns and benefit shortfalls?

Flyvbjerg: We have to remember that the period from the initial idea stage to when the project is put into operation is very long. Ten years is not uncommon. You also see fifteen, twenty years. Decision makers may be tempted to say "Well, when they finally cut the ribbon and the problems possibly start occurring, I won't be in office anymore." In fact I just read an article by Steven Weinberg in the *New York Review of Books* in which he interprets President Bush's New Vision for Space Exploration—which is a megaproject if there ever was one—in just this manner.

The problem here is a lack of accountability arising from the long time periods involved. The costs of a possible disaster do not fall on the people who made the decision. The costs and criticism fall on other people who say, "We didn't make the decisions. We're just here now to administer this project so don't criticize us." There's a diffusion of responsibility.

Ehrenfeucht: Could we turn to the question of risk? The book is titled *Megaprojects and Risk*. Why was risk such an important theme?

Flyvbjerg: This is a crucial question. Our research shows that planners and decision makers involved in megaprojects tend to think in a deterministic way and not in a stochastic fashion. They think according to what has been called the EGAP principle: Everything Goes According to Plan. Again, this may be something very human. But it turns out that most things related to megaprojects are stochastic. Most things happen only with a certain probability. When thinking in a deterministic fashion, you end up disregarding risk. This is a major problem with megaprojects.

Ehrenfeucht: What would be different if we were thinking about risk?

Flyvbjerg: Thinking in terms of risk promotes critical and reflexive thinking. It also inserts a healthy dose of empirical matter-of-factness into the planning of megaprojects. You cannot understand risk without understanding probability, and probability is an empirical concept.

For instance, if you think in terms of risk, simple cost-benefit thinking with one figure for costs and one for benefits, and a single cost-benefit ratio, is immediately undermined. Anybody thinking in a risk frame of mind would not accept one figure for a project. Each figure has a certain likelihood and you have to ask what is the likelihood that it will be another figure. This is what risk analysis is about, inquiring, for instance, what is the likelihood that the costs of the Big Dig or of rebuilding Iraq are going to be 50%, 100%, or 150% higher than what the cost engineers came up with? Or if someone says, we believe the Los Angeles Metro will have umpteen thousand passengers a day on the Redline, a person thinking in terms of risk would be critical and ask what is the likelihood we're going to have that number instead of a number half that size? Thinking in terms of risk means thinking in terms of alternatives, and alternatives tend to problematize deterministic thinking.

Ehrenfeucht: What drives the deterministic thinking? The people who immediately benefit?

Flyvbjerg: My point of departure in thinking about risk is as a power researcher. I'm interested in power—political power, power in planning, organizational power, institutional power. When I see a seemingly dated way of thinking, like thinking deterministically about megaprojects, I relate it to the issue of power. "Cui bono?" as the Romans asked, "Who benefits?" Who has an interest in the situation looking the way it does? When a phenomenon appears strange—and it is strange to have highly educated people like engineers, economists and planners treat megaprojects like this—the question I ask is, are these people uninformed or are they acting in a calculated manner? I know they are not uninformed because I'm trained as a planner myself and I train planners. That leaves calculation. Research confirms this.

Behind calculation, what are the interests? Who is interested in not dealing with risk? Well, people interested in making a project look good on paper in order to have it approved and built would be interested in ignoring risk—financial, environmental, social, safety—because risk has a price, as we all know from insurance. So ignoring risk is ignoring a part of the total costs, and our research shows this to be a substantial part.

Here it is also important to remember that most megaprojects are subject to the logic of sunk costs and the point of no return. It is difficult to drop a project once it has reached a certain stage because the costs sunk in the project are now too high and non-retrievable. If you have a billion-dollar project, once you have put in a hundred million, and you find that the project will now cost 1.5 billion dollars, you rarely stop. This is why partly finished bridges are so rare. Seasoned promoters know this when they plan their projects. The consequences of ignoring risks do not become clear until it is too late, so it is possible to ignore them and still get the project built.

Ehrenfeucht: In *Megaprojects and Risk*, why did you look at transportation infrastructure projects?

Flyvbjerg: First, the book grew out of a research project where transportation was our focus. We were interested in understanding and improving planning and management in large transportation infrastructure projects. In addition, we wanted to have a sharp focus because we wanted to dig quite deep, deeper than had been done before, regarding the economics and politics of planning these projects.

At the same time, we compared transportation projects with other project types, including power plants, water projects, dams, oil and gas extraction projects, IT systems, aerospace projects and even weapons systems. We looked at several hundred other projects based on other people's studies, and we found that the patterns we were uncovering for transportation infrastructure projects were generally found in the other areas as well. This led us to conclude that the pattern we uncovered is quite general. Later research has further confirmed this conclusion.

Ehrenfeucht: What is the role of planners in this process?

Flyvbjerg: As planners, planning students and planning researchers, we like to think of planners as people doing the right thing, just as other professions like to think positively of themselves. But this is too simple for a researcher looking critically at megaprojects. Therefore I would like to distinguish between planners who are interested in doing things right—having a proper planning process, producing information that is not misinformation, working for the public interest as their code of ethics say they should do—and the situation where planners actively take part in the rent-seeking behavior that is typical in many megaprojects. Rent-seeking behavior is actions aimed at making a profit—economic or political—for a certain stakeholder group, regardless of the overall benefits and costs of a project. In the first instance, planners may make a genuine contribution to proactively improving the planning and decision-making process for megaprojects because, as a

profession, they clearly have the knowledge and tools to do so.

In the second situation, planners are basically part of the problem, not the solution. By participating in rent-seeking behavior they contribute to megaproject disasters, or to making megaprojects more risky than they need to be, instead of preventing disasters and reducing risks. I am unhappy to say this situation is quite common. For a democratically minded person, here the question becomes how to force checks and balances on planners to make them accountable, that will punish them when they do the things with megaprojects they are not supposed to do according to their code of ethics and according to the basic rules of democratic governance, and that will reward them when they do the right thing. You asked me about planners, but this goes for all groups involved in a project. And it is not different from other areas in society subject to rent-seeking behavior and the misuse of power. In democratic societies we seek to eliminate or reduce such behavior by measures of accountability.

Ehrenfeucht: How could we improve accountability in megaproject development?

Flyvbjerg: There are two basic types of accountability. One is related to the public sector, the other to the private sector. Let's take the public sector first. Here the main means of accountability is transparency. But there is little transparency in megaprojects, so we need to make these projects more transparent. This is a paradox in planning. The smaller a planning project is, the more transparency, the more public participation, etc. The larger the planning project, the less transparency and participation. Civil society is often kept out of the megaproject planning process, more so than for other planning. That is a problem to do something about and this may happen in a number of ways.

First, all information on megaprojects should be subject to independent peer review. As we talked about earlier, you cannot trust the information produced by promoters because it is often biased to make their project look good on paper with large benefits and low costs. Independent peer review could be carried out by national audit offices, ministries of finance or by independent panels of experts, as was the case for environmental impacts of the Øresund and Great Belt Bridges in Scandinavia. Independent peer reviews are crucial for credibility and public debate.

Second, it is important to systematically compare forecasts for a given project to forecasts and outcomes for other similar projects that have been completed. This is what we call reference class forecasting. Central to any megaproject is a cost-benefit analysis. Central to that analysis are forecasts of costs and benefits. Each of these should be made subject to reference class forecasting.

Third, peer reviews and forecasts should be made available to the public. It is a problem today that information is closed and you cannot get access to it, sometimes even if you are working on the project or for the government agency which promotes it. I know this from personal experience. If you're on the

outside, it is virtually impossible, even if you attempt to use the freedom of information act.

Fourth, public hearings, citizens' juries, scientific conferences and review panels should be used much more widely to generate transparency. This has been done in Denmark and Sweden with great success regarding environmental impacts of megaprojects. So we do not see only negative experiences with megaprojects. We see success stories too. From one project out of ten we may learn positively how to do things better.

Finally, forecasters and planners should come from organizations that will be penalized if the forecasts and plans go wrong. This will create an incentive to get forecasts right. This incentive is often not there today or, even worse, the incentive works in the opposite direction: you are rewarded for making rosy forecasts and plans.

Ehrenfeucht: And what about private sector accountability?

Flyvbjerg: In the private sector, in business, the main means of accountability is not transparency but competition. If you know how to compete you win, if not you lose out. And without competition accountability suffers, for instance in the case of monopolies. This is all standard fare, but what does it mean for megaprojects?

Well, if you get the private sector to invest in megaprojects, it will be private money that is placed at risk, not taxpayers' money. One reason many public projects disregard risk is that they pass it on to the taxpayer and then act as if the risk did not exist. If you bring in private capital—we recommend at least a third, also for subsidized projects—the people who own that capital will critically scrutinize what planners and managers do with the money. The normal mechanisms of the financial markets will come into play and they are typically better at enforcing financial accountability than mechanisms found in the public sector.

Moreover, even where private accountability fails to contain the disaster gene we talked about earlier, as has happened for the privately owned Channel tunnel, there is the additional advantage that losses are limited to those who have decided to invest in the project. They pay if the disaster gene kicks in, not the taxpayer.

Ehrenfeucht: Do planners have a personal and professional responsibility? Do ethics matter?

Flyvbjerg: Definitely. Megaprojects offer a wonderful opportunity to study planners' ethics and what elsewhere I have called the dark side of planning. Our studies show that in many projects planners do not live up to their codes of ethics. Some of the checks and balances we already talked about would help remedy this situation. But there is also the question of professional ethics in relation to our professional organizations, and to what extent these organizations take their codes of ethics seriously by actually enforcing them.

If you look at the American Institute of Certified Planners' Code of Ethics and Professional Conduct,

planners must strive to provide full, clear and accurate information on planning issues to citizens and governmental decision-makers. Planners must also serve the public interest. The British Royal Town Planning Institute has a similar code of conduct. If such codes are to have practical import they must be enforced by rewarding planners who follow the codes and punishing those who don't. This would help improve megaproject planning and decision-making. As I said, today the incentive structure is the exact opposite for many megaprojects: planners are often rewarded for being unethical.

Our research shows, for instance, that for seventy years transportation planners have consistently and predictably got their forecasts wrong by the same large margin. It is difficult to imagine that medical doctors would be allowed to make similar "errors" decade after decade in producing prognoses for a certain disease in the face of evidence that the prognoses were consistently and systematically biased. That would be malpractice. So it is in planning, in my analysis.

But as the American Planning Association states up front on its homepage: "Ethical planning isn't always easy." But what's the alternative, unethical planning? It is clear that we must resist this as a profession. It is equally clear that currently we are not doing enough when it comes to megaprojects.

Ehrenfeucht: How are non-professionals, civil society, currently involved in megaprojects? And what could be better?

Flyvbjerg: Studies show that civil society generally, and especially the poor and disadvantaged, are not sufficiently involved in the planning process. Poor people are often hurt by megaprojects, I'm sorry to say. To add insult to injury, they are sometimes even actively excluded. This is the opposite of transparency and participation. Patrick McCully's and Arundhati Roy's studies of dams document the problem for the planning of very large water and energy projects. A number of case studies of smaller, but still large, urban infrastructure and services projects in Pakistan, Bangladesh, India and Ethiopia show similar results: social impact analysis cannot be trusted, the poor are not considered, hundreds of thousands of livelihoods are disrupted or lost with no immediate prospect for reemployment.

What to do about that? Again we have to think in terms of power. Technical solutions are not the prime concern in such situations, even if they may matter as they relate to power, for instance, as counter-proposals to the proposals of power. We have to do what people have always done when dissatisfied with the misuse of power: organize and fight back with the means available to us.

As mentioned in the introduction to *Megaprojects and Risk*, we wrote the book with the hope that activists and local communities affected by megaproject development would find useful insights in the book, for example, regarding the deceptions and power games they are likely to meet and possible counter measures. We are happy to see that the book is now actually being used like this. For instance, I recently re-

ceived a note from a volunteer activist in Pakistan asking for a copy of the book. He explained he wanted to use the book in a campaign against the building of big dams in Pakistan. These dams are leading to more deprivation and more poverty for the average citizens, and more opportunities for corruption and embezzlement by the public officials and elite.

These are his words, not mine, but I think they are a pretty good description of the problems in a development setting. They also point a way forward, however, in organizing. And I am delighted that there is a role in this, even if it's admittedly a small and marginal one, for something as unfashionable as an academic book.

What the book has to offer to those confronted with a megaproject is collective knowledge from a large number of projects. Most people who are confronted by a megaproject have this experience only once in a lifetime, perhaps twice, decades apart. This means there is little opportunity to gain useful experience before it's too late. The people who build megaprojects, on the other hand, do so all the time. They have lots of experience. This asymmetry in experience and knowledge all too often translates into an asymmetrical power relationship and places civil society in a loser's role.

So, if you are confronting a megaproject, it is important to know the experience from other megaprojects and about their pattern. It is not a simple thing, for instance, for a local resident to stand up to a megaproject cost engineer who says the costs would be 500 million dollars, and say "Studies have found that in nine out of ten cases such budgets are underestimated, and most likely the costs will be 750 million. What do you say? Would the project still be viable with this cost?"

Megaprojects are going to continue so it is important that stakeholders, including the stakeholders who might be hurt, stand up and stand up early. People often do not start protesting until construction begins on the site, unfortunately, and then it is too late.

Ehrenfeucht: Finally, could we talk a little bit about rebuilding Iraq? You wrote a piece about it.

Flyvbjerg: Yes, when the war began and the plans for rebuilding Iraq were being developed, I took a look at the projects involved in the reconstruction effort. They were projects of the kind that typically have large cost overruns in any setting. If you add to this that the reconstruction effort would be pressed for time, would be very complex, would take place in a developing nation just ravaged by war, and would be a possible target for terrorist attacks, it was clear to me that the megaproject of rebuilding Iraq from the outset was burdened with the disaster gene we talked about earlier. Human life would be at risk, costs were likely to skyrocket, the planned benefits would be hard to realize. Later developments have shown this analysis to be correct. The disaster gene has kicked in and the world is holding its breath, waiting to see what happens next in Iraq, and outside.

Moreover, as with other megaprojects, there are groups who stand to benefit no matter what the outcome is—those companies, like Halliburton, which have been in a position to secure contracts, and the consultants who helped them prepare the bids. Huge profits are being made and these groups may laugh all the way along their well-trodden path to the bank. Even at this level of mundane detail, the reconstruction of Iraq follows the pattern found in other megaprojects.

Ehrenfeucht: You suggest that the outcomes would not be better under the UN. Do you have some thoughts on how a process could occur that would benefit those most affected?

Flyvbjerg: I'm not an expert on international relations, so I have to be careful with what I say. But clearly the UN is not known for its efficiency in administrative matters, in fact, quite the opposite. Also, even within the UN, senior officials admit that the organization does not have the capacity or experience to administer a country the size of Iraq. This is why I'm skeptical of the UN, even though the UN should undoubtedly play a role. Perhaps four or five major countries, assisted by the UN, would be a way forward. What I would like to see is an attempt to learn from past experience and here I think Germany and Japan after World War II would be good models to look at.

As a planner and planning researcher, I'm sorry to see that my analysis of the reconstruction effort was so quickly proven depressingly correct. As a citizen in an increasingly globalized world, I hope things will not end up in a complete mess, in a new Vietnam. Fortunately, that's not where we are at present. And it's important we don't get there.

RENIA EHRENFEUCHT (reniae@ucla.edu) is a doctoral candidate in urban planning at UCLA.