

Survival guide to challenging costs in major projects

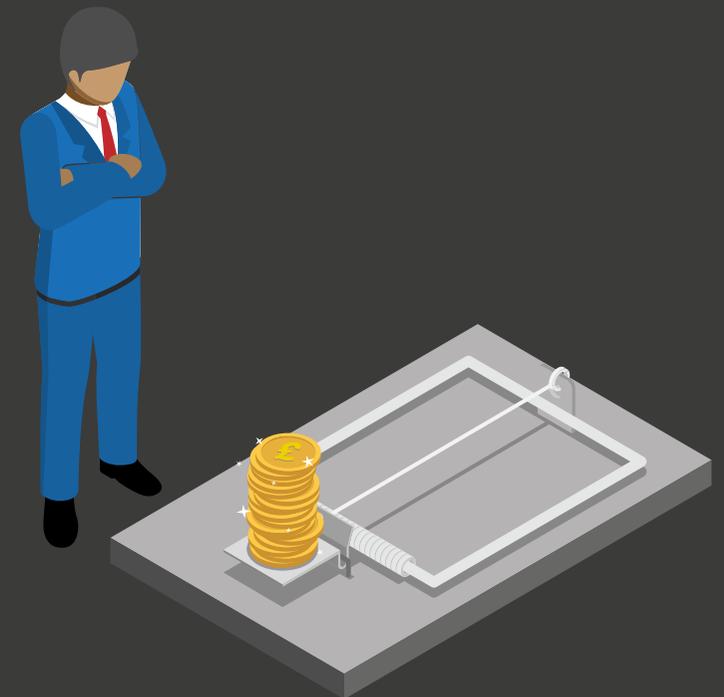
About this guide

This publication outlines some of the challenges in estimating and managing costs that we have observed in our work on major projects. It offers Accounting Officers and senior decision makers some ground rules and thoughts on factors to consider when challenging costs.



INTERACTIVE PDF

For full functionality on iPad
view with Good Reader



Survival guide to challenging costs in major projects

The challenge

How this guide can help you

Reasons to be careful

How to survive

Toolkit

NAO Support

The challenge

Setting up and managing major projects is more difficult and challenging than ever before

The infrastructure projects that government is now delivering, such as High Speed 2 and Hinkley Point C, are bigger, more complex and ambitious and will be delivered over a longer timescale than those delivered in the UK for many decades. This creates particular challenges around the management of cost.

Ministers', Parliament's, the Press's and the Public's demands for successful delivery remain high, but are not always aligned with each other, reflecting different stakeholders' expectations or priorities.

For example, we see:

- Increased complexity and an appetite for innovation creating more uncertainty, which makes it more difficult to produce estimates;
- Pressure to make firm commitments early on about how much a project will cost; and
- A tendency towards optimism from project teams over what can be delivered and how much it will cost.

Any of these factors can set a project up for failure right from the start, and put value for money at risk.



Survival guide to challenging costs in major projects

The challenge

How this guide can help you

Reasons to be careful

How to survive

Toolkit

NAO Support

How this guide can help you

The National Audit Office's work shows that poor estimating and cost control on projects impacts on value for money. This can be on individual projects where it causes delays thus reducing benefits. More widely funds can be diverted from other priorities, similarly delaying future investment in other important projects.

We know that Accounting Officers are well aware of their duties under Managing Public Money and have Accounting Officer's Responsibilities training through Civil Service Learning. We also know that they have many other concerns to consider and weigh up when making decisions about a project, and that in these circumstances it can be hard to spot the warning signs. This survival guide is based on observations from our work of what can lead to actual and apparent cost growth and seeks to help by:

- offering tips on the early warning signs; and
- suggesting challenges to over-enthusiastic sponsors and project teams that you might want to make to help protect you and your minister.



Survival guide to challenging costs in major projects

The challenge

How this guide can help you

Reasons to be careful

How to survive

Toolkit

NAO Support

Reasons to be careful

- **Ministers are close to the executive role.** Ministers get involved in executive decision making more often and this can confuse accountability, and lead to decisions not being sufficiently tested.
- **Risk and over-optimism comes at a cost.** You can't spend money twice. For example is a 50% chance your project will cost more than you think an acceptable level of risk?
- **Cost increases on major projects means there is less money for other priorities.** Is that what you and your minister want?
- **Beware of 'entryism'.** If a project is not realistically costed once it is in the programme it will be hard to cancel.



Your **personal judgement** is published in accounting officer assessments

Have a healthy scepticism about early cost estimates and an appreciation of the possible down side scenarios, to address over optimism and spare you some bad press.



There is **greater scrutiny** throughout the project's lifecycle

This is all against a background of more intense public scrutiny with both immediate and long term lasting and personal reputational risks to Accounting Officers. For example, Accounting Officer Assessments are now mandated on all GMPP projects ([see guidance](#)) and the National Audit Office is auditing projects throughout their lifecycle, meaning accountability for decisions increasingly happens while Accounting Officers are in post.



So what?

When you agree to proceed with a project, you are making a personal judgement up front that it represents a good use of public money. You can be called back and held to account long after you have moved on. Making an irreversible commitment at an early stage on the basis of uncertain information that turns out to be over-optimistic may mean years of negative press coverage, critical NAO reports and uncomfortable PAC hearings.



The Warning Signs we've noticed at project initiation



Project failure in value for money terms is often built in when a project is initiated. For example, we have observed that government is often too quick to arrive at a preferred solution, rejecting alternatives that may prove better value. Teams can also be under pressure from ministers or others to make early commitments about what a project will cost.

The Green Book gives a structure for appraising projects so that decisions are evidence based and consider VFM, but we have found that **the following warning signs** often mean greater risk to costs on a project and so you need to dig deeper.



A minister or sponsor suggests a **ground breaking project**

These are inherently more risky and much more difficult to cost. Low risk projects with proven methodologies and existing supply chains have a greater chance of success.



A project offers **soft benefits that take decades to deliver**

Be wary if multiple benefits seem to be lumped in to the same project or if a project relies heavily on soft benefits. Hard costs need hard benefits.



Your team gives you a **point estimate**

There can be no certainty about what a project is likely to cost if its scope is uncertain. Early cost estimates should be presented as a range, never a point estimate. They should take account of all risks; reflect costs under different scenarios and there should be clear red lines showing when it becomes unaffordable.



Your sponsors have **vested interests**

There may be incentives for project sponsors (or contractors) to deliberately underestimate what a project is likely to cost in order to secure its approval. Or they may simply be over-optimistic.



Alternatives are ruled out too early

We have found options appraisals where alternatives have been excluded, for example on policy grounds, but without a thorough evaluation of costs or limited evaluation of the costs of rejected alternatives.

How to survive 2/3

The Warning Signs we've noticed after the initial decision to proceed



As a project enters the planning and execution phases, there may be signs that costs are set to increase. Before you know it, you could find yourself focussing on trying to make a project appear successful rather than on delivering a successful project.



Your commercial team says "don't worry, the **contractor bears all the risk**"

Government is almost always risk bearer of last resort so be wary of risk sharing arrangements where the contractor bears all of the construction risk. The contractor will always have the option of walking away; government doesn't. Consider the cost implications in the event that government has to intervene.



Your delivery team asks you to **release funds early**

If projects have ear-marked contingency or have requested to draw down on funding reserved for construction during pre-construction phases, the project may be under financial pressure.



You're told that cost overruns can be solved by **delaying projects**

There may be justifiable reasons for a project's costs to go up and the department may have to adjust timescales to stay in budget. But this may be part of a wider pattern and delaying projects can be costly if, for example, contractors are kept on board for longer than planned.



You're told not to worry about rising costs as the **benefits are also increasing**

This may be a case of keeping up appearances rather than new benefits identified.

Survival guide to challenging costs in major projects

The challenge

How this guide can help you

Reasons to be careful

How to survive

Toolkit

NAO Support

Do's and don'ts

Many, if not all programmes aspire to transparent reporting, good cost forecasting and continuous monitoring of costs, but we have observed that too often the need for these activities is only really recognised when a department faces a crisis in affordability, or when things have gone wrong or there is exceptional pressure to do so, for example at spending reviews.

Some do's and don'ts for managing costs during delivery:



Demand performance updates

You should expect a baseline against which to measure a project's performance. Your teams should keep you up to date as to whether projects in your department are delivering to time and budget, and on the status of critical risks. [Crossrail](#) (Jan 14).



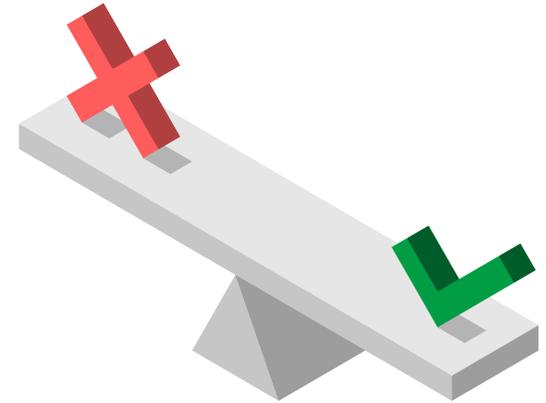
Don't wait for costs to overrun before you look for savings

Project teams should give as much time and attention to cost and driving out value as they do to time and quality.



Encourage consistent and transparent data

Too frequently we see cost information used for different purposes that is not easily reconciled. For example cost data reported in the government Major Projects Portfolio may contradict costs reported in the National Infrastructure Pipeline.



Survival guide to challenging costs in major projects

The challenge

How this guide can help you

Reasons to be careful

How to survive

Toolkit

NAO Support

Toolkit ^{1/2}

Useful questions to ask

It is not always easy to know how to challenge costs on major projects. Here we have provided some key questions that you could ask at different stages of the policy and project lifecycles.



Looking at cost estimates

- What have similar projects cost?
- Why is the estimate not expressed as a range?
- Could sponsors have turned a blind eye to upper estimates for fear that they may be perceived as unacceptably high?
- Are there incentives that might cause sponsors to underestimate the likely cost?
- Are you satisfied that the project is affordable?
- Are you confident that 'non-preferred' options would not offer better value?
- Is the cost to service users going to be affordable?

As the project progresses

- What would be the impact on the project and its business case, or other business activity, under different cost overrun scenarios (eg at a 30%, 50%, 100% or 200% overrun)?
- Where are the red lines? At what cost does the project become unaffordable or unviable?
- Experience suggests that government is always risk bearer or last resort. What assurance do you have that government is not exposed?

Demanding greater control

- What evidence do you have that the project is delivering to cost, time and schedule?
- What is the impact of any delay on costs and long term value?
- What is the status and impact of critical risks and how are they being managed?
- Does the cost estimate against which the project's performance is being measured still look achievable and is the project still affordable?
- Why has the benefits case improved? What has changed?

Survival guide to challenging costs in major projects

The challenge

How this guide can help you

Reasons to be careful

How to survive

Toolkit

NAO Support

Costing glossary

Base case	The best estimate of how much a proposal will cost in economic terms, including an allowance for risk and optimism.
Bottom-up estimating	An estimating technique based on making estimates of every work package (or activity) in the work breakdown structure and summarising them to provide a total estimate of cost or effort required.
Comparative estimating	An estimating technique based on the comparison with, and factoring from, the cost of a previous similar project or operation.
Cost performance index	A measure of the cost efficiency of budgeted revenues, expressed as a ratio where $CPI = \text{Earned Value} / \text{Actual cost}$. If CPI is less than one, the project is over budget.
Delivery confidence assessment (DCA)	An indication of the likelihood of the successful delivery of a project. This is usually given as a "RAG" rating, where red is 'unachievable', amber-red is 'in doubt', amber is 'feasible', amber-green is 'probable' and green is 'likely'.
Downside scenario	This might also be known as the 'worst-case scenario'. This might be calculated as part of a 'what-if analysis' which predicts how changes in inputs (for example delivery of supplies, availability of personnel) can affect potential outcomes.
Earned value analysis	Analysis of project progress where the actual time/cost budgeted and spent is compared to the value of the work delivered (where should we be for the amount spent?).
P50 confidence level	A project costed at the P50 confidence level means that 50% of estimates exceed the P50 estimate and that, by definition, 50% of estimates are less than the P50. In other words, it is a middle estimate (but not the mean).
P90 confidence level	A project costed at the P90 confidence level means that 90% of the estimates are less than the P90 estimate and 10% of estimates exceed than the P90.
Parametric estimating	An estimating technique that uses a statistical relationship between historic data and other variables (for example square meterage in construction, lines of code in software development) to calculate an estimate.
Qualitative Risk Analysis	The process of scoring risks based on their likelihood of occurring and the impact on the project in the event that they do occur. They are normally expressed as a ranked scale, say between 1 and 5.
Quantitative Risk Analysis	The process of expressing the impact of a risk on the project into numerical values. Quantifying impacts to schedule, cost or performance should enable effective mitigation strategies to be put in place or appropriate contingencies calculated.
Top-down cost estimating	The total project cost is estimated based on historical costs and other project variables and then subdivided down to individual activities.
Total float	Time by which an activity may be delayed or extended without affecting the total project duration or violating a target finish date.

Common acronyms

AC	Actual Cost
AFC	Anticipated final cost
BAC	Budget at Completion
BCWS	Budgeted Cost of Work Scheduled
BOE	Basis of Estimate
BPR	Baseline Performance Review
CPA	Critical Path Analysis
CSF	Critical Success Factor
CTR	Cost-Time Resource
ECC	Estimated Cost to Complete
EFT	Earliest Finish Time
ESA	End Stage Assessment
ICE	Independent Cost Estimate
IRR	Internal Rate of Return
LCC	Life Cycle Cost
NPV	Net Present Value
ROI	Return on Investment



National Audit Office

Survival guide to challenging costs in major projects

The challenge

How this guide can help you

Reasons to be careful

How to survive

Toolkit

NAO Support

NAO Support

How the NAO can help

If you would like to learn more about any of the points raised in this guide or would like any further information concerning our reports on the estimating and managing of costs on major projects then please contact us or visit our website:

Contact details



enquiries@nao.gsi.gov.uk



+44 (0)20 7798 7264

Visit our website

We publish a number of reports each year that focus on government's management of major projects.



www.nao.org.uk

References



[Modernising the Great Western railway](#) (Nov 16)

[The Sheffield to Rotherham tram-train project: investigation into the modification of the national rail network](#) (Jul 17)

[The Equipment Plan 2016–2026](#) (Jan 17)

[Major Projects Report 2015 and the Equipment Plan 2015 to 2025](#) (Oct 15)

[Major Projects Report 2011](#) (Nov 11)

[Progress with the Road Investment Strategy](#) (Mar 17)

[Investigation: the Department for Transport's funding of the Garden Bridge](#) (Oct 16)

[Crossrail](#) (Jan 14)