National Audit Office

Costing government programmes: why is it so hard to get right?

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Role of the NAO

National Audit Office

We are the UK's independent public spending watchdog.

We support Parliament in holding government to account and help improve public services through our high-quality audits

Importance of getting costing right

"This resulted in an increase in cost estimates from £**1.2 billion in the** Outline Business Case to £2.8 billion in the Programme Business Case"

Improving-the-UKs-science-capability-for-managing-animal-diseases (2022)

"£3.9 billion to £12.9 billion (14% to 47%) *more than its available funding"*

High Speed 2: A progress update (2020)

"Value for money comprises the optimal use of resources to achieve the intended outcomes."

(NAO definition)

"£1.35 billion (115%) total increase in forecast cost since the initial cost estimate and time of our review"

Defence: Managing infrastructure projects at nuclear-regulated sites (2020)

"£2.8 billion increase in funding [to May 2019]"

"£1.9 billion forecast increase since we reported in May 2019"

Completing Crossrail (2019); Crossrail: a progress update (2021)

Why do we see costs increase?

Element of cost estimate	Cost change since April 2017 (£m)	Cost change since April 2017 (%)	Cost estimate in October 2019 (£m)
Main civil construction[3]	4,916	85	10,667
Station design and build	1,020	34	3,984
Railway systems	961	52	2,792
Preparatory works	860	124	1,552
HS2 Ltd costs: HS2 Ltd staff and administration	814	35	3,138
On network works (ONW) and wider network works (WNW): Works on the existing rail network	721	85	1,573
Utility diversions	389	81	869
Land and property acquisition	154	5	3,562
Other[4]	609	180	948
Trains (rolling stock) and operations and maintenance (O&M)	-390	-20	1,584
Total	**10,054**	**49**	**30,669**

Notes

1 All values are in 2015 prices and do not include contingency or VAT. The numbers may not sum due to rounding.

2 Numbers drawn from Department for Transport and HS2 Ltd information. The cost estimates at April 2017 and October 2019 include the cost of the over-site enabling work at Euston station. The over-site enabling work is not included in the £55.7 billion available funding for the programme.

3 Main civil construction includes savings negotiated with contractors of £230 million.

4 'Other' includes third-party agreements, logistics and transport management, Department for Transport commissioned work and other Phase One contracts.

5 We have not audited the calculations and evidence underpinning these estimates. At the time of publishing this report, the Department had agreed with HS2 Ltd a revised cost and schedule for Phase One; however, these had not yet been approved by wider government stakeholders and were subject to change.

Source: National Audit Office analysis of Department for Transport and High Speed Two Ltd information

Why are costs so hard to get right?

- Unknown unknown always exist
- Costs/ budgets often set too soon
- [Scope] decisions impact cost
- Culture of over-optimism

Those unknown unknowns are always possible

Main categories of cost increase between April 2019 and March 2021, Crossrail Ltd funding only

The largest cost increase has been due to changes to the opening schedule

Cause of cost change	Description	Change since April 2019
		(£m)
Schedule change	Movement in programme milestones as a consequence of resequencing, acceleration or delay.	934
COVID-19	Additional costs incurred as a consequence of the COVID-19 pandemic.	228
Scope change	Changes made to ensure programme meets sponsor requirements.	154
Productivity	Variation in the achievement of completed tasks compared to planned targets.	126
Commercial settlement	Settlement of commercial 'compensation events' due to, for example, delays to contractors' planned start dates.	30
Other	Includes, for example, the net impact of other increases and reductions in scope and cost increases due to unexpected site conditions.	38
Total		**1,510**

Summary of Ministry of Defence factors behind nuclear-regulated site infrastructure project cost increases

Almost half of cost increases to date across the three projects relate to construction starting before designs were sufficiently mature

Factor		MENSA	Core production capability facilities	Primary build facility	Total	
		(£m)	(£m)	(£m)	(£m)	(%)
Design maturity	Construction started before requirements or designs clear	399	139	108	**647**	**48**
Contractor performance	Contractor failure to deliver to time or quality requirements	87	–	–	**87**	**6**
Changes to approach	Changes to project management or commercial approach	150	–	1	**151**	**11**
Additional contractor fees	Primary contractor fees earned on cost increases	97	7	10	**114**	**8**
Unforeseen events	Emerging factors which the Department or contractors could not have reasonably foreseen	–	–	11	**11**	**1**
Other	Other factors leading to cost increases	339	–	–	**339**	**25**
Total		**1,072**	**146**	**130**	**1,349**	**100**

However, setting costs too soon make it harder to reflect those unknowns

HS2 Ltd's development of the Phase One cost estimate between 2009 and 2019

HS2 Ltd's current cost and schedule estimate is its most detailed so far and uses more comprehensive designs and more accurate cost and schedule data

	Early stage (2009)	Preferred route and developing design (2009 to 2013)	Hybrid bill debated in Parliament (2013 to 2016)	Royal Assent to confirm final route (2016 to 2017)	Agreeing final costs before construction begins (2017 to 2019)
Maturity of route	Route represents a line on a map.	The expected route continues to mature although still a basic outline. HS2 Ltd discusses with construction specialists which sections are expected to be tunnels or viaducts. Government decides to proceed with Y-shaped route.	In order to submit the hybrid bill, HS2 Ltd develop drawings of the programme routes outlining the main works that would be undertaken and land affected. This includes a Book of Reference which lists all the land and property that will be on the safeguarded route.	Route is finalised following passage of the hybrid bill through Parliament and includes additions from parliamentary scrutiny of the bill. The design reaches 13% completion.	Detailed route design and schedules are developed with input from contractors 70%–80% of the scheme design complete.
Maturity of estimate	No cost estimate at this stage.	Cost estimate prepared for business case, which required a benefit-cost ratio. A simple calculation using average cost rates multiplied by the kilometres of the scheme. This estimate was reviewed by major projects officials with experience of Thameslink and Crossrail. Basic schedules exist.	An Estimate of Expense is submitted to Parliament; a statement of what the government considered it would cost to construct the railway. This includes costs based on estimates from an external professional adviser for land and property. The Estimate of Expense is revised as the hybrid bill made its way through Parliament.	Calculated with cost models. Only 3% of the data from the construction supply chain with the rest from estimates and comparable international infrastructure projects. A limited number of ground and site surveys were able to be carried out. Cost estimate comprised of 15,000 lines of data and 500 cost rates. Cost estimates used to let contracts to the market.	HS2 Ltd's most detailed cost and schedule estimate based on a mixture of: • detailed costs and schedules provided by contractors (49%); and • data from international benchmarking and some cost assumptions. Cost estimate comprised of 260,000 lines of data underpinned by 12,000 cost rates.

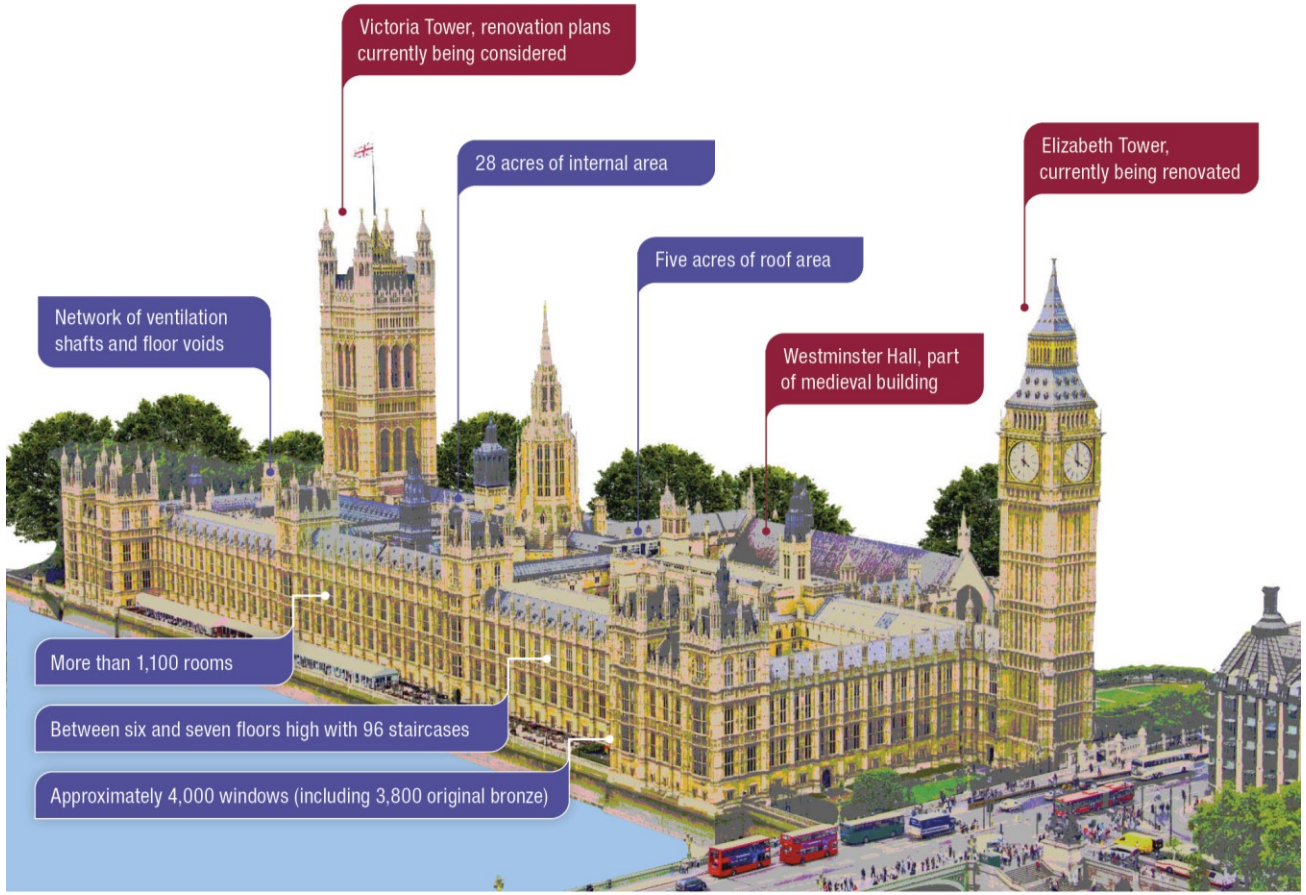
Increasing understanding of programme design, cost, schedule and risk

Budget

- 2013: Budget set (2011 prices)
- 2015: 2013 budget increased by inflation (2015 prices)

However, setting costs too soon make it harder to reflect those unknowns

- Planning allows more time to set out what required and get things right.
- Our work on **Crossrail** identified areas where work (and therefore cost) not recognised as not thought about early on
- But there will also be recognised unknowns early in a programme such on **restoring Palace of Westminster**…



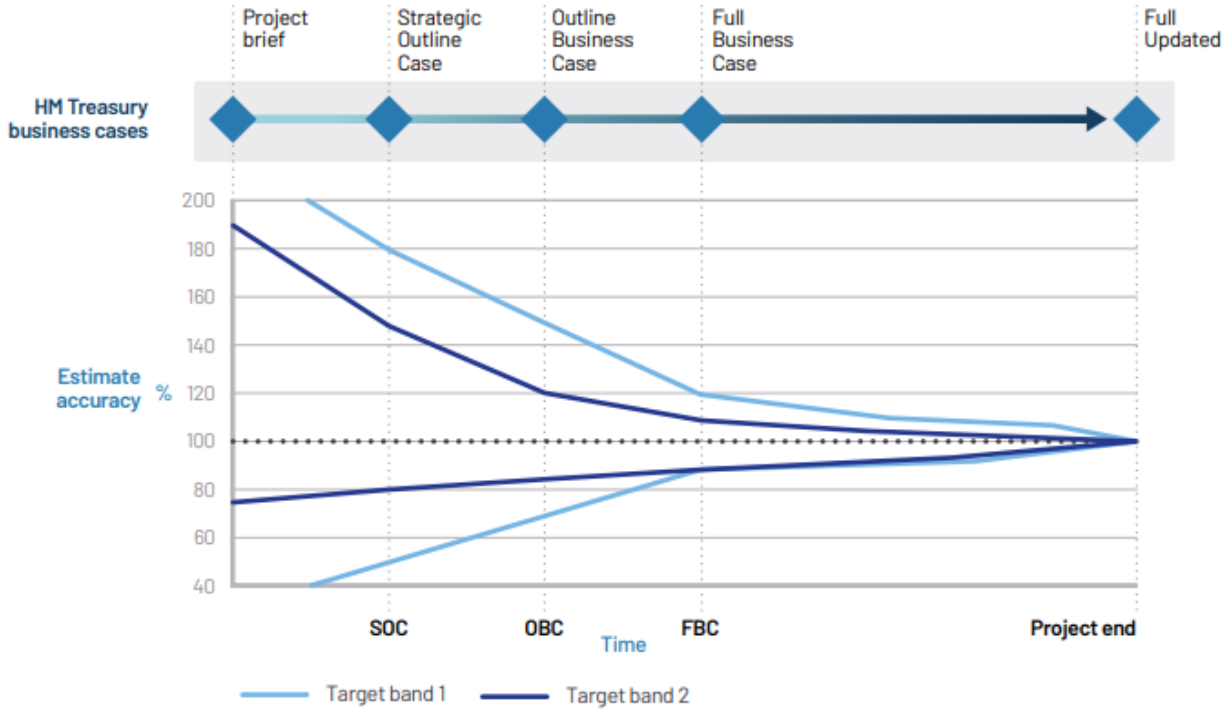
However, setting costs too soon make it harder to reflect those unknowns

Government's tendency to use single point estimates means costs will always change (and never right).

We often recommend the need to:

- understand risks and uncertainties
- recognise these in the cost which should be shown as a range
- reduce the range over time as the uncertainties become more certain

Figure 12 - Cost estimate range through the project stages



Stage Gates	SOC		OBC		FBC	
Ref. Classification	5		4-3		3-2	
Typical project maturity	<5%		30%		>60%	
Target range	-20%	+50%	-15%	+30%	-10%	+10%
By exception	-50%	+100%	-30%	+50%	-10%	+20%

Decisions impact cost (but is this understood?)

Decisions made throughout a programme will inevitably impact cost.

The impact needs to be thoroughly understood as part of the decision.

But how does this factor into our thinking on whether or not 'costs are right'

Incentives for over-optimism hard to overcome

There needs to be the right culture for understanding and appreciating how much things actually cost, overcoming a natural tendency for over-optimism

Our survival guide highlights warning signs for unrealistic information:

- A ground breaking project (which inherently riskier and harder to cost)
- Using a point estimate early in a programme
- Contractors with vested interests deliberately underestimate costs to get business
- Delivery teams ask for funds to be released early

To improve cost realism, our Equipment Plan report recommended MoD be more consistent and improve reliability of adjustments.

National Audit Office

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