

The Scholars Programme



On track or off the rails? An introduction to procurement of trains Key Stage 4 Programme

Pupil Name

Coursebook
Designed by

Oishee Kundu



Timetable and Assignment Submission

Timetable – Tutorials

Tutorial	Date	Time	Location
1 (Launch Trip)	23 January 2020		
2	30 January 2020		
3	6 February 2020		
4	13 February 2020		
5	27 February 2020		
6 (Draft assignment feedback)	12 March 2020		
7 (Final assignment feedback)	30 April 2020		

Timetable – Homework Assignments

Homework Assignment	Description	Due Date
Tutorial 1	300-word essay on train procurement and possible challenges	
Tutorial 2	400 words on the procurement process & principal-agent problem	
Tutorial 3	500-word argumentative essay on the use of market price and international competition in public procurement contracts	
Tutorial 4	800-word review on an academic paper on megaprojects	
Tutorial 5	Draft assignment (2000-word essay on the final assignment question)	
Tutorial 6	Final assignment	1 April 2020

Assignment Submission – Lateness and Plagiarism

Lateness	
Submission after midnight on _____	10 marks deducted
Plagiarism	
Some plagiarism	10 marks deducted
Moderate plagiarism	20 marks deducted
Extreme plagiarism	Automatic fail

KS4 Programme – Pupil Feedback Report

Grade	Marks	What this means
1 st	70+	Performing to an excellent standard at A-level
2:1	60-69	Performing to a good standard at A-level
2:2	50-59	Performing to an excellent standard at GCSE
3 rd	40-49	Performing to a good standard at GCSE
Working towards a pass	0-39	Performing below a good standard at GCSE
Did not submit	DNS	No assignment received by The Brilliant Club

Lateness	
Any lateness	10 marks deducted

Plagiarism	
Some plagiarism	10 marks deducted
Moderate plagiarism	20 marks deducted
Extreme plagiarism	Automatic fail

Name of PhD Tutor	Oishee Kundu		
Title of Assignment	How should the government buy trains?		
Name of Pupil			
Name of School			
ORIGINAL MARK / 100		FINAL MARK / 100	
DEDUCTED MARKS		FINAL GRADE	

If marks have been deducted (e.g. late submission, plagiarism) the PhD tutor should give an explanation in this section:

Knowledge and Understanding	Research and Evidence
Developing an Argument	Critical Evaluation
Structure and Presentation	Language and Style
Overall Comments (participation, effort, resilience)	

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Course Rationale

The UK government has been buying trains recently, but are they on track or off the rails?

We use trains without thinking too much about who owns them, how much do they cost, and why the seats are so uncomfortable. This course encourages students to be curious about the transportation system of the country they live in and develops their skills in critically evaluating and appreciating government purchasing activities by looking at trains as an example. Although this is primarily an economics course, it will be equally interesting for those interested in politics, history, management, or engineering.

By picking apart the story of a recent train purchase in the UK, students will learn about risks, trust, imperfect markets, and international competition. These concepts will help them engage in wider debates about the role of government in society. Tutorial 1 begins by presenting the case of Thameslink and the procurement of 115 high-speed commuter trains and exposes poor procurement performance in the form of delays in the programme. Students investigate these delays to form initial ideas of procurement challenges. Tutorial 2 describes different stages of the public procurement process and introduces the 'principal-agent' problem within public procurement. In tutorial 3, students will engage in debates to understand the arguments for and against international competition in public procurement. Tutorial 4 involves reading and discussing an academic paper on project management and finding links to the story of Thameslink.

Although each tutorial will have a mixture of group and individual learning activities, the homework assignments will be written tasks to prepare students for their final assignment. The final assignment 'how should the government buy trains' requires students to write an essay that expresses their knowledge and understanding, makes well-argued policy recommendations, and includes an executive summary. The assignments therefore provide opportunities for students to write concisely about political and social issues.

During the course, students will encounter evidence from different institutions like the National Audit Office and parliamentary select committees which is intended to increase their political awareness. Ultimately, the aim of this course is to equip students to think like an economist and address a problem that is widely discussed in the media, in Parliament, by policymakers and politicians, and informed and active citizens in the country.

Group Discussions

How do you make the most of a group discussion?

The purpose of discussions is to allow everyone in the group to express their ideas and learn from each other. Often this will involve coming to a group decision about the issue under discussion, though they may of course 'agree to disagree' on certain points.

What we don't want in our tutorials:



Rules:

1. Pronounce clearly what you are saying
2. Use eye contact and facial expression to help to get your idea across or to support what someone else is saying
3. Speak in a way that is right for a discussion (more formal than a chat between friends)
4. Build on other people's ideas, and summarise your own views and the views of others when necessary
5. Give reasons to support your views and critically examine the views expressed by others
6. Organise the discussion and take turns with others
7. Listen carefully and respond to the views of others

Other ground rules for this course

- **Buddy system:** you and your buddy will often be paired together during tutorials and need to look after each other during and after tutorials (in case they miss a tutorial, help them to catch up!).
- **To speak:** raise your hand or stand up.
- To show agreement with someone speaking: lightly knock your desk
- Don't hesitate to ask questions.
- **Write** down what you learn in the spaces provided in the handbook. They may be useful when you have to work on your final assignment.
- In case there are any concerns with respect to accessing resources, especially those listed in Appendix 3, please inform the tutor.

Mark Scheme Table

Skills	1 st (70-100)	2:1 (60-69)	2:2 (50-59)	3 rd (40-49)	Mark /100
Knowledge and understanding	<ul style="list-style-type: none"> All content included and materials used are relevant to the general topic and to the specific question/title Good understanding of all the relevant topics. Technical terms are defined and used accurately throughout Clear justification of how the material and content included is related to the specific issues that are the focus of the assignment 	<ul style="list-style-type: none"> Most of the materials used and content included are relevant to the general topic and to the specific question/title Good understanding of most the relevant topics Technical terms are mostly defined and used accurately Adequate justification of how the material used and content included are related to the specific issues that are the focus of the essay 	<ul style="list-style-type: none"> Some of the materials used and content included are relevant to the general topic and to the specific question/title Good understanding on some of the relevant topics but occasional confusion on others Technical terms are sometimes used and defined accurately Some justification of how the material used and content included are related to the specific issues that are the focus of the essay 	<ul style="list-style-type: none"> The content included and materials used are not applied to the question/title in a relevant manner There is confusion in how understanding of the topics is expressed 	
Research and evidence	<ul style="list-style-type: none"> Includes rich sources of research findings, data, quotations or other sourced material as evidence for the claims/ideas Uses evidence/calculations to support claims/assertions/ideas, consistently clearly and convincingly Evidence of further reading beyond materials provided which were used in an appropriate context 	<ul style="list-style-type: none"> Includes adequate sources of research findings, data, quotations or other sourced material as evidence for the claims/ideas Uses evidence/calculations to support claims/assertions/ideas, mostly clearly and convincingly Evidence of further reading beyond materials provided 	<ul style="list-style-type: none"> Includes some sources of research findings, data, quotations or other sourced material as evidence for the claims/ideas Uses evidence/calculations to support claims/assertions/ideas, at times clearly and convincingly Limited evidence of further reading beyond materials provided 	<ul style="list-style-type: none"> Inclusion sources and materials is very limited and mostly not attributed Applicable sources are rarely used to support ideas. Data is not used or few appropriate conclusions are drawn from it. 	
Developing an argument	<ul style="list-style-type: none"> A point of view or position in relation to the title or question is consistently clear. The position is developed effectively and consistently throughout the essay Argument is exceptionally well-developed and well-justified Makes links effectively between subjects that have not previously been associated Uses concepts from the tutorials in an unfamiliar context and does so accurately and confidently. Content is analysed effectively to support the argument 	<ul style="list-style-type: none"> A point of view or position in relation to the title or question is adequately clear. The position is well-developed in most of the essay Argument is clear and well-developed, and position is justified Some evidence of linking subjects that have not previously been associated Uses some concepts from the tutorials in an unfamiliar context, but not always accurately Analyses content to support the argument 	<ul style="list-style-type: none"> A point of view or position in relation to the title or question is somewhat clear. The position is well-developed in parts of the essay Argument is clear but not well-developed Limited evidence of linking subjects that have not previously been associated Limited use of concepts from the tutorials in other contexts Uses some analysis of content to support the argument 	<ul style="list-style-type: none"> There is not a clear point of view or position taken and sometimes the argument is not clearly established 	

Critical evaluation	<ul style="list-style-type: none"> ○ Moves beyond description to an assessment of the value or significance of what is described ○ Evaluative points are consistently explicit/ systematic/ reasoned/ justified ○ Effectively critiques the reliability of sources provided 	<ul style="list-style-type: none"> ○ Mostly description but some assessment of the value or significance of what is described ○ Evaluative points are mostly explicit/ systematic/ reasoned/ justified ○ Some evidence of critiques on the reliability of sources provided 	<ul style="list-style-type: none"> ○ Describes with minimal assessment of the value or significance of what is described ○ Evaluative points are at times explicit/ systematic/ reasoned/ justified ○ Limited evidence of critiques on the reliability of sources provided 	<ul style="list-style-type: none"> ○ The work is descriptive in nature and there is a lack of critical engagement in the value of sources 	
Structure and presentation	<ul style="list-style-type: none"> ○ Ideas are presented in paragraphs and arranged in a logical structure that is appropriate for the assignment ○ The introduction clearly outlines how the essay/ report will deal with the issues ○ The conclusion summarises all the main points clearly and concisely ○ All sources are referenced correctly in an agreed format 	<ul style="list-style-type: none"> ○ Ideas are presented in paragraphs and arranged in a structure that is mostly appropriate for the assignment ○ The introduction adequately describes how the essay/ report will deal with the issues ○ The conclusion summarises most of the main points clearly ○ Most sources are referenced correctly in an agreed format 	<ul style="list-style-type: none"> ○ Ideas are presented in paragraphs and arranged in a structure ○ The introduction mentions how the essay/ report will deal with the issues ○ The conclusion summarises some of the main points clearly ○ Some sources are referenced correctly in the agreed format with occasional errors 	<ul style="list-style-type: none"> ○ Ideas are presented in paragraphs but there is a lack of structure in how the work is presented ○ The work lacks an introduction that establishes the scope of the question ○ The work lacks a conclusion that summarise the main points raised ○ Work is not referenced accurately 	
Language and style	<ul style="list-style-type: none"> ○ No spelling, grammar or punctuation errors ○ Writing style consistently clear, tone appropriate and easy to follow ○ Accurate and consistent use of technical language and vocabulary 	<ul style="list-style-type: none"> ○ Minimal spelling, grammar or punctuation errors ○ Writing style mostly clear, tone appropriate and easy to follow ○ Some attempts of using technical language and vocab alary, but not always accurate 	<ul style="list-style-type: none"> ○ Some spelling, grammar or punctuation errors ○ Writing style moderately clear, tone appropriate and easy to follow ○ Use of simple language and vocabulary effectively but struggles to use technical language 	<ul style="list-style-type: none"> ○ There are a significant number of spelling, grammar and punctuation errors ○ Use of simple language and vocabulary effectively but a lack of technical language 	
Overall Mark (average of the 6 marks from the criteria above)					

Glossary of Keywords

Word	Definition	In a sentence
Bidder	A person or organisation making a formal offer for something	Can my brother's café bid for supplying sandwiches and cakes for this event?
Contract	An agreement (usually written) stating the rules which are enforceable by law	According to the contract, any increase in cost would be shared equally between the buyer and the seller.
Incentives	Something (usually a reward) that motivates someone to behave in a certain way	The casting of Timothée Chalamet is enough of an incentive for my friend to watch a movie.
Invitation to Tender (ITT)	A document which asks persons or organisations to submit a bid to provide an item or a service	The suppliers have been eagerly waiting for the publication of the Invitation to Tender online.
National Audit Office (NAO)	An independent body that looks into government spending and produces reports on government performance	The Parliament and public can question government funding based on the work by the National Audit Office.
Overrun	An instance of something continuing or exceeding beyond the expected limits	The match was allowed to overrun by 2 minutes
Perfect competition/ perfect market	A market structure where there are many buyers and sellers and the products are exactly alike.	Perfect competition only exists in theory because very rarely are two products exactly alike in reality.
Procurement	The process of finding and agreeing to terms and conditions to purchase a product or a service.	My sister managed to procure the perfect gift for our parents.
Rolling stock	Railway vehicles like engines and coaches	Last year, Northern Rail withdrew a lot of its old rolling stock to introduce newer trains.
Senior Responsible Owner (SRO)	A person who is appointed to be accountable for the progress and performance of a major government project	The SRO is under enormous pressure because the project needs an additional £900 million.
Shadow Minister	An opposition MP who is appointed by the Shadow Cabinet to scrutinise the policies and actions of a particular department	The Shadow Minister has criticised the government's fractured electrification strategy.
Transport Secretary	The MP in government who is the political head of the Department for Transport	The Transport Secretary will be making a statement today about the new timetable.

Tutorial 1 – All aboard!



What is the Purpose of Tutorial 1?

- Introductions
- What is 'procurement' and what are the reasons for public procurement?
- Learning about the Thameslink procurement project and identifying challenges in procurement and delivery of high-speed trains
- Relating the challenges to subjects taught at the university-level (economics, political science, history, engineering, management)
- Course expectations

Learning outcomes:

At the end of the tutorial, pupils will have gained knowledge on:

- Why the government buys trains?
- How to judge procurement performance?
- What were the challenges in procurement of trains for Thameslink?

Starter: Recount your latest experience of travelling on a train

Where were you travelling from? Where were you travelling to? What was the train like- seats, food trolley, toilets, speed, baggage storage spaces? What did you like/ dislike about the train?

In the railway industry, trains are called 'rolling stock' and in the UK, trains are owned by Rolling stock leasing companies (ROSCO) who lend the trains to a Train Operating Company (TOC) which run the trains and sell tickets to passengers. But sometimes, there is a critical requirement for new trains or the order is very large and the government steps in to help in the procurement of rolling stock.

national rail train operators

August 2019

- Airport services: Heathrow Express, Stansted Express, Gatwick Express
- In TOC colour: limited service (lines by service / operator)
- TL Rail Elizabeth Line: under construction
- Route of High Speed 2
- All lines shown except in London area with in grey line
- ✈ Airport interchange
- 🚢 Ferry interchange
- 🚗 Railair coach link with Heathrow Airport

Train Operating Companies Open Access Operators

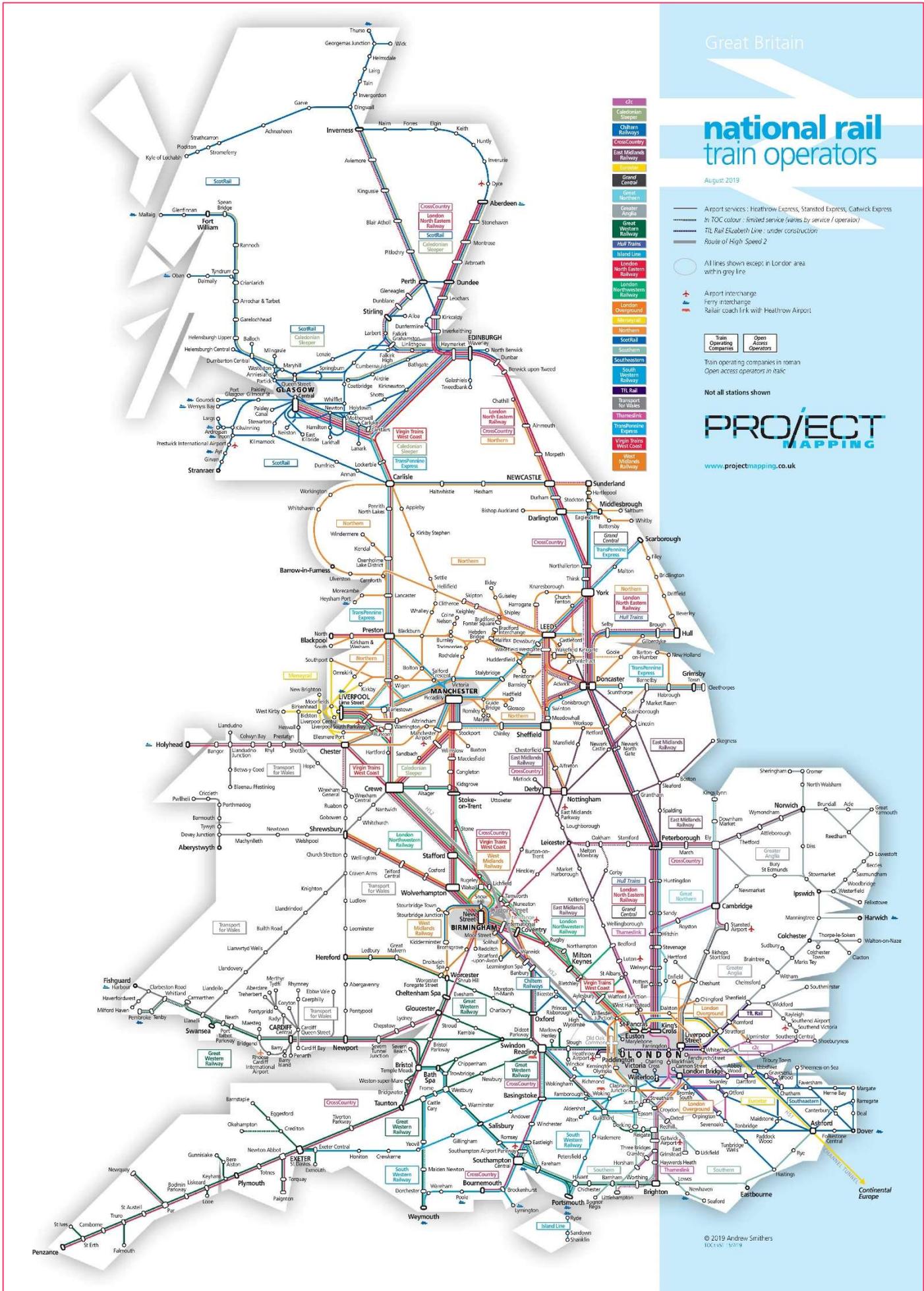
Train operating companies in roman
Open access operators in italic

Not all stations shown

PROJECT MAPPING

www.projectmapping.co.uk

Calsonium
Chiltern Railways
CrossCountry
East Midlands Railway
London Overground
Great Central
Greater Anglia
Great Western Railway
Hull Trains
Island Line
London North Eastern Railway
London Northwestern Railway
London Underground
Merseyrail
Norfolk
Northern
ScotRail
South Western Railway
TransPennine Express
West Midlands Railway
West Yorkshire
Thameslink
Transport for Wales
Virgin Trains West Coast
West Coast Railway



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10/15/19 12/19

What is procurement? What is public procurement?

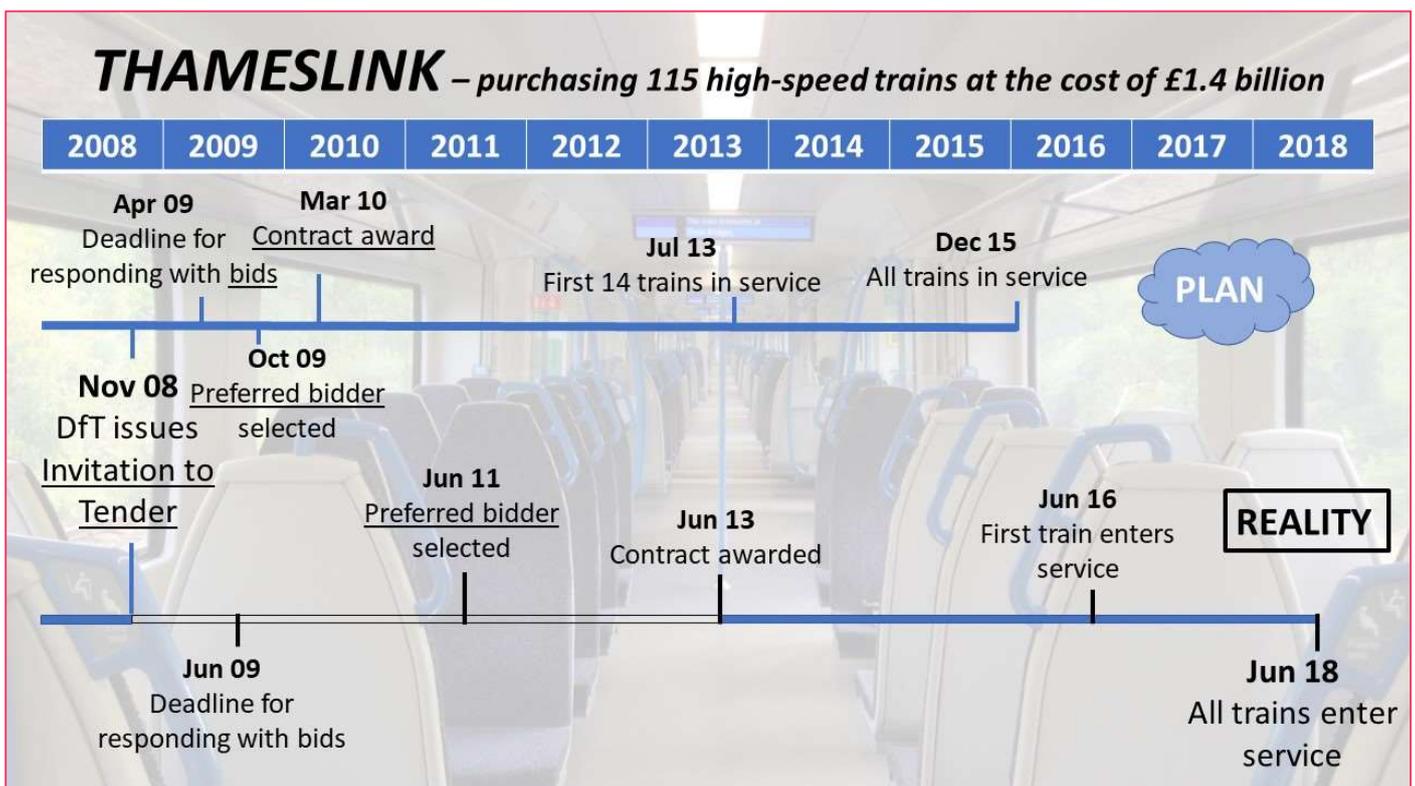
Thameslink: the need for new trains, more trains, faster trains

The Thameslink service connects London and south-east England. It is a commuter service- usually its passengers are travelling short distances and using the train to get to work or get back home.

The Thameslink service opened in 1988 and quickly became very popular and the Department for Transport (DfT) began considering upgrading the train services by buying more trains to reduce overcrowding and provide more frequent services to people. There was a lot of demand for more trains and more services- as the economy grows, more people get jobs and because the economic growth and employment boom was very high in London, the pressure on a train service bringing people in and out of London was facing a lot of pressure.

However, in the 1990s there were major changes in how railway services were owned and operated in the UK and very little was done to buy trains for Thameslink. In the meantime, there was a high increase in the number of passengers. Many trains ran late, had limited capacity (four carriages), and were overcrowded. Finally, in 2005 the government launched the Thameslink programme to improve the infrastructure, train stations, and rolling stock on the Thameslink service. The specifications for the new trains had to be compatible with the infrastructure work being done on the tracks and the stations. In November 2008, DfT issued an invitation to tender, inviting train manufacturers to submit their train designs and the price they would charge for 115 high-speed trains. It was expected that all the new trains will be in service by December 2015.

In reality, the first new train entered Thameslink service in June 2016 and the procurement project was three years behind schedule. But why?



A timeline on the Thameslink rolling stock procurement (created by Oishee Kundu in 2019)

Activity: Investigating the reasons for delay in procurement

Based on the newspaper headlines and stories below, identify reasons for delays and write them down on a post-it note (refer to the timeline on the previous page if necessary).

FT FINANCIAL
TIMES

Deadline for train orders put back

Wright, Robert
24 March 2009

The deadline for trainmakers to submit bids for one of the UK's biggest-ever train orders has been put back by nearly two months.

The Department for Transport has put back the deadline to submit bids for up to 1,200 new carriages for the cross-London **Thameslink** route from April 30 to June 25 to let manufacturers raise financing under a new, two-stage process.

THE  **TIMES**

Delay puts new rail rolling stock under threat

Angela Jameson
5 February 2010

Plans to relieve overcrowding on commuter lines and replace 30-year-old intercity trains could be in disarray after it emerged that the Department for Transport was struggling to sign off train purchasing contracts worth billions of pounds.

A £1.2 billion contract for new carriages on London's troubled **Thameslink** route will not be awarded until summer amid fears that a new Conservative government could rip up all commitments to rail projects.

theguardian

In the firing line: Transport

Dan Milmo
11 June 2010

The new transport secretary, Philip Hammond, froze plans for dozens of new local transport projects. Large projects such as the **Thameslink** and Crossrail schemes in London have already been put under review. Local authorities were yesterday told that any new scheme awaiting Department for Transport approval is not guaranteed funding.

FT FINANCIAL
TIMES

Thameslink eyes automated journeys

Wright, Robert
16 April 2009

Thameslink, the key cross-London rail route, could become the world's first mainline commuter network to hand most train driving to computers, if upgrade plans get the go-ahead.

Managers in charge of the £5.5bn upgrade for Network Rail, owner of Britain's rail network, believe computer control is probably necessary to ensure reliability on the north-south, cross-London route, due to be handling 24 trains an hour from 2015. Computers allow routes to be used more intensively.

The plans for computer control emerged when the Department for Transport issued its tender for trains for the **Thameslink** route and specified they should be capable of using automatic train control. The line, which suffers from severe overcrowding, is being upgraded to take longer trains, remove bottlenecks round London Bridge and connect the route to the east coast main line near Kings Cross station.

theguardian

Future of UK's last train factory in doubt after pounds 3bn deal goes overseas: Thameslink carriages will be built in Germany; Unions and Labour MPs attack 'disgraceful' move

Tom Bawden
17 June 2011

The future of Britain's last remaining train factory was thrown into doubt yesterday after the government named an overseas consortium as the preferred bidder for a pounds 3bn contract to make carriages for the upgraded **Thameslink** route.

The move was greeted with anger by unions and Labour MPs, who said the appointment made a mockery of George Osborne's budget pledge in March that "we want the words made in Britain, created in Britain, designed in Britain, [and] invented in Britain to drive our nation forward".

Maria Eagle, Labour's shadow transport secretary, said: "The Tory-led government's claim to want to support the British manufacturing is exposed today as nothing more than a sham."

The Daily Telegraph

Train deal 'scandal' dims hope for renewal of manufacturing

By Graham Ruddick
6 July 2011

Bombardier, the Canadian group, yesterday announced it will cut 1,400 jobs at its plant in Derby after failing to win a contract from the Government to produce rolling stock for London's **Thameslink** network. The job losses provoked a furious reaction from unions, who claimed the Coalition's decision to award the contract to German company Siemens is a "scandal".

theguardian

Bombardier fails to get pounds 1.4bn contract overturned

Dan Milmo
23 August 2011

Bombardier's hopes that the government will halt a pounds 1.4bn train contract awarded to a rival have been dashed.

David Cameron wrote to Chris Williamson, Labour MP for Derby North, saying he would neither reverse the decision nor meet a delegation to discuss the issue.

theguardian

Siemens' pounds 1.4bn Thameslink order held at signing signals

Dan Milmo
6 August 2012

Signing off the pounds 1.4bn **Thameslink** trains contract could slip into the autumn as German manufacturer Siemens attempts to finalise one of the most controversial government procurement deals of recent years.

Siemens was selected as preferred bidder to make 1,200 carriages for the London commuter route in 2011. Steve Scrimshaw, the head of Siemens' UK train division, had targeted closure by the summer but admitted the signing of commercial and financial contracts could now move beyond August.

"We are making good progress on **Thameslink**," he said. "But there is a lot of contractual stuff that has to be sorted out. We have got a relatively strong banking group and we are quite confident of getting to financial closure. That will be end of summer, early autumn."

Previously, Siemens expected to complete the deal in early 2012, before forecasting sign-off this summer. Last year it was reported that the Siemens-led consortium was struggling to reach a financing agreement with banks.

The Daily Telegraph

New fears of delay to Thameslink project

Nathalie Thomas
29 October 2013

The Commons Public Accounts Committee (PAC) has raised serious concerns over the **Thameslink** upgrade, which aims to improve services for passengers travelling north-south through the capital.

A three-year delay in the award of a £1.6bn contract to build new trains for the franchise raises questions over whether the project will be finished on time in 2018, the MPs said.

MPs are also concerned over a shortage of "strong project management skills" at the Department for Transport, which is overseeing the **Thameslink** project. The DfT has a core team of only five on programme and the civil servant leading them has recently been transferred to High Speed 2.

Margaret Hodge, the chair of the PAC, said: "The planned completion date has been put back to 2018, but meeting the timetable for delivering the new trains will be very demanding and risky."

"Another worry is the small size of the department's core **Thameslink** team – just five people for a programme of this size and complexity. We question whether the department has enough people with strong project management and commercial skills necessary to take forward its very ambitious portfolio of big projects."

A spokesman for the DfT said: "Difficulties in the financial markets, caused in part by uncertainty regarding the euro, alongside the complexity of the deal and our drive to secure maximum value for the taxpayer, did lead to a delay in concluding the rolling stock contract but we remain confident that the trains will be delivered at the right time."

He added: "A major recruitment programme is currently under way."

THE TIMES

Self-driving trains will run every 2.5 minutes on main lines

Graeme Paton
7 October 2017

Advance testing is under way on the **Thameslink** line through central London to run automated trains that can accelerate and brake more efficiently than those operated by a driver. This will lead to trains running every two and a half minutes, similar to the frequency on the Tube, and the number of services increasing by 60 per cent. Drivers will still be needed to operate doors and carry out safety checks and will take full control of the trains outside central London on lines stretching as far as Brighton and Cambridge. Self-driving trains have not been used outside the London Underground, where they operate on four lines, including the Northern and Victoria.

Note the challenges that delayed the procurement of Thameslink trains

What are your expectations from this course?

Homework

Write a 300-word essay that answers the following questions:

Why does the government buy trains, and what are the challenges that can occur in procuring trains?

Please note:

- Word limit: 10% above or below the word count is accepted (i.e. 270 – 330 words)
- Suggested structure (use a new paragraph to make a new point/idea):
 - **Introduction (60 words):** Start your essay by stating the importance of trains; use some interesting facts and figures to capture the reader's attention and justify the importance of reading your essay. Explain any general terms or concepts that you would be using throughout the text (like 'procurement' or 'rolling stock'). It is always useful to summarise your answer (this could mean you complete the introduction after finishing the rest of the essay) in a few lines. Also, tell the reader about the structure of the essay ("In the next section, XYZ is described ... In Section 3, ABC is analysed...")
 - **Section 1 (80 words):** Respond to the first part of the question; refer to tutorial discussions and previous knowledge, but also consult additional resources in Appendix 3 like the House of Commons library briefing paper to provide information about UK government's involvement in buying trains; describe the situation of train purchase and ownership in the UK before focussing on the specific question of why government is buying trains for a programme like Thameslink.
 - **Section 2 (120 words):** Respond to the second part of the question; refer to tutorial discussions and materials and feel free to consult more resources within and outside the handbook. Make sure you provide context¹ before launching into a discussion and give examples to help the reader understand what you are saying and why you are saying such a thing.
 - **Conclusion (40 words):** Finish the essay by summarising and providing any further thoughts on the questions. Always remember, the introduction and conclusion are the most read portions of your essay and therefore should fit together well (so that even if someone skips the 200 words in between, they can still get an essential understanding of the contents).
- Refer to the referencing guidelines in Appendix 1. You may wish to add your references with the help of MS Word → References → Insert Citation. The APA style is recommended.

¹ Context usually is used to help a reader understand why you are saying something. For example, "X is important for several reasons..." should have some lines on what is X before such a sentence is written.

Tutorial 2 – How to buy trains



What is the Purpose of Tutorial 2?

- Understand the principal-agent problem in public procurement
- Learn about the different stages of public procurement

Learning outcomes:

At the end of the tutorial, pupils will have gained knowledge on:

- The principal-agent problem in economics and how it relates to public procurement
- The different stages of public procurement
- The stakeholders and their role in the procurement of Thameslink trains

Starter: Can you cheat someone who wants you to do something?

Imagine someone gave you £1000 to buy a laptop for them. You know that this person's requirements can be easily met with a laptop that would cost no more than £500, but they are not aware of the real price of laptops like the different brands and features. Can you cheat them? How, and why?

Unless the principal (the person wants something to be done) negotiates a contract, sets and enforces rules and regulations, and examines the work, agents (people who are asked to do something) can cheat the principal. Incentives- things that motivate someone to do something- enshrined in written or unwritten contracts are important and change selfish and opportunistic behaviour of agents.

In economics, this is known as the principal-agent problem, and Bengt Holmström and Oliver Hart won the Nobel Prize in Economics in 2016 for their work on the principal-agent problem and contract theory.

How is the principal-agent problem related to public procurement?

Think about the Thameslink project and the procurement of trains. Note down your initial thoughts

Activity 1: Identifying the stages of public procurement

Go back to the Thameslink timeline on page 13. What were key events in the planned timeline?

Activity 2: Identifying the stakeholders² in Thameslink

Based on the procurement stages and the newspaper articles on pages 14-15, identify stakeholders

² A stakeholder in a project is a person or group of people (sometimes an organisation) who are affected by the project. The progress and performance of the project is important to them.

What role do these stakeholders play in the procurement of trains?

Also, are they a principal (someone who wants something to be done) or an agent (someone who has to do something)?

Stakeholder	Role in procurement	Principal or agent?

Note down three elements of the public procurement process which address the principal-agent problem in procurement:

Summary of the tutorial

- Public procurement process can be divided into the following stages:
 - Concept or design phase in which the requirement is identified
 - Competition phase in which the Invitation to Tender (ITT) is issued giving details of the requirement and the criteria along which the competing bidders will be judged
 - Negotiation phase, which begins once the winner of the competition is announced and ends when the contract between the government and the supplier is signed
 - Manufacturing phase, when the supplier makes the product
 - Delivery phase, when the item is delivered and brought into service
- There are multiple people and organisations involved in the procurement process and they are called stakeholders in the project because they are affected by the project's progress and performance (i.e. they have a stake in the project).
- In the case of Thameslink, it is possible to identify six stakeholders:
 - The Department for Transport (DfT) which takes the lead in the procurement by publishing ITT, answering questions from potential bidders, conducting the competition and selecting the winner, and negotiating the contract with the manufacturer
 - Bidders from the train manufacturing industry, particularly Siemens which won the procurement competition and Bombardier, which lost the competition
 - The Committee of Public Accounts and other parliamentary select committees like the Transport Committee which scrutinises and critiques the work being done by government departments
 - The National Audit Office, an independent body which inspects the government's work and the Infrastructure and Projects Authority which produces annual reports on the progress of major government projects
 - Members of Parliament (MPs), who may either be part of the government or in the opposition, have the power to represent the concerns of their constituents in parliament
 - Wider public, including both commuters and people who use the Thameslink service as well as citizens who take interest in public procurement
- Public procurement involves tasks that are performed by some people on behalf of others. Essentially, people are asking the government to buy something which they need. This introduces the principal-agent problem in public procurement.
- Various mechanisms within the public procurement process help to control the negative effects of the principal-agent problem in public procurement. Some of these are:
 - The Invitation to Tender document, which makes the requirements and rules of the competition clear and transparent.
 - The contract between government (DfT) and the supplier (Siemens) which sets the terms and conditions (price, responsibilities, risk-sharing)
 - The National Audit Office, IPA report, and parliamentary select committees, who scrutinise the work of the government department undertaking the procurement

Homework

Write a 400-word essay that answers the following questions:

What is the process associated with public procurement? Who are the stakeholders in the procurement of trains and what are their roles? Can you apply the principal-agent problem to identify possible challenges in procurement?

Please note:

- Follow the rules on word count, structure, and referencing from your previous homework assignment.
- You should refer to the ideas from the tutorial, but you can also draw on additional materials provided in Appendix 3 and/or external sources.

Tutorial 3 – The trouble with imperfect markets



What is the Purpose of Tutorial 3?

- Introduce the theory of comparative advantage as the basis of international trade
- Discuss the opportunities and challenges of international competition in public procurement
- Understand the limits of market price in conveying information in an imperfect market

Learning outcomes:

At the end of the tutorial, pupils will have gained knowledge on:

- The theory of comparative advantage
- Arguments for and against international competition and industrial protection
- The challenges of using price in an imperfect market

Starter: Better together, or better off alone?

You are running a busy bakery near the train station and your sibling has a similar shop in the town centre. You both sell similar sweets, based on the recipes you learnt at home as children. Two of your bakes are very popular with the customers- the caramel shortbread and the chocolate brownie.

In one hour you can make 30 pieces of caramel shortbread or bake a batch of 40 chocolate brownies. Your sibling is not as good as you at baking and takes an hour to make 5 pieces of caramel shortbread and an hour to bake a batch of 20 brownies.

Your sibling asks you whether it would be better if each of you baked only one type of item and then traded, so that you can have both types of sweets in your shop. Should you engage in the trade or are you better off on your own? Explain why.

In 1 hour...	You	Your sibling
Caramel shortbread	30	5
Chocolate brownie	40	20

You are better than your sibling at baking both the items. Economists would say that you have an absolute advantage over your sibling. However, you have a comparative advantage in making shortbread- you are 6 times better than your sibling at making shortbread, but only 2 times better than your sibling at baking brownies. If you specialise in making the item in which you have a comparative advantage, the overall production (shortbread and brownies) will be more than what would have been achieved had you tried producing both items. If both caramel shortbread and chocolate brownies have the same price, your family will be richer if your sibling only baked the item, they are least bad at!

David Ricardo, a 19th century British economist is credited for coming up with the theory of comparative advantage and argued in favour of specialisation and free trade. Ricardo's arguments were used to repeal British Corn Laws³ in 1846.

If free trade is a good thing, then why were people so angry when Bombardier (the 'last train manufacturer in UK') lost the Thameslink contract?

Activity 1: Read these excerpts from the Transport Committee⁴ hearing on 7 Sep 2011 and discuss your thoughts about the question stated above.

Witnesses: Steve Scrimshaw, Managing Director, Rolling Stock, Siemens plc, Jonathan Faulk, Director General for Internal Market and Services, European Commission, and Jeremy Candfield, Director General, The Railway Industry Association, gave evidence.

Q45 Chair: Good morning, gentlemen. Welcome to the Transport Select Committee. Could you please identify yourselves for our records and give your name and the organisation you represent?

Jonathan Faulk: Jonathan Fall, Director General, European Commission.

Steve Scrimshaw: Steve Scrimshaw representing Siemens in the UK.

Jeremy Candfield: Jeremy Candfield, Director General of the Railway Industry Association.

Q46 Chair: Thank you very much. Mr Scrimshaw, why do you think you were made preferred bidder? Have you been told why and what is happening now?

Steve Scrimshaw: I think we were made preferred bidder because, under the evaluation criteria, which is a lot more complex than has so far been described, which takes into account lots and lots of different factors like energy consumption, weight, maintenance periodicity, damage to the infrastructure, etc, as well as capital cost, as well as finance, everything, we were judged to be the best value for money for the UK taxpayer.

Q47 Chair: Would that include an assessment of the implications for jobs in the UK?

Steve Scrimshaw: No. That was not part of the published criteria; so I do not think that impact would have been assessed as part of the evaluation. That is probably something you need to address to the Secretary of State.

Q48 Chair: If that had been in the criteria, would it have affected the outcome?

Steve Scrimshaw: I do not genuinely know how they would take that into account because it is a very broad issue to try and take into account. I understand a procurement review has been suggested and we welcome that, providing it does not lead to uncompetitiveness, protectionism and delivers value for money for the taxpayer.

Q49 Chair: How many jobs will come to the UK with your contract?

Steve Scrimshaw: We have declared as part of the preferred bidder announcement that we would create 2,000 jobs in the UK, of which around 1,400 would be the building of depots and the ongoing maintenance for around 30 years, which probably could be the same as Bombardier, I would guess, and another 600 in the UK supply chain, which would involve around 300 at our facility in the north-east of England.

Q50 Chair: Is that an assessment or is that a commitment?

Steve Scrimshaw: That is what we are committing to do as part of it. The numbers are near enough. It is not an exact science.

Q51 Chair: Mr Candfield, what is your assessment of the implications for the supply chain if the contract with Siemens is finally agreed?

Jeremy Candfield: It is very difficult for us to say on the basis of the data that we have available. We do not have sufficient information about the supply chains of either company. From time to time we carry out business surveys of the Association's membership.

Q106 Paul Maynard: Many commentators and politicians have observed that, with this decision, it appears to be the end of train manufacturing in the United Kingdom. Do you consider it appropriate to think of train manufacturing as a national critical industry, stressing sovereign capability? Do you think that such an approach would benefit the passengers for whom we are, after all, building these trains?

Q114 Julie Hilling: You talked earlier about the Hitachi contract protecting the skills of train builders, but surely that contract is one of assembly rather than building the trains? Then, just moving on from that, how are we going to retain in the economy those skills of train building going forward, because clearly there is an ageing work force? How do we ensure that there are apprentice teams? How do we ensure in our economy that we still have the ability to build trains going forward? Are there further contracts coming forward? I appreciate you talked before about taking into account the other elements that can be taken into account, but are there things coming forward then that we can look at to protect that train-building capacity in the UK?

[↑ questions to the Transport Secretary](#)

DfT PROCUREMENT CULTURE

It is apparent that the DfT is at best unaware and at worst utterly ambivalent about the effect of the award of rolling stock contracts to non UK based manufacturers. The Department seems content to apply EU Directives, designed to promote open markets and competition, in the most neo-liberal way possible. There appears to be no consideration of the critical importance of social and economic impact clauses in the Invitation to Tender documents sent to prospective bidders similar to those used so widely in Germany and France to secure domestic production. Indeed it appears to be seen as a virtue by DfT officials that UK based manufacturers are not protected or supported in any way possible when large contracts are on offer.

Some years ago RMT was appalled to be told by the senior DfT procurement official that should UK based manufacturers lose out on the contract to build the replacement stock for the High Speed Trains currently operating on the East Coast and Great Western Main Lines any jobs lost in rail manufacturing would be made up for by additional jobs in the docks and ports sector as the new trains arrived for import.

← written evidence from the National Union of Rail, Maritime, and Transport Workers (RMT)

³ Corn Laws refer to the tariffs that were imposed on imported food grains in UK between 1815 and 1846. Tariffs meant that food grains coming from outside the UK were more expensive and this allowed domestic grain producers (usually rich landowners) to charge a higher price for their food than what they would have received in the presence of competition. The imposition of Corn Laws is associated with the Peterloo massacre in 1816- the price of bread was getting higher without commensurate growth in workers' wages.

⁴ This is the parliamentary committee (composed of MPs) who scrutinize the government's activities and policies related to transportation.

Note down the challenges of international competition in public procurement.

In the market: what information do you get when you look at the price of a product?

Activity 2: On a sheet of paper, write down one piece of information you think you receive by looking at the price of a product or comparing the prices of two products. Crumple it up and throw the paper ball to someone else in the room (make eye contact before throwing the ball). When you receive a paper ball from someone else, flatten it and add another piece of information (if it does not contain what you have previously written, feel free to re-use it).

At the end of the activity, note down all the points we have gathered as a group:

In an imperfect market, where there are few buyers and/or few sellers and the product being purchased is customized, i.e. specifically created for the buyer, price cannot perform many (or any) of the functions you have listed above.

Externalities (socio-economic, environmental, cultural and political) are also not easily reflected in the price. So why does public procurement follow price and choose the bidder providing a bid with the lowest price as the preferred bidder?

In the Transport Committee hearing in 2011, Professor Chris Bovis from the University of Hull submitted a written evidence explaining that public procurement and its regulations display "strong neo-classical⁵ influences".

"Such influences embrace the merit of efficiency and the presence of competition, mainly price competition, which would create optimal conditions for welfare gains. The connection between public procurement regulation and the neo-classical approach to economic integration is reflected upon the criterion for awarding public contracts based on the lowest offer. This feature of the legal framework focuses on price competition being inserted into the relevant markets and, assisted by the transparency requirement to advertise public contracts would result in production and distribution efficiencies and drive the market towards an optimal allocation of resources." (Transport Committee, 2011, Ev 29)

Optimal allocation of resources lies at the heart of economics which is essentially the study of how to allocate limited resources which have alternative uses.

⁵ Neo-classical is a school of thinking in Western societies that draws inspiration from the classics (which are thought to be the origins of the subject) and applies them in the modern or new world.

Debate: This House believes that price competition should not be used in public procurement

Additional activity to be pursued if time permits.

Summary of the tutorial

- The theory of comparative advantage postulates that overall (world) output would increase if societies specialized in the production of items they have a comparative advantage in (things that they are least bad at doing). This is the basis of international trade and the theory is used as an argument against protectionism on the grounds that it is inefficient (we could have more if we specialised and traded, than if we tried to make everything ourselves).
- International trade and international competition can lead to challenges in public procurement. In the Thameslink procurement, these concerns were:
 - The loss of jobs in train manufacturing industries
 - The loss of engineering skills and train-building capacity in the long run
 - The loss of a potentially critical national industry
- Price conveys information like quality, actual production costs, and profits in a perfectly competitive market. In an imperfect market where there are few buyers and few sellers and the product being purchased is highly customized, price is not a perfect indicator of information.
 - Price also often fails to account for external costs and benefits (externalities).
 - Public procurement regulation is often based on price competition or the selection of the lowest price.
 - The preference for lowest price is based on the assumption that it allows optimal allocation of limited resources (like public money).
 - The choice of supplier according to lowest price may be challenged for failing to account for socio-economic benefits, as happened in the case of Thameslink.
 - European procurement regulations allow the selection principle of MEAT which stands for 'Most Economically Advantageous Tender' that helps to take clearly defined socio-economic considerations, defined at the initiation of procurement, into account.

Homework

Write a 500-word argumentative essay on the topic:

The use of competition in public procurement

Please note:

- Follow the rules on word count, structure, and referencing from the homework assignment of the first tutorial (p. 16).
- Make reference to both international competition and price competition.
- In an argumentative essay, you should explain the arguments for and against topic before providing a brief conclusion where you provide your own point of view and explain why you support one side of the argument over another.
- You should refer to the ideas from the tutorial, but you can also draw on additional materials provided in Appendix 3 and/or external sources.

Tutorial 4 – If something can go wrong, it will



What is the Purpose of Tutorial 4?

- Learning about megaprojects (what are they, why they are pursued, their characteristics)
- Appreciating the complexity of megaprojects
- Applying the framework of megaprojects on the Thameslink procurement case study

Learning outcomes:

At the end of the tutorial, pupils will have gained knowledge on:

- Megaprojects and their characteristics
- The challenges of critically evaluating large-scale public procurement projects

Starter: Two truths and a lie about the Sydney Opera House

1. Construction took 14 years, instead of the 4 years as was originally planned.
2. The initial cost estimate for the building was \$7 million and, in the end, it cost \$107 million.
3. The architect Jørn Utzon attended a special performance held in his honour in 2003.

Should the Sydney Opera House have been built at all? Why/ why not?

Professor Bent Flyvbjerg at Oxford does research on the management of megaprojects- large-scale, complex ventures that cost over a billion pounds, involve multiple public and private stakeholders, and are often transformational (redefining the societies they exist in).

Activity 1: Why do societies choose to invest in megaprojects?

Read the section on 'The Four Sublimes' (Appendix 3 page 44 and 45). Prepare your notes for discussion.

If done right, megaprojects can be a great thing. But when they go wrong, they can “end up being disappointing to their sponsors; a fewer number turn out to be destroyers of shareholder wealth; and a few are horrendous with respect to anything and everything involved- the investing companies, the local population and the environment” (Morrow, 2011, p. 12)⁶.

Activity 2: The characteristics of megaprojects

Return to the journal article in Appendix 3 (page 45) and read about the ten characteristics of megaprojects. Allocate each characteristic to one of the five boxes below. Reflect on the variety of skills and subject knowledge required to understand megaprojects.

Technology	Management	Politics
Economics	History	

Which of these megaprojects' characteristics did Thameslink exhibit?

Think back on all you have learnt about the procurement of trains so far and make notes for a discussion

⁶ Morrow, E. W. (2011). *Industrial megaprojects*. Hoboken, NJ: Wiley.

So, what should we do?

There are some who would argue that there is no point in dwelling on the delays and cost overruns of megaprojects. When government projects exceed their budgets or run late, they shrug and say that they are not surprised. Some go as far as to claim that optimistic estimates of cost and time, even though inaccurate, are essential in getting a megaproject started. 'If people knew the real cost from the start, nothing would ever be approved.' Lying and deception becomes some sort of virtue in this world view.

There may be moral objections to such an argument, but from an economist's point of view there are grave efficiency concerns. Flyvbjerg, in the paper in Appendix 3, calls it the 'survival of the unfittest', an inverted Darwinism that is appalling to the economist's core motivation of optimal allocation of resources. This is because hiding the real costs and timescales of projects means that the projects that get chosen to be implemented are not the ones that are actually the best, but *the ones that look best on paper*. To look best on paper, the costs would have been highly underestimated and the benefits highly overstated.

So, what should we do? 'We cannot solve problems we cannot talk about'. Appreciating the complexity of megaprojects is an essential step in improving project performance and the efficiency of public spending. Accepting and educating ourselves about the complexity of public procurement (as we have been doing for the last few weeks) is a more constructive way of approaching these large projects.

Think about how you would advise the Department for Transport when it engages in buying a new fleet of trains the next time. Make some notes, discuss with another person, and share your insights with the rest of the group.

Homework

Write an 800-word essay that answers the following question:

What are the challenges of complex public procurement projects?

Please note:

- Follow the rules on word count, structure, and referencing from your previous homework assignment.
- Read the journal article by Bengt Flyvbjerg in Appendix 3, particularly the sections titled 'Hirschman's Hiding Hand, Revisited', 'Survival of the Unfittest', and 'Light at the End of the Tunnel'.
- You are welcome to make reference to other materials in Appendix 3 and encouraged to read more widely about megaprojects to write this essay.
- Using examples from Thameslink in a few places will help you to illustrate your arguments as well as contribute to your essay for the final assignment.
- It is important to not only explain the challenges but also suggest some solutions, if they exist (try and educate the reader with what you have learnt and found out!)

Tutorial 5 – Review



What is the Purpose of Tutorial 5?

- Revisit the challenges that occurred in the procurement of Thameslink
- Revise the concepts covered in previous tutorials
- Introduce the final assignment and expectations

Learning outcomes:

At the end of the tutorial, pupils will have gained knowledge on:

- The requirements for the final assignment

Starter: Taboo!

Partner up! Each team will have a minute where one member will try to explain the term written on a piece of paper picked at random without using the word itself. The team with the highest score after two rounds wins.

Some of the terms are:

- Public procurement
- Principal-agent problem
- Incentives
- Invitation to Tender
- Stakeholder
- Negotiation
- Contract
- Parliamentary select committee
- National Audit Office
- Accountability
- Comparative advantage
- Externalities
- Perfect competition
- Most Economically Advantageous Tender
- Protectionism
- Selection of the lowest bidder
- Technological challenges
- Overrun
- Optimism bias

Write down things you would like to remember from the game below:

Activity 1: A-Z of Thameslink

In groups of 2 or 3, make an alphabet list using terms and concepts from the Thameslink story and the tutorials. Write down the word and use it in a sentence to link it with the Thameslink rolling stock procurement case study.

A- _____

B- _____

C- _____

D- _____

E- _____

F- _____

G- _____

H- _____

I- _____

J- _____

K- _____

L- _____

M- _____

N- _____

O- _____

P- _____

Q- _____

R- _____

S- _____

T- _____

U- _____

V- _____

W- _____

X- _____

Y- _____

Z- _____

Of all the things you now know, what are your three favourite words?

Final Assignment

Question: How should the government buy trains?

Scenario:

The Department for Transport (DfT) has asked you to write an essay that responds to the question of train procurement and provides policy advice using evidence.

Please note:

- Word limit: 2000 words (+/- 10% is acceptable)
- The paper must include an **executive summary**⁷ at the beginning (150-200 words, counted towards the word limit) that will provide the essential information contained in the essay (remember, the Transport Secretary is a busy person!)
- Suggested structure of the essay (each section can have multiple paragraphs):
 - **Introduction (300 words):** State the importance and relevance of the question being asked (why is the government buying trains at all?); give background information about recent train purchases in the UK; briefly summarise the structure and contents of the essay so that readers know what to expect.
 - **Section 1 (400 words):** Describe the procurement process associated with buying trains. Discuss the role of the Department for Transport in the different stages of the procurement process (concept, competition and selection, negotiation, delivery and introduction into service). Mention other stakeholders in the procurement and make reference to the principal-agent problem (this can be a useful segue to section 2!)
 - **Section 2 (400 words):** Discuss the challenges that can occur in the different stages of procurement using economic theory and examples from a recent train purchase. In particular, explain and argue the opportunities and challenges associated with:
 - Imperfect competition (hint: the use of market price)
 - International trade (hint: industrial protectionism, specialization)
 - **Section 3 (400 words):** Appreciate the complexity of the procurement by stating some common challenges of megaprojects (refer to the work by Bengt Flyvbjerg).
 - **Conclusion (300 words):** Summarise the main lessons that the Department for Transport should remember when buying trains in the future. Provide justifications for the advice you are providing.
- Attribute any evidence or sentences you take from other academic articles, parliamentary sources, and government reports to **avoid plagiarism** (and also to demonstrate your knowledge of existing research on the topic!). Use a consistent style of referencing.
- Always define terms and concepts so that everyone can understand what you are talking about—remember, how the government buys trains affects many people, and everyone should be able to read your essay!

Make sure you understand:

- The reason why the government is buying trains
- The different stages of public procurement, the different stakeholders involved in the public procurement process, and the principal-agent problem within public procurement
- Markets are not perfect (therefore competition can be imperfect) and price may not reflect complete information (externalities and socio-economic considerations)
- International trade can have positive or negative consequences for the economy, and government policy can play an active role in promoting positive outcomes and preventing adverse effects of negative outcomes
- Public procurement and megaprojects are difficult and risky and go wrong for many reasons (some of which cannot be controlled) but we have to be aware of the complexity.

⁷ Executive summary summarizes an essay or report in a manner that readers can understand a large body of text without having to read the entire essay at all.

Essay writing reflection

Use the checklist below to reflect on your essay writing ability at the moment. Read the statements for each skill and then tick the box that most closely fits how you currently feel about your ability to do that skill.

You will use this to help your PhD tutor give you feedback in your next tutorial. They will give you specific advice on how to improve these areas in relation to your draft assignment so be completely honest.

Addressing the question			Using evidence		
I can... <ul style="list-style-type: none"> identify what the title or question is asking me to do select relevant information from the course to answer the title or question explain why the information I have used is relevant 			I can... <ul style="list-style-type: none"> select evidence that supports my points link evidence to my points and ideas clearly and convincingly explain how my evidence supports my points use references 		
I feel...			I feel...		
Confident	Partially confident	Not confident	Confident	Partially confident	Not confident
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developing an argument			Critical evaluation		
I can... <ul style="list-style-type: none"> include a point of view or position in response to the title or question develop and explain my point of view argue why my point of view or position is correct 			I can... <ul style="list-style-type: none"> ensure I analyse events and information rather than just describe them assess the relevance and significance of the ideas and examples I am writing about 		
I feel...			I feel...		
Confident	Partially confident	Not confident	Confident	Partially confident	Not confident
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structuring			Use of language		
I can... <ul style="list-style-type: none"> arrange my points in to a logical order write paragraphs that focus on one idea or point each write an introduction that explains how I will deal with the issues of the essay write a conclusion that sums up my main points 			I can... <ul style="list-style-type: none"> minimise spelling, punctuation and grammar errors ensure my writing makes the meaning clear and easy to follow write using and appropriate tone and level of formality 		
I feel...			I feel...		
Confident	Partially confident	Not confident	Confident	Partially confident	Not confident
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Tutorial 6 – Draft assignment feedback and reflection

What is the Purpose of Tutorial 6?

- To received feedback on your draft assignment
- To reflect on your essay writing skills
- To identify practical ways to improve your assignment

What three things can you now do to improve your assignment and your essay writing ability?

1

2

3

Tutorial 7 – Final assignment feedback and reflection

What is the Purpose of Tutorial 7?

- To receive feedback on final assignments.
- To write targets for improvement in school lessons.
- To reflect on the programme including what was enjoyed and what was challenging.

Final assignment feedback

What I did well...	What I could have improved on...
<ul style="list-style-type: none">•••	<ul style="list-style-type: none">•••

My target for future work is...

Reflecting on The Scholars Programme

What did you most enjoy about The Scholars Programme?

-
-
-

What did you find challenging about the programme?

-
-
-

How did you overcome these challenges?

-
-
-

Appendix 1 – Referencing correctly

When you get to university, you will need to include references in the assignments that you write, so we would like you to start getting into the habit of referencing in your Brilliant Club assignment. This is really important, because it will help you to avoid plagiarism. Plagiarism is when you take someone else's work or ideas and pass them off as your own. Whether plagiarism is deliberate or accidental, the consequences can be severe. In order to avoid losing marks in your final assignment, or even failing, you must be careful to reference your sources correctly.

What is a reference?

A reference is just a note in your assignment which says if you have referred to or been influenced by another source such as book, website or article. For example, if you use the internet to research a particular subject, and you want to include a specific piece of information from this website, you will need to reference it.

Why should I reference?

Referencing is important in your work for the following reasons:

- It gives credit to the authors of any sources you have referred to or been influenced by.
- It supports the arguments you make in your assignments.
- It demonstrates the variety of sources you have used.
- It helps to prevent you losing marks, or failing, due to plagiarism.

When should I use a reference?

You should use a reference when you:

- Quote directly from another source.
- Summarise or rephrase another piece of work.
- Include a specific statistic or fact from a source.

How do I reference?

There are a number of different ways of referencing, and these often vary depending on what subject you are studying. The most important thing is to be consistent. This means that you need to stick to the same system throughout your whole assignment. Here is a basic system of referencing that you can use, which consists of the following two parts:

- **A marker in your assignment:** After you have used a reference in your assignment (you have read something and included it in your work as a quote, or re-written it your own words) you should mark this in your text with a number, e.g. [1]. The next time you use a reference you should use the next number
 - e.g. [2].
- **Bibliography:** This is just a list of the references you have used in your assignment. In the bibliography, you list your references by the numbers you have used, and include as much information as you have about the reference. The list below gives what should be included for different sources.
- **Websites** – Author (if possible), title of the web page, website address, [date you accessed it, in square brackets].
 - e.g. Dan Snow, 'How did so many soldiers survive the trenches?', <http://www.bbc.co.uk/guides/z3kgjxs#zg2dtfr> [11 July 2014].
- **Books** – Author, date published, title of book (in italics), pages where the information came from.
 - e.g. S. Dubner and S. Levitt, (2006) *Freakonomics*, 7-9.
- **Articles** – Author, 'title of the article' (with quotation marks), where the article comes from (newspaper, journal etc.), date of the article.
 - e.g. Maeve Kennedy, 'The lights to go out across the UK to mark First World War's centenary', *Guardian*, 10 July 2014.

Appendix 2 – Additional resources

House of Commons Library Briefing Paper

Railway rolling stock (trains) by Louise Butcher
Number CBP3146, 15 June 2017

<https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN03146#fullreport>

National Audit Office reports

- Progress in delivering the Thameslink programme (5 June 2013)
<https://www.nao.org.uk/report/progress-in-delivering-the-thameslink-programme/>
- Procuring new trains (9 July 2014)
<https://www.nao.org.uk/report/procuring-new-trains-2/>
- Update on the Thameslink Programme (23 November 2017)
<https://www.nao.org.uk/report/update-on-the-thameslink-programme/>
- The Thameslink, Southern and Great Northern rail franchise (10 January 2018)
<https://www.nao.org.uk/report/the-thameslink-southern-and-great-northern-rail-franchise/>

Citing NAO reports

Comptroller and Auditor General. (YEAR). *Name of the report* (No. HC 123). National Audit Office.

Parliamentary debates

Date	Chamber	Title	Link
2 Feb 2010	Westminster Hall	Thameslink	https://hansard.parliament.uk/Commons/2010-02-02/debates/10020246000003/Thameslink
14 Jul 2011	Lords	Railways: Thameslink Rolling Stock Contract	https://hansard.parliament.uk/Lords/2011-07-14/debates/11071465001190/RailwaysThameslinkRollingStockContract
20 Nov 2012	Commons	Thameslink and Crossrail Contracts	https://hansard.parliament.uk/Commons/2012-11-20/debates/12112052000001/ThameslinkAndCrossrailContracts
19 Dec 2013	Commons	Thameslink	https://hansard.parliament.uk/Commons/2013-12-19/debates/13121959000025/Thameslink
13 Jul 2016	Westminster Hall	Govia Thameslink Rail Service	https://hansard.parliament.uk/Commons/2016-09-12/debates/603460E7-FF10-4CB2-91CD-9AFD3C70C875/GoviaThameslinkRailService
12 Sep 2016	Commons	Govia Thameslink Rail Service	https://hansard.parliament.uk/Commons/2016-09-12/debates/603460E7-FF10-4CB2-91CD-9AFD3C70C875/GoviaThameslinkRailService
19 Jul 2017	Westminster Hall	Thameslink	https://hansard.parliament.uk/Commons/2017-07-19/debates/2CAD2783-BA33-42D0-8070-9AD609D73D29/Thameslink

Another way to find parliamentary debates in Hansard:

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Transport Committee

UK Rolling Stock Procurement (16 December 2011)

<https://www.parliament.uk/business/committees/committees-a-z/commons-select/transport-committee/other-committee-work/parliament-2010/uk-rolling-stock-procurement/>

Watch the evidence session (you can also find the transcript of the oral evidence in the report vol I):

Wednesday 7 September 2011, meeting started 9.35 am, ended 11.38 am

<https://www.parliamentlive.tv/Event/Index/3e308d69-995c-46e1-92e3-8b67e34bd188>

Written evidence by Professor Chris Bovis (August 2011)

Thameslink Project

The recent procurement exercise has revealed fundamental issues in relation to strategic procurement in the UK and in particular the procurement of rolling stock.

Below are some thematic issue analysis which could familiarise the Select Committee on Transport with the latest developments at EU and domestic levels.

A. What are the principles which underpin public procurement regulation?

1. Public procurement in the European Union has been significantly influenced by the internal market project. The identification of public procurement as a major non-tariff barrier has revealed the economic importance of its regulation.³ Savings and price convergence appeared as the main arguments for liberalizing the trade patterns of the demand (the public and utilities sectors) and supply (the industry) side of the public procurement equation. The economic approach to the regulation of public procurement aims at the integration of public markets across the EU. Through the principles of transparency, non-discrimination and objectivity in the award of public contracts, it is envisaged that the regulatory system will bring about competitiveness in the relevant product and geographical markets, will increase import penetration of products and services destined for the public sector, will enhance the tradability of public contracts across the common market, will result in significant price convergence and finally it will be the catalyst for the needed rationalization and industrial restructuring of the European industrial base.

2. In parallel with the economic arguments, legal arguments emerged supporting the regulation of public procurement as a necessary ingredient of the fundamental principles of the Treaties such as the free movement of goods and services, the right of establishment and the prohibition of discrimination of nationality grounds. The legal significance of the regulation of public procurement in the common market has been well documented. Public procurement liberalization reflects the wish of European Institutions to eliminate preferential and discriminatory purchasing patterns by the public sector and create seamless intra-community trade patterns between the public and private sectors. Procurement by member states and their contracting authorities is often susceptible to a rationale and policy that favours indigenous undertakings and national champions at the expense of more efficient competitors (domestic or Community-wide). As the relevant markets (product and geographical) have been sheltered from competition, distorted patterns emerge in the trade of goods, works and services destined for the public sector. These trade patterns represent a serious impediment in the functioning of the common market and inhibit the fulfillment of the principles enshrined in the Treaties.

3. Legislation, policy guidelines and jurisprudence have all played their role in determining the need for integrated public markets in the European Union, where sufficient levels of competition influence the most optimal patterns in resource allocation for supplying the public sector as well as the public utilities with goods, works and services. Public procurement has now been elevated as a key objective of the EU's 2020 Growth Strategy.

B. Procurement regulation as an economic exercise

1. Viewing public procurement from the prism of an economic exercise, its regulation displays strong neoclassical influences. Such influences embrace the merit of efficiency in the relevant market and the presence of competition, mainly price competition, which would create optimal conditions for welfare

gains. The connection between public procurement regulation and the neo-classical approach to economic integration in the common market is reflected upon the criterion for awarding public contracts based on the lowest offer. This feature of the legal framework focuses on price competition being inserted into the relevant markets and, assisted by the transparency requirement to advertise public contracts above certain thresholds would result in production and distribution efficiencies and drive the market towards an optimal allocation of resources.

2. Removing protectionism and preferential treatment and inserting an environment of competition in public markets will bring about allocative efficiencies, which in turn will result in social welfare gains at European and national levels through the emergence of three major effects that would primarily influence the supply side. These gains include a trade effect, a competition effect and a restructuring effect.

3. The trade effect is associated with the actual and potential savings that the public sector would be able to achieve through lower cost purchasing. This effect appears to have a static dimension, since it emerges as a consequence of enhanced market access of the relevant sectors or industries. The trade effect emanates from the principle of transparency in public markets (compulsory advertisement of public contracts above certain thresholds). On the other hand, the competition effect relates to the changes of industrial performance as a result of changes in the price behaviour of national firms which had previously been protected from competition by means of preferential and discriminatory procurement practices. The competition effect derives also from the principle of transparency and appears to possess dynamic characteristics. The competition effect comes as a natural sequence to price competitiveness and inserts an element of long-term competitiveness in the relevant sectors or industries in aspects other than price (eg research and development, innovation, customer care). The competition effect would materialise in the form of price convergence, at both national and Community-wide levels, of goods, works and services destined for the public sector. Finally, the third effect (the restructuring effect) reflects upon the restructuring dimension of the supply side as a result of increased competition in the relevant markets. The restructuring effect possesses dynamic characteristics and refers to the long-term industrial and sectoral adjustment through strategic investment, takeovers and mergers and acquisitions. The restructuring effect attempts to capture the reaction of the relevant sector or industry vis-à-vis the competitive regime imposed upon the demand and supply sides, as a result of openness and transparency and the sequential trade and competition effects.

4. The lowest offer as an award criterion of public contracts is a quantitative method of achieving market equilibrium between the demand and supply sides. The supply side competes in costs terms to deliver standardised (at least in theory) works, services and goods to the public sector. Price competition is bound to result in innovation in the relevant industries, where through investment and technological improvements, firms could reduce production and/or distribution costs. The lowest offer criterion could be seen as the necessary stimulus in the relevant market participants in order to improve their competitive advantages.

5. The lowest offer award criterion reflects on, and presupposes low barriers to entry in a market and provides for a type of predictable accessibility for product or geographical markets. This is a desirable characteristic in a system such as public procurement regulation which is charged with integrating national markets and creating an homogenous and transparent common market for public contracts. In addition, the low barriers to enter a market, together with the transparent price benchmarking for awarding public contracts through the lowest offer criterion would inevitably attract new undertakings in public procurement markets. This can be seen as an increase of the supply-side pool, a fact which would provide the comfort and the confidence to the demand side (the public sector) in relation to the competitive structure of an industry. Nevertheless, the increased number of participants in public tenders could have adverse effects. Assuming that the financial and technical capacity of firms is not an issue, the demand side (the public sector) will have to bear the cost of tendering and in particular the costs relating to the evaluation of offers. The more participants enter the market for the award of public contracts, the bigger the costs attributed to the tendering process would have to be born by the public sector.

6. However, competitiveness in an industry is not reflected solely by reference to low production costs. Efficiencies which might result through production or distribution innovations are bound to have a short

term effect on the market for two reasons: if the market is bound to clear with reference to the lowest price, there would be a point where the quality of deliverables is compromised (assuming a product or service remains standardized). Secondly, the viability of industries which tend to compete primarily on cost basis is questionable. Corporate mortality will increase and the market could revert to oligopolistic structures.

7. The welfare gains emanating from a neo-classical approach of public procurement regulation encapsulate the actual and potential savings the public sector (and consumers of public services at large) would enjoy through a system that forces the supply side to compete on costs (and price). These gains, however, must be counterbalanced with the costs of tendering (administrative and evaluative costs born by the public sector), the costs of competition (costs related to the preparation and submission of tender offers born by the private sector) and litigation costs (costs relevant to prospective litigation born by both aggrieved tenderers and the public sector). If the cumulative costs exceed any savings attributed to lowest offer criterion, the welfare gains are negative.

8. A neo-classical perspective of public procurement regulation reveals the zest of policy makers to establish conditions which calibrate market clearance on price grounds. Price competitiveness in public procurement raises a number of issues with anti-trust law and policy. If the maximisation of savings is the only (or the primary) achievable objective for the demand side in the public procurement process, the transparent/ competitive pattern cannot provide any safeguards in relation to underpriced (and anti-competitive) offers.

9. The price competitive tendering reflects on the dimension of public procurement regulation as an economic exercise. On the one hand, when the supply side responds to the perpetually competitive purchasing patterns by lowering prices, the public sector could face a dilemma: what would be the lowest offer it can accept. The public sector faces a considerable challenge in evaluating and assessing low offers other than "abnormally low" ones. It is difficult to identify dumping or predatory pricing disguised behind a low offer for a public contract. On the other hand, even if there is an indication of anti-competitive price fixing, the European public procurement rules do not provide for any kind of procedure to address the problem. The anti-trust rules take over and the suspension of the award procedures (or even the suspension of the contract itself) would be subject to a thorough and exhaustive investigation by the competent anti-trust authorities.

C. The ordo-liberal approach to public procurement regulation

1. Harmonisation of laws has been entrusted to carry the progress of public procurement regulation. Directives, as legal instruments, have been utilized to provide the framework of the *acquis communautaire*, but at the same time afford the necessary discretion to the Member States as to the forms and methods of their implementation. This is where the first deviation from the traditional economic approach of public procurement occurs. Anti-trust law and policy is enacted through the principle of uniformity across the common market, utilizing directly applicable regulations. By allowing for discretion to the Member States, an element of public policy is inserted in the equation, which often has decentralized features. Traditionally, discretion afforded by Directives takes into account national particularities and sensitivities as well as the readiness of domestic administrations to implement *acquis* within a certain deadline. In addition, individuals, who are also subjects of the rights and duties envisaged by the Directives, do not have access to justices, unless provisions of Directives produce direct effect.

2. However, the public policy dimension of public procurement regulation is not exhausted in the nature of the legal instruments of the regime. The genuine connection of an ordo-liberal perspective with public procurement regulation is reflected in the award criterion relating to the most economically advantageous offer. The public sector can award contracts by reference to "qualitative" criteria, in conjunction with price, and thus can legitimately deviate from the strict price competition environment set by the lowest offer criterion. There are three themes emanating from such approach: one reflects on public procurement as a complimentary tool of the European Integration process; the second regards public procurement as an instrument of contract compliance; last, the ordo-liberal perspective can reveal a rule of reason in public procurement, where the integration of public markets in the European Union serves as a conveyer belt of common policies, such as

environmental policy, consumer policy, social policy, industrial policy and takes into account a flexible and wider view of national and community priorities, and a type of “European public policy”.

D. How are complex public contracts awarded?

1. Although in numerous instances the importance of the economic approach to the regulation of public procurement has been reinforced by European and national institutions, the relative discretion of contracting authorities to utilise non-economic considerations as award criteria it has also been confirmed. Under the most economically advantageous offer award criterion, environmental and socio-economic considerations are allowed to play a part in the evaluation process and determine the award of public contracts, provided that they are linked to the subject-matter of the contract, do not confer an unrestricted freedom of choice on the authority, are expressly mentioned in the contract documents or the tender notice, and comply with all the fundamental principles of Community law, in particular the principle of non-discrimination.

2. Often, questions are asked as to the possibility of a contracting authority to lay down criteria that pursue advantages which cannot be objectively assigned a direct economic value, such as advantages related to the protection of the environment or the promotion of employment policies. The European Court of Justice held that that each of the award criteria used by contracting authorities to identify the most economically advantageous tender must not necessarily be of a purely economic nature.

3. The European Court of Justice maintained that a criterion relating to the reliability of supplies is a legitimate factor in determining the most economically advantageous offer for a contracting authority. However, the capacity of tenderers to perform the terms and conditions of the contract cannot be legitimately linked with the subject matter of the contract, unless the contracting authority provides for an objectively determined verification. Therefore, the link of non-economic criteria to the subject matter of the contract presupposes the existence of procedural requirements which permit the authentication of the accuracy of the information contained in the tenders and confirm that the criteria serve the objective pursued.

Thameslink in the Government Major Project Portfolio (2013 – 2019)

Since 2013, the Infrastructure and Projects Authority (previously called the Major Projects Authority) has been publishing details of all its major projects on an annual basis (titles the Annual Report on Major Projects). IPA gives a Delivery Confidence Rating which indicates a project's likelihood to be delivered on time and within budget. The consolidated data and narratives gives more details (like departmental responses to the assessment).

Green indicates successful delivery in highly likely; **Amber/Green** indicates successful delivery is probable; **Amber** indicates 'successful delivery appears feasible but significant issues already exist'; **Amber/Red** indicates that successful delivery of the project is in doubt; **Red** indicates that successful delivery 'appears unachievable'.

Variable	2013	2014	2015	2016	2017	2018	2019
Delivery Confidence Rating	Amber/Green	Amber/Green	Amber	Amber	Amber/Green	Amber	Amber

2013: <https://www.gov.uk/government/publications/major-projects-authority-annual-report-2013>

2014: <https://www.gov.uk/government/publications/major-projects-authority-annual-report-2014>

2015: <https://www.gov.uk/government/publications/major-projects-authority-annual-report-2015>

2016: <https://www.gov.uk/government/publications/infrastructure-and-projects-authority-annual-report-2016>

2017: <https://www.gov.uk/government/publications/infrastructure-and-projects-authority-annual-report-2017>

2018: <https://www.gov.uk/government/publications/infrastructure-and-projects-authority-annual-report-2018>

2019: <https://www.gov.uk/government/publications/infrastructure-and-projects-authority-annual-report-2019>

An obituary on Jørn Utzon

Utzon: the Sydney Opera House's brightest star

IN FEBRUARY 1966, Joern Utzon resigned as chief architect of the Sydney Opera House.

Forced out by governmental and bureaucratic intransigence, Utzon quietly left Australia, never to return. When the Opera House opened in 1973, the architect was not invited to the ceremony, and nor was his name mentioned. For too long it was as if Australia's most iconic building materialised by itself, minus its unfairly maligned guiding genius.

It is ironic, therefore, that Sydney recognised the passing of Utzon, who died in Denmark on Saturday at the age of 90, by dimming the lights on the Opera House's sails and flying the flags on the Harbour Bridge at half-mast. Such honour was not accorded to Utzon's nemeses — the premier of the day, Robert Askin, and his public works minister, Davis Hughes.

In truth, Utzon's architectural masterpiece belongs to all Australia, and all Australia should mourn. Although, in recent years, there has been rapprochement, with Utzon again being involved in several changes to the Opera House's design, the stigma of its planning and construction will never be quite effaced from history.

The great abiding sadness is that Utzon never saw the Opera House as a functioning building; he never walked up the steps in the glowing harbour twilight; he never sat under the sails to hear the music and see the spectacles the place was designed to show. Therefore, he was witness to only a fraction of its history, and none of it involving the past 35 years as an active performance venue.

Perhaps eclipsing what happens inside it, is the Sydney Opera House's own cultural worth. None of this would have happened without Utzon's vision, which, in his words, "together with the sun, the light and the clouds, it makes a living thing". The name Joern Utzon also deserves to live on for ever.

(published in *The Age* on 2 December 2008)

What You Should Know About Megaprojects and Why: An Overview

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ABSTRACT ■

This paper takes stock of megaproject management, an emerging and hugely costly field of study, by first answering the question of how large megaprojects are by measuring them in the units of mega, giga, and tera, and concluding with how we are presently entering a new “tera era” of trillion-dollar projects. Second, total global megaproject spending is assessed, at US\$6 to US\$9 trillion annually, or 8% of the total global gross domestic product (GDP), which denotes the biggest investment boom in human history. Third, four “sublimes”—political, technological, economic, and aesthetic—are identified and used to explain the increased size and frequency of megaprojects. Fourth, the “iron law of megaprojects” is laid out and documented: Over budget, over time, over and over again. Moreover, the “break-fix model” of megaproject management is introduced as an explanation of the iron law. Fifth, Albert O. Hirschman’s theory of the “Hiding Hand” is revisited and critiqued as unfounded and corrupting for megaproject thinking in both the academy and policy. Sixth, it is shown how megaprojects are systematically subject to “survival of the unfittest,” which explains why the worst projects get built rather than the best. Finally, it is argued that the conventional way of managing megaprojects has reached a “tension point,” in which tradition is being challenged and reform is emerging.

KEYWORDS: megaproject management; scale; four sublimes; iron law of megaprojects; break-fix model of megaprojects; Hirschman’s Principle of the Hiding Hand; survival of the unfittest; tension points

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Mega, Giga, Tera: How Big Are Megaprojects?

Megaprojects are large-scale, complex ventures that typically cost US\$1 billion or more, take many years to develop and build, involve multiple public and private stakeholders, are transformational, and impact millions of people.¹ Hirschman (1995, vii, xi) calls such projects “privileged particles of the development process” and points out that often they are “trait making”; in other words, they are designed to ambitiously change the structure of society, as opposed to smaller and more conventional projects that are “trait taking,” that is, they fit into pre-existing structures and do not attempt to modify these. Megaprojects, therefore, are not just magnified versions of smaller projects. Megaprojects are a completely different breed of project in terms of their level of aspiration, lead times, complexity, and stakeholder involvement. Consequently, they are also a very different type of project to manage. A colleague of mine likes to say that if managers of conventional projects need the equivalent of a driver’s license to do what they do, then managers of megaprojects need the equivalent of a pilot’s jumbo jet license.² And, just like you wouldn’t want someone with just a driver’s license to fly a jumbo jet, you wouldn’t want conventional project managers to manage megaprojects.

Megaprojects are increasingly used as the preferred delivery model for goods and services across a range of businesses and sectors, including infrastructure, water and energy, information technology, industrial processing plants, mining, supply chains, enterprise systems, strategic corporate initiatives and change programs, mergers and acquisitions, government administrative systems, banking, defense, intelligence, air and space exploration, big science, urban regeneration, and major events. Examples of megaprojects are high-speed rail lines, airports, seaports, motorways, hospitals, national health or pension information and communication technology (ICT) systems, national broadband, the Olympics, large-scale signature architecture, dams, wind farms, offshore oil and gas extraction, aluminum smelters, the development of new aircraft, the largest container and cruise ships, high-energy particle accelerators, and the logistics systems used to run large supply chain-based companies like Amazon and Maersk. Below, we will see just how big megaprojects and the megaprojects business are. We will also try to understand what drives scale.

To illustrate just how big megaprojects are, consider one of the largest dollar figures in public economic debate in recent years—the size of the U.S. debt to China. This debt is approximately US\$1 trillion and is considered so large it may destabilize the world economy if the debt is not managed prudently. With this supersize measuring rod, now consider the fact that the combined cost of just two of the world’s largest megaprojects—the Joint Strike Fighter aircraft program and China’s high-speed rail project—is more than one half of this figure, US\$700 billion (Figure 1). The cost of a mere handful of the largest

¹As a general rule of thumb, “megaprojects” are measured in billions of dollars, “major projects” in hundreds of millions, and “projects” in millions and tens of millions. Megaprojects are sometimes also called “major programs.”

²The colleague is Dr. Patrick O’Connell, Practitioner Director of Major Programme Management at Oxford University’s Saïd Business School.

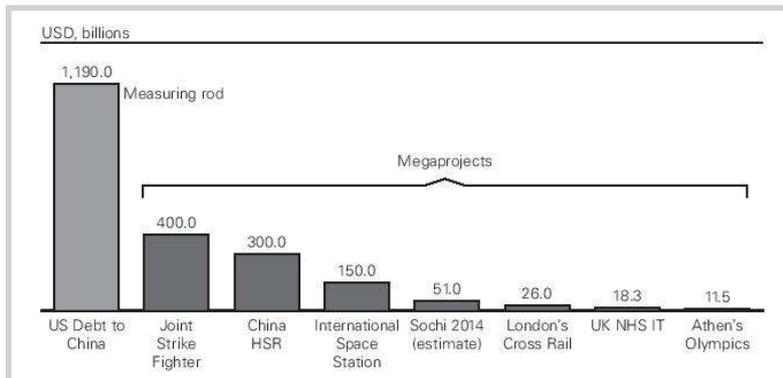


Figure 1: Size of selected megaprojects, measured against one of the largest dollar-figures in the world, the accumulated U.S. debt to China.

megaprojects in the world will dwarf almost any other economic figure and certainly any investment figure.

Not only are megaprojects large, however, they are constantly growing ever larger in a long historical trend with no end in sight. When New York's Chrysler Building opened in 1930 at 319 meters, it was the tallest building in the world. The record has since been surpassed seven times and from 1998, the world record for height has significantly been held by emerging economies, with Dubai's Burj Khalifa presently holding the record at 828 meters. This is a 160% increase in building height over 80 years. Similarly, the longest bridge span has grown even faster, by 260% over approximately the same period. Measured by value, the size of infrastructure projects has grown by 1.5% to 2.5% annually in real terms over the past century, which is equivalent to a doubling in project size two to three times per century (author's megaprojects database). The size of ICT projects, the new kid on the block, has grown much faster, as illustrated by a 16-fold increase between 1993 and 2009 in lines of code in Microsoft Windows, from 5 to 80 million lines. Other types of megaprojects, ranging from the Olympics to industrial projects, have seen similar developments. Coping with increased scale is therefore a

constant and pressing issue in megaproject management.

"Mega" comes from the Greek word "megas" and means great, large, vast, big, high, tall, mighty, and important. As a scientific and technical unit of measurement, "mega" specifically means one million. If we were to use this unit of measurement in economic terms, then strictly speaking, megaprojects would be million-dollar (or euro, pound, etc.) projects; indeed, for more than one hundred years, the largest projects in the world were measured mostly in the millions. This changed with World War II, the Cold War, and the Space Race. Project costs had now escalated to the billions, led by the Manhattan Project (1939–1946), a research and development program that produced the first atomic bomb, and later the Apollo program (1961–1972), which landed the first humans on the moon (Morris, 1994; Flyvbjerg, 2014). According to *Merriam-Webster Dictionary*, the first known use of the term "megaproject" was in 1976; but before that, from 1968, "mega" was used in "megacity"; and later, from 1982, as a standalone adjective, indicating "very large."

Thus, the term "megaproject" caught on just as the largest projects were technically no longer megaprojects but, to be more accurate, were evolving into "gigaprojects"—"giga" being the unit

of measurement meaning one billion. However, the term "gigaproject" never really caught on. A Google search reveals that the word "megaproject" is used 27 times more frequently on the Web than the term "gigaproject." For the largest of this type of project, a price tag of US\$50 to US\$100 billion is now common (e.g., the California and UK high-speed rail projects), and a price above US\$100 billion is not uncommon (e.g., the International Space Station and the Joint Strike Fighter). If these were nations, projects of such size would rank among the world's top 100 countries measured by gross domestic product, larger than the economies of, for example, Kenya or Guatemala. When projects of such size go wrong, entire companies and national economies suffer.

"Tera" is the next unit up, and is the measurement for one trillion (one thousand billion). Recent developments in the sizes of the very largest projects and programs indicate we may presently be entering the "tera era" of large-scale project management. If we consider as projects the stimulus packages launched by the United States, Europe, and China to mitigate the effects of the 2008 financial and economic crises, then we can speak in terms of trillion-dollar projects and thus of "teraprojects." Similarly, if the major acquisition program portfolio of the United States Department of Defense (valued at US\$1.6 trillion in 2013) is considered a large-scale project, then this, again, would be a teraproject (United States Government Accountability Office [GAO], 2013). Projects of this size compare with the GDPs of the world's top 20 nations, similar in size to the national economies of, for example, Australia or Canada. There is no indication that the relentless drive to scale is abating in megaproject development. Quite the opposite—scale seems to be accelerating.

How Big Is the Megaprojects Business?

Megaprojects are not only large and growing constantly larger, however, they

What You Should Know About Megaprojects and Why: An Overview

Type of Sublime	Characteristic
Technological	The excitement engineers and technologists get in pushing the envelope for what is possible in “longest-tallest-fastest” types of projects
Political	The rapture politicians get from building monuments to themselves and for their causes, and from the visibility this generates with the public and media
Economic	The delight business people and trade unions get from making lots of money and jobs off megaprojects, including money made for contractors, workers in construction and transportation, consultants, bankers, investors, landowners, lawyers, and developers
Aesthetic	The pleasure designers and people who love good design get from building and using something very large that is also iconic and beautiful, such as the Golden Gate Bridge

Table 1: The “four sublimes” that drive megaproject development.

are also being built in ever greater numbers, at ever greater value. The McKinsey Global Institute (2013) estimates global infrastructure spending will be US\$3.4 trillion per year between 2013 and 2030, or approximately 4% of the total global gross domestic product, mainly delivered as large-scale projects. *The Economist* (2008) similarly estimated infrastructure spending in emerging economies at US\$2.2 trillion annually for the period between 2009 and 2018.

To illustrate the accelerated pace at which spending is taking place, consider that in the five years between 2004 and 2008, China spent more on infrastructure in real terms than during the entire 20th century, which is an increase in spending rate of a factor of 20. Similarly, between 2005 and 2008, China built as many kilometers of high-speed rail as Europe did in two decades; Europe was extraordinarily busy building this type of infrastructure during this period as well. Not at any time in the history of mankind has infrastructure spending been this high, measured as a share of world GDP, according to *The Economist*, (2008), who calls it “the biggest investment boom in history.” And that’s just for infrastructure.

If we include the many other fields in which megaprojects are a main delivery model—oil and gas, mining, aerospace, defense, ICT, supply chains, mega events, and so forth—then a conservative estimate for the global megaproject market is between US\$6 and US\$9 trillion per year, or approximately 8% of the total global gross domestic

product. To put this into perspective, consider this is the equivalent of spending five to eight times the accumulated U.S. debt to China, *every year*. That’s big business by any definition of the term.

Moreover, megaprojects have proved remarkably recession proof. In fact, the downturn from 2008 has helped the megaprojects business grow further by showering stimulus spending on everything from transportation infrastructure to ICT. From being a fringe activity—albeit a spectacular one—mainly reserved for rich, developed nations, megaprojects have recently transformed into a global multi-trillion-dollar business that affects all aspects of our lives, from our electricity bill to how we shop, what we do on the Internet to how we commute.

With so many resources tied up in ever-larger and ever-more megaprojects, at no time has the management of such projects therefore been more important. The potential benefits of building the right projects in the right manner are enormous and are only matched by the potential waste from building the wrong projects, or building projects erroneously. Never has it been more important to choose the most fitting projects and get their economic, social, and environmental impacts right (Flyvbjerg, Bruzelius, & Rothengatter, 2003). Never has systematic and valid knowledge about megaprojects therefore been more important to inform policy, practice, and public debate in this highly costly area of business and government.

The Four Sublimes

What drives the megaproject boom described above? Why are megaprojects so attractive to decision makers? The answer may be found in the so-called “four sublimes” of megaproject management (see Table 1). The first of these, the “technological sublime,” is a term variously attributed to Miller (1965) and Marx (1967) to describe the positive historical reception of technology in American culture during the nineteenth and early twentieth centuries. Frick (2008) introduced the term to the study of megaprojects and here described the technological sublime as the rapture engineers and technologists get from building large and innovative projects, with their rich opportunities for pushing the boundaries for what technology can do, such as building the tallest building, the longest bridge, the fastest aircraft, the largest wind turbine, or the first of *anything*. Frick applied the concept in a case study of the multi-billion-dollar New San Francisco–Oakland Bay Bridge, concluding “the technological sublime dramatically influenced bridge design, project outcomes, public debate, and the lack of accountability for its [the bridge’s] excessive cost overruns” (p. 239).

Flyvbjerg (2012; 2014) proposed three additional sublimes, beginning with the “political sublime,” which here is understood to be the rapture politicians get from building monuments to themselves and for their causes. Megaprojects are manifest, garner attention, and lend an air of pro-activeness to

their promoters; moreover, they are media magnets, which appeals to politicians who seem to enjoy few things better than the visibility they get from starting megaprojects, except, perhaps, the ceremonious ribbon-cutting during the opening of one in the company of royals or presidents, who are likely to be present, lured by the unique monumentality and historical import of many megaprojects. This is the type of public exposure that helps get politicians re-elected; so, therefore, they actively seek it out.

Next, there is the “economic sublime,” which is the delight business people and trade unions get from making lots of money and jobs from megaprojects. Given the enormous budgets for megaprojects, there are ample funds to go around for all, including contractors, engineers, architects, consultants, construction and transportation workers, bankers, investors, landowners, lawyers, and developers. Finally, the “aesthetic sublime” is the pleasure designers and people who appreciate good design get from building, using, and looking at something very large that is also iconically beautiful (e.g., San Francisco’s Golden Gate Bridge or Sydney’s Opera House).

All four sublimines are important drivers of the scale and frequency of megaprojects described above. Taken together they ensure that strong coalitions exist of stakeholders who benefit from megaprojects and who will therefore work for more such projects.

For policymakers, investing in infrastructure megaprojects seems particularly coveted because, if done right, such investing:

- Creates and sustains employment;
- Contains a large element of domestic inputs relative to imports;
- Improves productivity and competitiveness by lowering production costs;
- Benefits consumers through higher-quality services; and
- Improves the environment when infrastructures that are environmentally

sound replace infrastructures that aren’t (Helm, 2008, p. 1).

There is a big “if” here, however, as in “*if* done right.” Only if this is disregarded—as it often is by promoters and decision makers for megaprojects—can megaprojects be seen as an effective way to deliver infrastructure. In fact, conventional megaproject delivery, infrastructure and other, is highly problematic, with a dismal performance record in terms of actual costs and benefits, as we will see below. The following characteristics of megaprojects are typically overlooked or glossed over when the four sublimines are at play and the megaproject format is chosen for the delivery of large-scale ventures:

1. Megaprojects are inherently risky due to long planning horizons and complex interfaces (Flyvbjerg, 2006).
2. Often, projects are led by planners and managers without deep domain experience who keep changing throughout the long project cycles that apply to megaprojects, leaving leadership weak.
3. Decision making, planning, and management are typically multi-actor processes involving multiple stakeholders, both public and private, with conflicting interests (Aaltonen & Kujala, 2010).
4. Technology and designs are often non-standard, leading to “uniqueness bias” among planners and managers, who tend to see their projects as singular, which impedes learning from other projects.³

³Uniqueness bias” is here defined as the tendency of planners and managers to see their projects as singular. This particular bias stems from the fact that new projects often use non-standard technologies and designs, leading managers to think their project is more different from other projects than it actually is. Uniqueness bias impedes managers’ learning, because they think they have nothing to learn from other projects because their own project is unique. This lack of learning may explain why managers who see their projects as unique perform significantly worse than other managers (Budzier & Flyvbjerg, 2013). Project managers who think their project is unique are therefore a liability for their project and organization. For megaprojects this would be a mega-liability.

5. Frequently there is overcommitment to a certain project concept at an early stage, resulting in “lock-in” or “capture,” leaving analyses of alternatives weak or absent, and leading to escalated commitment in later stages. “Fail fast” does not apply; “fail slow” does (Cantarelli, Flyvbjerg, & Rothengatter, 2010; Ross & Staw, 1993; Drummond, 1998).
6. Due to the large sums of money involved, principal-agent problems and rent-seeking behavior are common, as is optimism bias (Eisenhardt, 1989; Stiglitz, 1989; Flyvbjerg, Garbuio, & Lovallo, 2009).
7. The project scope or ambition level will typically change significantly over time.
8. Delivery is a high-risk, stochastic activity, with overexposure to so-called “black swans”; i.e., extreme events with massively negative outcomes (Taleb, 2010). Managers tend to ignore this, treating projects as if they exist largely in a deterministic Newtonian world of cause, effect, and control.
9. Statistical evidence shows that such complexity and unplanned events are often unaccounted for, leaving budget and time contingencies inadequate.
10. As a consequence, misinformation about costs, schedules, benefits, and risks is the norm throughout project development and the decision-making process. The result is cost overruns, delays, and benefit shortfalls that undermine project viability during project implementation and operations.

In the next section, we will see just how big and frequent such cost overruns, delays, and benefit shortfalls are.

The Iron Law of Megaprojects

Performance data for megaprojects speak their own language. Nine out of ten such projects have cost overruns; overruns of up to 50% in real terms are common, over 50% are not

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Project	Cost Overrun (%)
Suez Canal, Egypt	1,900
Scottish Parliament Building, Scotland	1,600
Sydney Opera House, Australia	1,400
Montreal Summer Olympics, Canada	1,300
Concorde Supersonic Aeroplane, UK, France	1,100
Troy and Greenfield Railroad, USA	900
Excalibur Smart Projectile, USA, Sweden	650
Canadian Firearms Registry, Canada	590
Lake Placid Winter Olympics, USA	560
Medicare transaction system, USA	560
Bank of Norway headquarters, Norway	440
Furka Base Tunnel, Switzerland	300
Verrazano Narrow Bridge, USA	280
Boston's Big Dig Artery/Tunnel project, USA	220
Denver International Airport, USA	200
Panama Canal, Panama	200
Minneapolis Hiawatha light rail line, USA	190
Humber Bridge, UK	180
Dublin Port Tunnel, Ireland	160
Montreal Metro Laval extension, Canada	160
Copenhagen Metro, Denmark	150
Boston–New York–Washington Railway, USA	130
Great Belt Rail Tunnel, Denmark	120
London Limehouse Road Tunnel, UK	110
Brooklyn Bridge, USA	100
Shinkansen Joetsu high-speed rail line, Japan	100
Channel Tunnel, UK, France	80
Karlsruhe–Bretten light rail, Germany	80
London Jubilee Line extension, UK	80
Bangkok Metro, Thailand	70
Mexico City Metroline, Mexico	60
High-speed Rail Line South, The Netherlands	60
Great Belt East Bridge, Denmark	50

Table 2: Large-scale projects have a calamitous history of cost overrun.

uncommon. The cost overrun for the Channel Tunnel, the longest underwater rail tunnel in Europe, connecting the United Kingdom and France, was 80% in real terms. The cost overruns for the Denver International Airport were 200%; for Boston's Big Dig, 220%; and for the Sydney Opera House, 1,400% (see more examples in Table 2).

Overrun is a problem in private as well as public sector projects, and things are not improving; overruns have stayed high and constant for the 70-year period for which comparable data exist. Geography doesn't seem to matter either; all countries and continents for which data are available suffer from overruns. Similarly, benefit shortfalls of up to

50% are also common and above 50% not uncommon, again with no signs of improvements over time and geography (Flyvbjerg, Holm, & Buhl, 2002, 2005).

Combine the large cost overruns and benefit shortfalls with the fact that business cases, cost-benefit analyses, and social and environmental impact assessments are typically at the core of planning and decision making for megaprojects and we see that such analyses can generally not be trusted. For example, for rail projects, an average cost overrun of 44.7% combines with an average demand shortfall of 51.4%, and for roads, an average cost overrun of 20.4% combines with a 50-50 risk that demand is also incorrect by more than 20%. With errors and biases of such magnitude in the forecasts that form the basis for business cases, cost-benefit analyses, and social and environmental impact assessments, such analyses will also, with a high degree of certainty, be strongly misleading. (Flyvbjerg, 2009) "Garbage in, garbage out," as the saying goes.

As a case in point, let's consider the Channel Tunnel in more detail. This project was originally promoted as highly beneficial both economically and financially. At the initial public offering, Euro-tunnel, the private owner of the tunnel, tempted investors by telling them that 10% "would be a reasonable allowance for the possible impact of unforeseen circumstances on construction costs" (The Economist, 7 October, 1989, 37-38). In fact, costs went 80% over budget for construction, as mentioned above, and 140% over budget for financing. Revenues have been one half of those forecasted. As a consequence, the project has proved non-viable, with an internal rate of return on the investment that is negative, at minus 14.5% with a total loss to the British economy of US\$17.8 billion; thus, the Channel Tunnel detracts from the economy instead of adding to it. This is difficult to believe when you use the service, which is fast, convenient, and competitive with alternative modes of travel. But, in fact, each passenger is

heavily subsidized—not by the taxpayer this time, but by the many private investors who lost their money when Eurotunnel went insolvent and was financially restructured. This drives home an important point: A megaproject may well be a technological success, but a financial failure, and many are. An economic and financial ex post evaluation of the Channel Tunnel, which systematically compared actual with forecasted costs and benefits, concluded that “the British Economy would have been better off had the Tunnel never been constructed” (Anguera, 2006, p. 291). Other examples of non-viable megaprojects are Sydney’s Lane Cove Tunnel, the high-speed rail connections at the Stockholm and Oslo Airports, the Copenhagen Metro, and Denmark’s Great Belt Tunnel, the second-longest underwater rail tunnel in Europe, after the Channel Tunnel.

Large-scale ICT projects are even more risky. One in six such projects becomes a statistical outlier in terms of cost overrun, with an average overrun for outliers of 200% in real terms. This is a 2,000% over incidence of outliers compared with normal and a 200% over incidence compared with large construction projects, which are also plagued by cost outliers (Flyvbjerg & Budzier, 2011). Total annual project waste from failed and underperforming ICT projects for the United States alone has been estimated at US\$55 billion by the Standish Group (2009).

Delays are a separate problem for megaprojects and they cause both cost overruns and benefit shortfalls. For example, preliminary results from a study undertaken at Oxford University, based on the largest database of its kind, suggest that delays on dams are 45% on average. Thus, if a dam was planned to take 10 years to execute, from the decision to build until the dam became operational, then it actually took 14.5 years on average. Flyvbjerg, Holm, and Buhl (2004) modeled the relationship between cost overrun and length of implementation phase based on a large data set for major construction proj-

ects; they found that, on average, a one-year delay or other extension of the implementation phase correlates with an increase in percentage cost overrun of 4.64 percentage points.

To illustrate, for a project the size of London’s US\$26 billion Crossrail project, a one-year delay would cost an extra US\$1.2 billion, or US\$3.3 million per day. The key lesson here is that in order to keep costs down, implementation phases should be kept short and delays small. This should not be seen as an excuse for fast-tracking projects, in other words, rushing them through decision making for early construction start. Front-end planning needs to be thorough before deciding whether to give the green light to a project or stopping it before it starts (Williams & Samset, 2010). But often the situation is the exact opposite. Front-end planning is scant, bad projects are not stopped; implementation phases and delays are long; costs soar, and benefits and revenue realization recedes into the future. For debt-financed projects this is a recipe for disaster, because project debt grows, whereas there is no revenue stream to service interest payments, which are then added to the debt, which increases interest payments, and so on in a vicious cycle. As a result, many projects end up in the so-called “debt trap,” where a combination of escalating construction costs, delays, and increasing interest payments makes it impossible for income from a project to cover costs, rendering the project non-viable. That is what happened to the Channel Tunnel and Sydney’s Lane Cove Tunnel, among other projects.

This is not to say that there are no projects that were built on budget and on time and delivered the promised benefits. The Guggenheim Museum Bilbao is an example of that rare breed of project. Similarly, recent metro extensions in Madrid were built on time and to budget (Flyvbjerg, 2005), as were a number of industrial projects (Merrow, 2011). It is particularly important to study such projects to understand

the causes of success and test whether success may be replicated elsewhere. It is far easier, however, to produce long lists of projects that have failed in terms of cost overruns and benefit shortfalls than it is to produce lists of projects that have succeeded. To illustrate this, as part of ongoing research on success in megaproject management, this author and his associates are trying to establish a sample of successful projects large enough to allow statistically valid answers; but, thus far have failed. Why? Because success is so rare in megaproject management that, at present, it can only be studied as small-sample research; whereas, failure may be studied with large samples of projects.

Success in megaproject management is typically defined as projects being delivered on budget, on time, and with the promised benefits. If, as the evidence indicates, approximately one out of ten megaprojects is on budget, one out of ten is on schedule, and one out of ten delivers the promised benefits, then approximately one in one thousand projects is a success, defined as “on target” for all three. Even if the numbers were wrong by a factor of two—so that two, instead of one out of ten projects were on target for cost, schedule, and benefits, respectively—the success rate would still be dismal, now eight in one thousand. This serves to illustrate what may be called the “iron law of megaprojects”: *Over budget, over time, over and over again* (Flyvbjerg, 2011).⁴ Best practice is an outlier, average practice a disaster in this interesting and very costly area of management.

The “Break-Fix Model” of Megaproject Management

The above analysis leaves us with a genuine paradox, the so-called “megaprojects paradox,” first identified by

⁴The Economist (March 10, 2012, p. 55) describes the near-certainty of large cost overruns and delays in transportation infrastructure projects as “the iron law of infrastructure projects.” Our data show the iron law is not limited to infrastructure; it applies to megaprojects in general and covers benefit shortfalls in addition to cost overruns and delays.

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Flyvbjerg et al. (2003, pp 1–10). On one side of the paradox, megaprojects as a delivery model for public and private ventures have never been more in demand, and the size and frequency of megaprojects have never been larger. On the other side, performance in megaproject management is strikingly poor and has not improved for the 70-year period for which comparable data are available, at least not when measured in terms of cost overruns, schedule delays, and benefit shortfalls.

Today, megaproject planners and managers are stuck in this paradox because their main delivery method is what has been called the “break-fix model” for megaproject management.⁵ Generally, megaproject planners and managers—and their organizations—do not know how to deliver successful megaprojects, or do not have the incentives to do so, and therefore such projects tend to “break” sooner or later, for example, when reality catches up with optimistic, or manipulated, estimates of schedule, costs, or benefits; delays, cost overruns, and benefit shortfalls follow. Projects are then often paused and reorganized—sometimes also refinanced—in an attempt to “fix” problems and deliver some version of the initially planned project with a semblance of success. Typically, lock-in and escalation make it impossible to drop projects altogether, which is why megaprojects have been called the “Vietnams” of policy and management: “easy to begin and difficult and expensive to stop” (White, 2012; Cantarelli et al., 2010; Ross & Staw, 1993; Drummond, 1998). The “fix” often takes place at great and unexpected cost to those stakeholders who were not aware of what was going on and were unable or lacked the foresight to pull out before the break.

The break-fix model is wasteful and leads to misallocation of resources, in

both organizations and society, for the simple reason that under this model decisions to go ahead with projects are based on misinformation more than on information. The degree of misinformation varies significantly from project to project, as documented by the large standard deviations that apply to cost overruns and benefit shortfalls (Flyvbjerg et al., 2002; 2005). We may therefore *not* assume, as is often done, that on average all projects are misrepresented by approximately the same degree and, therefore, we are still building the best projects, even if they are not as good as they appear on paper. The truth is, we don’t know, and often projects turn out to bring a net loss to the economy, rather than a gain. The cure to the break-fix model is to get projects right from the outset so they don’t break, through proper front-end management.

Hirschman’s Hiding Hand, Revisited

One may argue, of course, as famously done by Hirschman (1967a, pp 12–13) that if people knew in advance the real costs and challenges involved in delivering a large project, “they probably would never have touched it” and nothing would ever get built; so, it is better not to know, because ignorance helps get projects started, according to this argument. The following excerpt is a recent and particularly candid articulation of the nothing-would-ever-get-built argument, by former California State Assembly Speaker and Mayor of San Francisco, Willie Brown, discussing a large cost overrun on the San Francisco Transbay Terminal megaproject in his *San Francisco Chronicle* column (27 July 2013, with emphasis added):

“News that the Transbay Terminal is something like \$300 million over budget should not come as a shock to anyone. We always knew the initial estimate was way under the real cost. Just like we never had a real cost for the [San Francisco] Central Subway or the [San Francisco–Oakland] Bay Bridge or any other massive construction

project. So get off it. In the world of civic projects, the first budget is really just a down payment. *If people knew the real cost from the start, nothing would ever be approved.* The idea is to get going. Start digging a hole and make it so big, there’s no alternative to coming up with the money to fill it in.”

Rarely has the tactical use by project advocates of cost underestimation, sunk costs, and lock-in to get projects started been expressed by an insider more plainly, if somewhat cynically. It is easy to obtain such statements off the record, but few are willing to officially lend their name to them, for legal and ethical reasons, to which we will return later. Nevertheless, the nothing-would-ever-get-built argument has been influential with both practitioners and academics in megaproject management. The argument is deeply flawed, however, and thus deserves a degree of attention and critique. Hirschman’s text contains the classic formulation of the argument and has served widely as its theoretical justification, as has Sawyer (1952), who directly inspired and influenced Hirschman.⁶ A recent celebration of Hirschman’s thinking on this point may be found in Gladwell (2013).

Hirschman (1967a, pp. 13–14) observed that humans are “tricked” into doing big projects by their own ignorance. He saw this as positive because, just as humans underestimate the difficulties in doing large-scale projects they also underestimate their own creativity in dealing with the difficulties, he believed, and “the only way in which we can bring our creative sources fully into play is by misjudging the nature of the task, by presenting it to ourselves as more routine, simple, undemanding of genuine creativity than it will turn out to be.” Hirschman called this the “prin-

⁵The author owes the term “break-fix model” to Dr. Patrick O’Connell, Practitioner Director of Major Programme Management at Oxford University’s Saïd Business School.

⁶Two versions of Hirschman’s text exist (1967a, 1967b). The version of the text referenced here is the one published in *Development Projects Observed* (Hirschman, 1967a), which is the original text. The differences between the two texts are minor and are mainly due to the editing of Irving Kristol, editor of *The Public Interest* at the time of publication (Adelman, 2013, p. 405).

ciple of the Hiding Hand” and it consists of “some sort of invisible or hidden hand that beneficially hides difficulties for us”—where the error of underestimating difficulties is offset by a “roughly similar” error in underestimating our ability to overcome the difficulties, thus helping “accelerate the rate at which ‘mankind’ engages successfully in problem-solving.”

Sawyer (1952, pp. 199, 203), in a study of early industrial infrastructure projects that he called a work “in praise of folly,” similarly identified what he called “creative error” in project development as, first, “miscalculation or sheer ignorance” of the true costs and benefits of projects; second, such miscalculation being “crucial to getting an enterprise launched at all.” Sawyer argued that such “creative error” was the key to building a number of large and historically important projects, including the Welland Canal between Lake Erie and Lake Ontario, the Panama Canal, the Middlesex Canal, the Troy and Greenfield Railroad, and early Ohio roads. For these and other projects, Sawyer found that “the error in estimating costs was at least offset by a corresponding error in the estimation of demand” (p. 200). Hirschman (1967a, p. 16) explicitly mentioned Sawyer as an inspiration and his “creative error” as a close “approximation” to the Hiding Hand principle.

It is easy to understand why Hirschman’s and Sawyer’s theories have become popular, especially with people who benefit from megaprojects. The theories encourage promoters and decision makers, such as Willie Brown quoted above, to just go ahead with projects and not worry too much about the costs or other problems, because the Hiding Hand will take care of them, eventually. And, in any case, who wants to be the killjoy stopping large projects from going ahead by an overdose of truth? Hirschman (1967b) was an immediate hit with practitioners—from Washington’s policy establishment to the United Nations, to the World Bank.

The head of the World Bank’s Economics Department told Hirschman: “You’ve helped in part to remove the unease that I have had in reflecting on the fact that if our modern project techniques had been used, much of the existing development in the world would never have been undertaken” (Adelman, 2013). Hirschman’s thinking also eventually penetrated academia. Teitz and Skaburskis (2003) follow the Hiding Hand logic when they ask of the huge cost overrun on the Sydney Opera House: “Did people really think that the Sydney Opera House would come in on budget? Or did we all agree to accept the deception and engage in wishful thinking in order to make something that we really wanted happen? ... [D]o Australians really regret those dramatic sails in the harbour? Or would they have regretted more the decision [not to build] that would most reasonably have been based on a fair prediction of costs?”

The logic is seductive, yet precarious. In retrospect, of course Australians do not regret the Sydney Opera House, given what it has done for Australia though, at first, the building was not called “dramatic sails in the harbour,” but “copulating white turtles” and “something that is crawling out of the ocean with nothing good in mind” designed by an architect with “lousy taste” (Reichold & Graf, 2004, p. 168). Non-Australians may feel regret, however; for example, the architect of the Opera House: What’s his name? Does anybody know? Only few do, which seems surprising given we are talking about the architect of arguably the most iconic building of the 20th century. And, if anybody knows the architect is the Dane Jørn Utzon, how come they can hardly ever mention another building designed by him? Because the overrun on the Opera House, and the controversy that followed, destroyed Utzon’s career and kept him from building more masterpieces. He became that most tragic figure in architecture: the one-building-architect. This is the real regret—and real cost—of the Sydney

Opera House, not premier Joe Cahill’s deliberate deception about the cost—to get approval in Parliament—and the consequential huge cost overrun (Flyvbjerg, 2005).

In a meeting held in support of Utzon at Sydney Town Hall in March 1966—six weeks before the controversy made Utzon leave Australia and the Opera House, in the middle of construction and never to return—the Viennaborn Australian architect Harry Seidler said, “If Mr. Utzon leaves, a crime will have been committed against future generations of Australians” (Murray, 2004, p. 105). Seidler was more right than he could have imagined, except the crime would not be limited to Australians—it became a crime against lovers of great architecture everywhere. After winning the Pritzker Prize, the Nobel for architecture, in 2003, Utzon again became widely acclaimed, even in Australia, where the Sydney Opera tour guides for years had been forbidden to even mention his name. But it was too late. Utzon was now 85 years old and had not built anything major for decades. So instead of having a whole oeuvre to enjoy, as we have for other architects of his caliber, we have just the one main building. Utzon was 38 when he won the competition for the Opera House. How would other works by the mature master have enriched our lives? We will never know.

As a thought experiment, consider the collected works of architect Frank Gehry, who is in the same league as Utzon; then consider which building you would choose, if you could choose only one, and the rest would have to go. So if you chose, say, the Guggenheim Museum Bilbao, then Los Angeles’ Disney Concert Hall, Chicago’s Jay Pritzker Pavilion, Prague’s Dancing House, and Seattle’s Experience Music Project Museum would be eliminated. This illustrates the high price the government of New South Wales has imposed on the world by mismanaging the planning of the Sydney Opera House and deliberately playing the game of cre-

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ative error and Hiding Hand. Even if the Opera House is an extreme case, Sydney drives home an important point: managing by creative error is risky and disruptive, sometimes in drastic and unexpected ways, and the Hiding Hand isn't big enough to hide all, or even most, errors.

Hirschman's and Sawyer's theories are also flawed on a more basic level, that of validity. A close look reveals the theories to be based on small samples and biased data. Hirschman studied only 11 projects or a few more if we take into account the subprojects, and Sawyer studied 10 to 15. This important fact is typically ignored when the Hiding Hand principle is discussed. Hirschman (1967a, pp. 7, 14) seemed aware of the weak foundations and limited applicability of the principle when he called it "speculative" and useful only "[u]p to a point." To a colleague he admitted at the time of publication that his book was "an exploration, an experiment"; to another he said he had deliberately biased his analysis "to emphasize unexpected successes" (Adelman, 2013, pp. 404–405). Even so, Hirschman went on to call the Hiding Hand a "general principle of action" and brazenly used a name for it with clear connotations to Adam Smith's famous Invisible (Hidden) Hand. Evidently, the temptation to formulate an "economic law" was too strong, despite the weak and biased data. Sawyer (1952, p. 204) warned the reader up front that his study must be considered a "marginal and distinctly limited note." He admitted the study considers only a "quite special kind of case" and neglects projects that were "failures" in order to focus on projects that were "successful" in the sense that "an original gross miscalculation as to costs ... was happily offset by at least a corresponding underestimation of demand." Sawyer's results, thus, do not describe a general characteristic of large projects, but a characteristic of his biased sample that includes only projects lucky enough to have had large underestimates of costs compensated

by similarly large or larger underestimates of demand. Some would call this dubious data fishing, and the only redeeming factor is that Sawyer was disarmingly honest and tongue-in-cheek humoristic about it. He appears to not have expected to be taken wholly seriously, which he unfortunately was by some, including Hirschman.

Today we have much better data and theories on megaproject performance than at the time of Hirschman and Sawyer. We now know that, although there may be elements of truth in these authors' theories for certain types of projects and contexts, their samples and conclusions are not representative of the project population. In particular, their odd asymmetrical assumption that optimism would apply to cost estimates, yet pessimism to estimates of benefits, has been solidly disproved by Kahneman and Tversky (1979a, 1979b) and by behavioral economists building on their work. They found that optimism bias applies to estimates of both costs and benefits. An optimistic cost estimate is low and leads to cost overrun, whereas an optimistic benefit estimate is high and results in benefit shortfalls. Thus, errors of estimation do not cancel each other out, as Hirschman would have it; the exact opposite happens—errors generally reinforce each other.

Megaproject planners and managers would therefore be ill advised to count on Hiding Hands, creative errors, or any other general principle according to which underestimates of costs would be balanced by similar underestimates of benefits. We also now know it would be equally foolhardy to assume that downstream human creativity may be generally counted on to solve problems that planners and managers overlook or underestimate when the decision is made to go ahead with a project. The data show that for too many projects with front-end problems, such creativity never materializes and projects end up seriously impaired or non-viable. Initial problems, if not dealt with up front, tend not to go away. The iron

law of megaprojects, described above, trumps Hirschman's Hiding Hand at a high level of statistical significance, and we know why. The Hiding Hand is itself an example of optimism and does therefore not capture the reality of megaproject management. For such capture, and true explanatory power, we must turn to theories of optimism bias, the planning fallacy, strategic misrepresentation, and principal-agent behavior.

Survival of the Unfittest

In sum, one does megaprojects—and megaproject management—a disservice if one claims they can only be done through the Hiding Hand, creative error, or downright deception. It is, undoubtedly, quite common for project promoters and their planners and managers to believe their projects will benefit society and they, therefore, are justified in "cooking" costs and benefits to get projects built (Wachs, 1990; Pickrell, 1992). Such reasoning is faulty, however. Underestimating costs and overestimating benefits for a given project (which is the common pattern, as described above) leads to a falsely high benefit-cost ratio for that project, which in turn leads to two problems. First, the project may be started despite the fact it is not financially and economically viable. Or, second, it may be started instead of another project, which would have shown to yield higher returns than the project started had the real costs and benefits of both projects been known. Both cases result in Pareto inefficiency; that is, the misallocation of resources and, for public projects, waste of taxpayers' money. Thus, for reasons of economic efficiency alone, the argument must be rejected that cost underestimation and benefit overestimation are justified for getting projects started.

But the argument must also be rejected for legal and ethical reasons. In most democracies, for project promoters, planners, and managers to deliberately misinform legislators, administrators, bankers, the public, and the media about costs and benefits

would not only be considered unethical but, in some cases also illegal, for example, where civil servants would intentionally misinform cabinet members, or cabinet members would intentionally misinform parliament. In private corporations, Sarbanes-Oxley-like legislation similarly makes deliberate misrepresentation a crime under many circumstances, which in the United States is punishable by imprisonment of up to 20 years.⁷ There is a formal “obligation to truth” built into most democratic constitutions—and now also in legislation for corporate governance—as a means for enforcing accountability. This obligation would be violated by deliberate misrepresentation of costs and benefits, whatever the reasons for such misrepresentation may be. Not only would economic efficiency suffer but also democracy, good governance, and accountability.

A first answer to the skeptics’ question of whether enough megaprojects would be undertaken if some form of misrepresentation of costs and benefits was not involved is, therefore, that even if misrepresentation was necessary in order to get projects started, such misrepresentation would typically not be defensible in liberal democracies—and especially not if it was deliberate—for economic, legal, and ethical reasons.

A second answer to the skeptics’ question is that misrepresentation is not necessary to undertaking projects, because many projects exist with sufficiently high benefits and low enough costs to justify building them. Even in the field of innovative and complex architecture, which is often singled out as particularly difficult, there is the

Basque Abandoibarra urban regeneration project, including the Guggenheim Museum Bilbao, which is as complex, innovative, and iconic as any signature architecture, and was built on time and budget. Complex rail projects, too, including the Paris–Lyon high-speed rail line and the London Docklands light railway extension have been built to budget. The problem is not that projects worth undertaking do not exist or cannot be built on time and on budget. The problem is that the dubious and widespread practices of underestimating costs and overestimating benefits used by many megaproject promoters, planners, and managers to promote *their* pet project create a distorted hall-of-mirrors in which it is extremely difficult to decide which projects deserve undertaking and which do not.

In fact, the situation is even worse than that. The common practice of depending on the Hiding Hand or creative error in estimating costs and benefits, thus “showing the project at its best” as an interviewee put it in a previous study, results in an inverted Darwinism, i.e., the “survival of the unfittest” (Flyvbjerg, 2009). It is not the best projects that get implemented in this manner, but the projects that look best on paper, and the projects that look best on paper are the projects with the largest cost underestimates and benefit overestimates, other things being equal. But the larger the cost underestimate on paper, the greater the cost overrun in practice; and the larger the overestimate of benefits, the greater the benefit shortfall. Therefore, the projects that have been made to look best on paper become the worst, or unfittest, projects in reality, in the sense that they are the very projects that will encounter the most problems during construction and operations in terms of the largest cost overruns, benefit shortfalls, and risks of non-viability. They have been designed like that—as disasters waiting to happen.

The result is, as even the industry’s own organization, the Major Projects

Association, has stated that “too many projects proceed that should not have done” (Morris & Hough, 1987, p. 214). One might add that projects also exist that do not proceed but should have, had they not lost out, not to better projects but to projects with “better” creative error; that is, “better” manipulated estimates of costs and benefits.

Light at the End of the Tunnel?

Fortunately, signs of improvement in megaproject management have recently appeared. The tacit consensus that misrepresentation is an acceptable business model for project development is under attack. Shortly after taking office, U.S. President Barack Obama openly identified “the costly overruns, the fraud and abuse, the endless excuses” in public procurement for major projects as key policy problems (White House, 2009). The *Washington Post* rightly called this “a dramatic new form of discourse” (Froomkin, 2009). Other countries are seeing similar developments. Before Obama came into office, it was not common in government or business to talk openly about overruns, fraud, and abuse in relation to megaprojects, although they were as widespread then as now. The few who did so were ostracized; however, as emphasized by Wittgenstein (2009), we cannot solve problems we cannot talk about. So talking is the first step.

A more material driver of improvement is the fact that the largest projects are now so big and consequential in relation to individual businesses and agencies that cost overruns, benefit shortfalls, and risks from even a single project may bring down executives and whole corporations. This happened with the Airbus A380 superjumbo jet, when delays, cost overruns, and revenue shortfalls cost the CEO and other top managers their jobs. The CEO of BP was similarly forced to step down and the company lost more than half its value when the Deepwater Horizon offshore oil drilling rig caught fire and caused the world’s largest oil spill in

⁷ The Sarbanes-Oxley Act of 2002 pioneered this area in the United States, but many other countries have since followed suit with similar legislation. Section 802[a] (18 U.S.C. § 1519) of the original act states that whoever knowingly alters, destroys, mutilates, conceals, covers up, falsifies, or makes a false entry in any record, document, or tangible object with the intent to impede, obstruct, or influence the investigation or proper administration of any matter within the jurisdiction of any department or agency of the United States or any case filed under title 11, or in relation to or contemplation of any such matter or case, shall be fined, imprisoned not more than 20 years, or both.

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the Gulf of Mexico in 2010. At Kmart, a large U.S. retailer, the entire company went bankrupt when a new multi-billion-dollar ICT enterprise system, which was supposed to make Kmart competitive with Walmart and Target, went off the rails (Flyvbjerg & Budzier, 2011). In China, corruption and related safety issues on the country's US\$300 billion high-speed rail program have caused massive reputational damage, and cost the railway minister his political career in 2011. Today, if you are a CEO, minister, permanent secretary, or other top manager and want to be sure to keep your job, you will want to manage your megaprojects properly. Episodes such as these have triggered leaders to begin looking for better megaproject delivery.

Even the wealth of whole cities and nations may be affected by a single megaproject failure. In Hong Kong, months of obstacles during the opening of a new international airport made traffic go elsewhere, resulting in a fall in GNP for the entire city state. For Greece, a contributing factor to the country's 2011 debt default was the 2004 Olympic Games in Athens, for which cost overruns and incurred debt were so large they negatively affected the credit rating of the whole nation, substantially weakening the economy in the years before the 2008 international financial crisis. This resulted in a double dip—and disaster—for Greece, when other nations had only a single dip. Likewise, in Japan in 2011, the nuclear tragedy at Fukushima significantly and negatively impacted the national economy as a whole. It is becoming increasingly clear that when megaprojects go wrong they are like the proverbial bull in the china shop: it takes just one bull to smash up the entire store. It is becoming similarly clear to many involved that something needs to be done about this.

In the United Kingdom, at the beginning of the century, cost underestimation and overrun were rampant in so many projects and in so many ministries that the reliability of national bud-

gets suffered, leading the chancellor to order a Green Book on the problem and how to solve it (HM Treasury, 2003). This move inspired other countries to follow suit. Lawmakers and governments have begun to see that national fiscal distress and unreliable national budgets are too high a price to pay for the conventional way of managing megaprojects. In 2011, the UK Cabinet Office and HM Treasury joined forces to establish a Major Projects Authority, with an enforceable mandate directly from the Prime Minister to oversee and direct the effective management of all large-scale projects that are funded and delivered by central government. In 2012, the Authority established, in collaboration with Oxford University, a Major Projects Leadership Academy—the first of its kind in the world—to train and authorize all UK civil servants in charge of central government major projects.⁸

Outside of government, private finance in megaprojects has been on the rise over the past twenty years, which means that capital funds, pension funds, and banks are increasingly gaining a say in management. Private capital is no panacea for the ills in megaproject management, to be sure; in some cases, private capital may even make things worse (Hodge & Greve, 2009). But private investors place their own funds at risk; therefore, funds and banks can be observed to not automatically accept at face value the cost and revenue forecasts of project managers and promoters. Banks typically bring in their own advisers to do independent forecasts, due diligence, and risk assessments, which are important steps in the right direction (Flyvbjerg, 2013). The false assumption that one forecast or one business case may contain the whole truth about a project is problematized. Instead, project managers and promoters are getting used to the

healthy fact that different stakeholders hold different forecasts and that forecasts are not only products of data and mathematical modeling but also of power and negotiation. And why is this healthier? Because it undermines trust in the misleading forecasts often produced by project promoters.

Moreover, democratic governance is generally getting stronger around the world. Corporate scandals, from Enron, WorldCom, and onward have triggered new legislation and a war on corporate deception that is spilling over into government with the same objectives: to curb waste and promote good governance. Although progress is slow, good governance is gaining a foothold even in megaproject management. The main drivers of reform come from outside the agencies and industries conventionally involved in megaprojects and this is good because it increases the likelihood of success. For example, the UK Treasury now requires that all ministries develop and implement procedures for megaprojects that will curb so-called "optimism bias" (Flyvbjerg, 2006). Funding will be unavailable for projects that do not take into account such bias, and methods have been developed for doing this (UK Department for Transport, 2006). Switzerland and Denmark have followed the lead of the United Kingdom (Swiss Association of Road and Transportation Experts, 2006; Danish Ministry for Transport and Energy, 2006, 2008). In Australia, the Parliament of Victoria has conducted an inquiry into how government may arrive at more successful delivery of significant infrastructure projects (Parliament of Victoria, 2012). Similarly, in the Netherlands, the Parliamentary Committee on Infrastructure Projects did extensive public hearings to identify measures that will limit the misinformation about large infrastructure projects presented to the Parliament, public, and media (Dutch Commission on Infrastructure Projects, 2004). In Boston, the government sued to recoup funds from contractor overcharges for the Big Dig

⁸For full disclosure: The author was involved in the planning, start up, and delivery of the UK Major Projects Leadership Academy.

related to cost overruns. More countries and cities are likely to follow the lead of the United Kingdom, Australia, Switzerland, Denmark, the Netherlands, and the United States in coming years.

Finally, research on how to reform megaproject management—examples of which have been referenced above—is beginning to positively impact practice. Such research has recently made great strides in better understanding what causes the many failures in megaproject delivery and how to avoid them. For example, we now understand that optimism bias and strategic misrepresentation are significantly better explanations of megaproject outcomes than previous explanations, including Hirschman's Hiding Hand and Sawyer's creative error discussed above. And with a better understanding of causes a better grasp of cures has followed, from front-end management (Williams & Samset, 2010) to reference class forecasting (Kahneman, 2011, pp 243-254; Flyvbjerg, 2006) to institutional design for better accountability (Scott, 2012; Bruzelius et al., 1998). Moreover, research is beginning to help us understand success and how to replicate it. Perhaps most importantly, researchers have begun to take seriously the task of feeding their research results into the public sphere so they may effectively form part of public deliberation, policy, and practice (Flyvbjerg, 2012; Flyvbjerg et al., 2012).

With these developments, things are moving in the right direction for megaproject management. It is too early to tell whether the reform measures being implemented will ultimately be successful. It seems unlikely, however, that the forces that have triggered the measures will be reversed, and it is those forces that reform-minded individuals and groups need to support and work with in order to improve megaproject management. This is the "tension point," where convention meets reform, power balances change, and new things are happening. In short, it is the place to be as a megaproject planner, manager,

scholar, student, owner, or interested citizen.⁹

References

- Aaltonen, K., & Kujala, J. (2010). A project lifecycle perspective on stakeholder influence strategies in global projects. *Scandinavian Journal of Management*, 26, 381-397.
- Adelman, J. (2013). *Worldly philosopher: The odyssey of Albert O. Hirschman*. Princeton, NJ: Princeton University Press.
- Anguera, R. (2006). The Channel Tunnel: An ex post economic evaluation. *Transportation Research Part A*, 40, 291-315.
- Brown, W. (2013). "When warriors travel to China, Ed Lee will follow," SF Gate, *San Francisco Chronicle*, 27 July.
- Bruzelius, N., Flyvbjerg, B., & Rothengatter, W. (1998). Big decisions, big risks: Improving accountability in mega projects. *International Review of Administrative Sciences*, 64(3), 423-440.
- Budzier, A., & Flyvbjerg, B. (2013). Making sense of the impact and importance of outliers in project management through the use of power laws. *Proceedings of the 11th International Research Network on Organizing by Projects (IRNOP) Conference*, June 16-19, Oslo, 28 pp.
- Cantarelli, C. C., Flyvbjerg, B. van Wee, B., & Molin, E. J. E. (2010). Lock-in and its influence on the project performance of large-scale transportation infrastructure projects: Investigating the way in which lock-in can emerge and affect cost overruns. *Environment and Planning B: Planning and Design*, 37, 792-807.
- Danish Ministry for Transport and Energy (2006). *Aktstykke om nye budgetteringsprincipper* (Act on New Principles for Budgeting), Aktstykke nr. 16, Finansudvalget, Folketinget, Copenhagen, October 24.
- Danish Ministry for Transport and Energy. (2008). *Ny anlægsgbudgettering på Transportministeriets område, herunder om økonomistyrings-model og risikohåndtering for anlægsprojekter*, Copenhagen, November 18.
- Drummond, H. (1998). Is escalation always irrational? *Organisation Studies*, 19, 919-929.
- Dutch Commission on Infrastructure Projects, Tijdelijke Commissie Infrastructuurprojecten. (2004). *Grote projecten uitvergroet: Een infrastructuur voor besluitvorming* (The Hague: Tweede Kamer der Staten-Generaal).
- The Economist. (1989, October 7). *Under water over budget*, pp. 37-38.
- The Economist. (2008). *Building BRICs of growth*, June 7, p. 80.
- The Economist. (2012, March 10). P. 55.
- Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of Management Review*, 14(1), 57-74.
- Flyvbjerg, B. (2005). Design by deception: The politics of megaproject approval. *Harvard Design Magazine*, 22, Spring/Summer, 50-59.
- Flyvbjerg, B. (2006). From Nobel Prize to project management: Getting risks right. *Project Management Journal*, 37(3), 5-15.
- Flyvbjerg, B. (2009). Survival of the unfittest: Why the worst infrastructure gets built, and what we can do about it. *Oxford Review of Economic Policy*, 25(3), 344-367.
- Flyvbjerg, B. (2011). Over budget, over time, over and over again: Managing major projects. In Peter W. G. Morris, Jeffrey K. Pinto, and Jonas Söderlund, eds., *The Oxford handbook of project management* (pp. 321-344). Oxford, England: Oxford University Press.
- Flyvbjerg, B. (2012). Why mass media matter, and how to work with them: Phronesis and megaprojects, in Flyvbjerg, B., Landman, T, Schram, S., eds., *Real social science: Applied phronesis* (pp 95-121). Cambridge, England: Cambridge University Press.
- Flyvbjerg, B. (2013). Quality control and due diligence in project management: Getting decisions right by taking the

⁹See Flyvbjerg et al. (2012) regarding the use of tension points for triggering change in policy and practice, including for megaprojects.

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outside view. *International Journal of Project Management*, 31(5), 760–774.

Flyvbjerg, B., (Ed.). (2014). *Megaproject planning and management: Essential readings*. Cheltenham, UK: Edward Elgar.

Flyvbjerg, B., Bruzelius, N., & Rothengatter, W. (2003). *Megaprojects and risk: An anatomy of ambition*. Cambridge, England: Cambridge University Press.

Flyvbjerg, B., & Budzier, A. (2011). Why your IT project might be riskier than you think. *Harvard Business Review*, 89(9), 24–27.

Flyvbjerg, B., Garbuio, B., & Lovallo, D. (2009). Delusion and deception in large infrastructure projects: Two models for explaining and preventing executive disaster. *California Management Review*, 51(2), 170–193.

Flyvbjerg, B., Holm, M. K. S., & Buhl, S. L. (2002). Underestimating costs in public works projects: Error or lie? *Journal of the American Planning Association*, 68(3), 279–295.

Flyvbjerg, B., Holm, M. K. S., & Buhl, S. L. (2004). What causes cost overrun in transport infrastructure projects? *Transport Reviews*, 24(1), 3–18.

Flyvbjerg, B., Holm, M. K. S., & Buhl, S. L. (2005). How (in)accurate are demand forecasts in public works projects? The case of transportation. *Journal of the American Planning Association*, 71(2), 131–146.

Flyvbjerg, B., Landman, T., & Schram, S. (Eds.). (2012). *Real social science: Applied phronesis*. Cambridge, England: Cambridge University Press.

Frick, K. T. (2008). The cost of the technological sublime: Daring ingenuity and the new San Francisco–Oakland Bay Bridge. In Priemus, H., Flyvbjerg, B., van Wee, B., eds., *Decision-making on mega-projects: Cost–benefit analysis, planning, and innovation* (pp 239–262). Northampton, MA: Edward Elgar.

Froomkin, D. (2009). Obama's radical new discourse. *The Washington Post*, February 24. Retrieved from [http://](http://voices.washingtonpost.com/white-house-watch/financial-crisis/obamas-radical-new-discourse_pf.html)

[white-house-watch/financial-crisis/obamas-radical-new-discourse_pf.html](http://voices.washingtonpost.com/white-house-watch/financial-crisis/obamas-radical-new-discourse_pf.html)

Gladwell, M. (2013). The gift of doubt: Albert O. Hirschman and the power of failure. *The New Yorker*, June 24.

Helm, D. (2008). Time to invest: Infrastructure, the credit crunch and the recession. *Monthly Commentary*, December 18. Retrieved from www.dieterhelm.co.uk

Hirschman, A. O. (1967a). *Development projects observed*. Washington, DC: Brookings Institution.

Hirschman, A. O. (1967b). The principle of the hiding hand. *The Public Interest*, Winter, pp. 10–23.

Hirschman, A. O. (1995). *Development projects observed*, second edition with a new preface (Washington, DC: Brookings Institution).

HM Treasury. (2003). *The Green Book: Appraisal and evaluation in central government*. Treasury Guidance. London, England: TSO.

Hodge, G. A., & Greve, C. (2009). PPPs: The passage of time permits a sober reflection. *Institute of Economic Affairs*, 29(1), 33–39.

Kahneman, D. (2011). *Thinking, fast and slow*. New York, NY: Farrar, Straus and Giroux.

Kahneman, D., & Tversky, A. (1979a). Prospect theory: An analysis of decisions under risk. *Econometrica*, 47, 313–327.

Kahneman, D., & Tversky, A. (1979b). Intuitive prediction: Biases and corrective procedures. In Makridakis, S., Wheelwright, S.C., eds., *Studies in the management sciences: Forecasting*, vol. 12. Amsterdam: North Holland, pp. 313–327.

Marx, L. (1967). *The machine in the garden: Technology and the pastoral ideal in America*. New York, NY: Oxford University Press.

McKinsey Global Institute. (2013). *Infrastructure productivity: How to save \$1 trillion a year*. McKinsey and Company.

Merrow, E. W. (2011). *Industrial mega-projects: Concepts, strategies, and practices for success*. Hoboken, NJ: Wiley.

Miller, P. (1965). *The life of the mind in America: From the Revolution to the Civil War*. New York, NY: Harvest Books.

Morris, P. W. G. (1994). The 1960s: Apollo and the decade of management systems. In P.W.G. Morris, ed., *The management of projects* (pp 38–88). London, England: Thomas Telford Books.

Morris, P. W. G., & Hough, G.H. (1987). *The anatomy of major projects: A study of the reality of project management*. New York, NY: John Wiley and Sons.

Murray, P. (2004). *The saga of Sydney Opera House: The dramatic story of the design and construction of the icon of modern Australia*. London, England: Spon Press.

Parliament of Victoria (2012). *Inquiry into effective decision making for the successful delivery of significant infrastructure projects. Public Accounts and Estimates Committee, Melbourne*. Retrieved from <http://www.sbs.ox.ac.uk/centres/bt/Documents/PAEC%20Significant%20infrastructure%20projects%2020%20March%202012%20-%20VAGO.pdf>

Pickrell, D. H. (1992). A desire named streetcar: Fantasy and fact in rail transit planning. *Journal of the American Planning Association*, 58(2), 158–176.

Reichold, K., & Graf, B. (2004). *Buildings that changed the world*. London, England: Prestel.

Ross, J., & Staw, B. M. (1993). Organizational escalation and exit: Lessons from the Shoreham Nuclear Power Plant. *The Academy of Management Journal*, 36(4), 701–732.

Sawyer, J. E. (1952). Entrepreneurial error and economic growth. *Explorations in Entrepreneurial History*, 4(4), 199–204.

Scott, W. R. (2012). The institutional environment of global project organizations. *Engineering Project Organization Journal*, 2(1–2), 27–35.

The Standish Group. (2009). *CHAOS report*. West Yarmouth, MA: Author.

Stiglitz, J. (1989). Principal and agent. In Eatwell, J., Milgate, M., Newman, P. eds., *The new Palgrave: Allocation*,

information and markets. New York, NY: W. W. Norton.

Swiss Association of Road and Transportation Experts. (2006). *Kosten-Nutzen-Analysen im Strassenverkehr*, Grundnorm 641820, valid from August 1. Zürich, Switzerland: Author.

Taleb, N. N. (2010). *The black swan: The impact of the highly improbable*, Second edition. New York, NY: Penguin.

Teitz, M., & Skaburskis, A. (2003). Forecasts and outcomes. *Planning Theory and Practice*. December, pp. 429-442.

UK Department for Transport. (2006). *The estimation and treatment of scheme costs: Transport analysis guidance*, TAG Unit 3.5.9. Retrieved from <http://www.dft.gov.uk/webtag/documents/expert/unit3.5.9.php>

United States Government Accountability Office (GAO). (2013). *Defense acquisitions: Assessments of selected weapon programs*. Report GAO-13-294SP (Washington, DC: GAO, March 28).

Wachs, M. (1990). Ethics and advocacy in forecasting for public policy. *Business and Professional Ethics Journal*, 9 (1 and 2), 141-157.

White, R. (2012). A waste of money, for years to come. *The New York Times*, January 27. Retrieved from <http://www.nytimes.com/roomfordebate/2012/01/26/does-california-need-high-speed-rail/high-speed-rail-is-a-waste-of-money-for-decades-to-come>

The White House. (2009). Remarks by the President and the Vice President at Opening of Fiscal Responsibility Summit, 2-23-09. Office of the Press Secretary, February 23. Retrieved from <http://www.whitehouse.gov/the-press-office/remarks-president-and-vice-president-opening-fiscal-responsibility-summit-2-23-09>

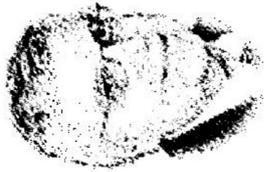
Williams, T., & Samset, K. (2010). Issues in front-end decision making on projects. *Project Management Journal*, 41(2), 38-49.

Wittgenstein, L. (2009). *Philosophical investigations*. Hoboken, NJ: Wiley-Blackwell.

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Let's Skip Acquisition Reform This Time

Each new U.S. administration starts with promises to fix the problems left behind by the old one. In defense, one of the promises always is acquisition reform, because there always are acquisition problems with which we must cope.



By **Harvey Sapolsky**, professor of Public Policy and Organization Emeritus at MIT and co-author, with Eugene Gholz and Caitlin Talmadge, of "U.S. Defense Politics: The Origins of Security Policy."

filled with vows to reform the acquisition process, as if Secretary Gates hadn't been on watch over the system during at least part of the last administration.

"Yes, senator, we can and we will."

Let's be honest this time. Let's just skip the acquisition reform charade. The truth is you can't fix the acquisition system. All the insiders know this. The promise of reform is for the rubes, those dumb taxpayers whom we want to believe that, on the 85th or 86th time, we will get it right.

The limited number of available reforms have all been recycled. You can centralize or decentralize. You can create a specialist acquisition corps or you can outsource their tasks. You can fly before you buy or you can buy before you fly. Another blue-ribbon study, more legislation and a new slogan will not make it happen at last.

We can't fix it because we want crazy things. We want a system that can fire missiles from a submarine hiding beneath the surface of the sea and hit a target thousands of miles away. Or we want a tank that can survive a shaped charge round, pack its own lethal punch and is airlifted by a C-130.

Systems have to perform reliably in the snow, in the mud, in the

sand. They have to communicate with every friend and not reveal themselves to any foe. And we want them soon, not later.

Worse, we already have a lot of first-class ships, aircraft, missiles and tanks; proposed new weapon systems have to be a lot better than them or any obvious modification we can make. To be worthy of our approval, the advocates of the new system have to dazzle us with expectations of what will soon be in our arsenal, something no enemy can match. It will likely cost billions, but it will be great.

With that gleam in their eye, the services seek bids for the weapons that will define their futures. Only a few contractors can qualify to make offers. After all, only a few firms know the acquisition regulations well enough and have sufficient engineering talent to manage complex projects.

Moreover, government-encouraged mergers have further thinned the ranks of eligible firms. Given that new starts in most weapon lines are once-in-a-decade-or-more events, project awards are survival tests. Not surprisingly, false opti-

mism abounds: "Sure we can build that, and cheaper than you think."

More milestone reviews, high-level councils and mandated reports will not change the basic facts. You have to exaggerate the benefits and underplay the costs to get a weapon system approved. We know by now to discount everything promised, but we still want the best weapons for our forces, jobs in our communities and profits for our companies.

Acquisition rules intentionally slow things down with demands for constant reconsideration in the hope that support for the project will fade. When we really want something quickly, like MRAPs for Iraq and Afghanistan, we have to suspend the rules, set up a fast track and push aside the bureaucrats.

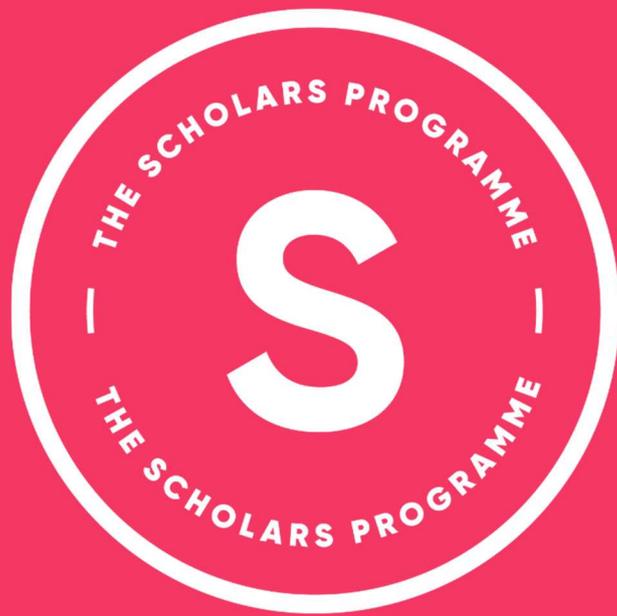
The problem with fast tracking as a solution is there has to be agreement that a weapon is needed. Most of the time, there is disagreement (e.g. EFV, F-22, DDG 1000). The Marines and Army supposedly delayed going for MRAPs initially and now it is said have regrets over the 15,000 bought as

they can't go off road, weigh tons, have poor mileage, etc.

Changing the rules every time we change administrations or secretaries is a colossal waste of effort, forcing everyone involved to learn a new manual, another set of acronyms and a revised timetable for required approvals.

Skipping the reform charade might force officials to educate the taxpayers instead of hoodwinking them. Things often don't work well not because the acquisition system is run by crooks or idiots, but because making decisions on what weapons to develop and buy is very hard. We don't know what wars we will fight and what weapons we will have to counter. Proponents of various systems compete for attention and dollars, and when they do, they are prone to exaggerate. Motives are mixed.

We worry about jobs as well as national security. We want to believe that technology will give us a combat edge, so we are always on the technology frontier. But in the end, cost overruns and performance and schedule disappointments are inevitable. ■



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