



Concept Symposium 2016

Governing the Front-End of Major Projects

Megaprojects - the productivity gap, uncertainty and economic viability



Alexander Budzier

Fellow in Management Practices
Saïd Business School, Oxford
UK

Megaprojects currently face multifaceted challenges:

- Construction productivity is lacking behind;
- Megaprojects sector is under pressures from changing markets & customers, changing societies & workforces, increased need for sustainability & resilience; and changing politics & regulation; and
- Megaprojects are typically over budget, behind schedule, and under benefits.

The degree of uncertainty of megaproject investments is illustrated by novel research into the Chinese investment boom of recent years, which shows a high rate of troubled assets.

The talk then outlines the causes of the megaproject challenges, i.e. that many megaprojects were a mission impossible from the start and that control and oversight are lacking.

Exploring the root causes behind these the talk finally offers ideas to discuss possible cures.



Megaprojects - Productivity Gap, Uncertainty and Economic Viability

Alexander Budzier

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Agenda

A hand is shown holding a dark blue rectangular bar. The word "Challenges" is written in white, bold, sans-serif font on the bar. The bar is positioned above two other bars, "Causes" and "Cures", which are light gray.

Challenges

Causes

Cures

Megatrends for Megaprojects



Markets and Customers

Demand in developing countries

65% of the next decade's growth in construction will happen in emerging countries

Globalized markets

1 in 2 Engineering & Construction companies plan to move into new geographies

Bigger and more complex projects

123km (76 miles) is the length of the undersea tunnel that will connect Dalian and Yantai

Ageing infrastructure

1 in 3 German railway bridges are more than 100 years old

Massive need for financing

\$1tn annual investments are needed to close the global infrastructure gap



Society and Workforce

Urbanization and housing crisis

200k people are added daily to urban areas and need affordable housing

Health and comfort needs of inhabitants

2-5x higher than outside levels are the levels of volatile organic compounds found inside US homes

Talent and ageing workforce

50% of general contractors are concerned about finding experienced crafts workers for their workforce

Stakeholder pressure and organization

67k signatures were collected opposing the construction of the Stuttgart train station

Politicization of construction decisions

In 2011 the Portuguese govt. cancelled a 165km (103 mile) high-speed train line project as an austerity measure



Sustainability and Resilience

Productivity challenge

40% estimated annual cost savings needed to close the productivity gap of infrastructure

Sustainability requirements

50% of solid waste in the United States is produced by the construction industry

Energy and climate change

30% of global greenhouse gas emissions are attributable to buildings

Resilience challenges

3x as many disasters were reported last year as in 1980

Cyberthreats

90% of firms agree that information controls have an impact on front-line employees



Politics and Regulation

Complex regulatory requirements

25 different procedures are required for a warehouse construction permit in India

Stricter HSE and labour laws

10% of the workforce in a public project in California had to come from the "otherwise unemployable"

Slow permit and approval process

\$1.2tn of infrastructure could be added by 2030 if all countries committed to specific time limits for approvals

Geopolitical uncertainty

18 Turkish construction workers were kidnapped by militants in Baghdad in September 2015

Corruption

49% of survey respondents believe corruption is common in the Western European construction market

Megatrends for Megaprojects



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Stakeholders

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Standards

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Politics

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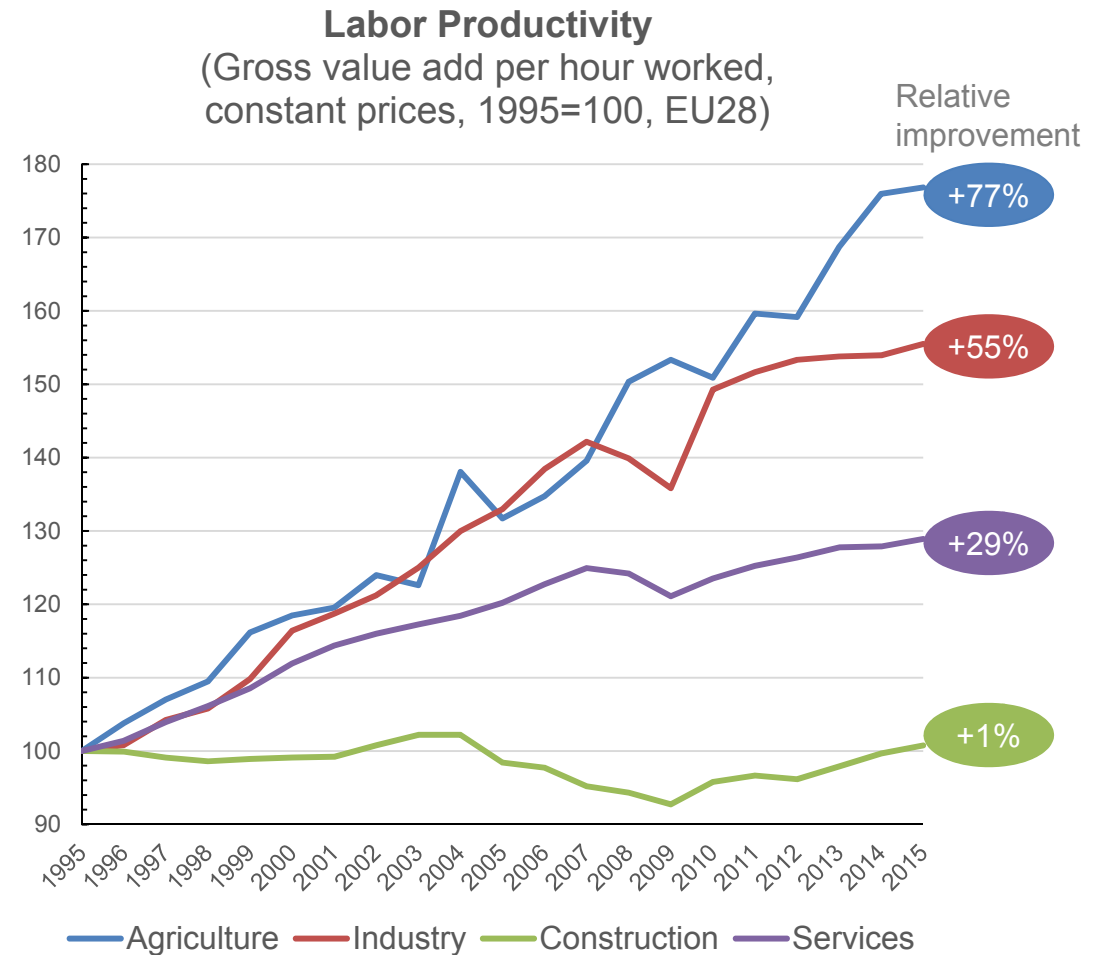
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Infrastructure Faces Productivity Challenge

In most countries, over the past 50 years, **productivity improvements in construction have been almost negligible**, especially when compared to those in other industries.



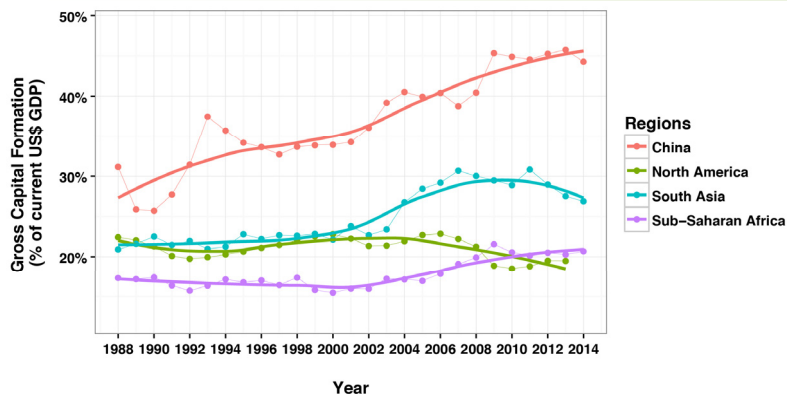
Megaprojects Struggle to be Economically Viable

Project type	Average Cost Overrun	Average Benefit Overrun
IT-led change	+107%	-29%
Dams	+96%	-11%
BRT	+41%	-58%
Rail	+40%	-34%
Tunnels	+36%	-19%
Power plants	+36%	-6%
Buildings	+36%	-1%
Bridges	+32%	-4%
Roads	+24%	-4%
Total	+43%	-17%

Case in Point: Two Faces of China

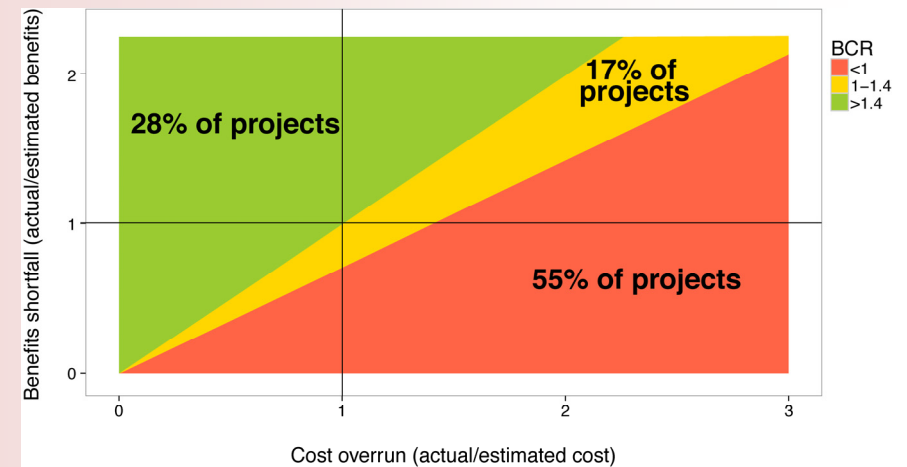
Biggest Boom...

- In the **five years** 2004-8, China spent more on infrastructure in real terms than in whole of **20th Century**.
- In the **four years** 2005-8, China built as many miles of high-speed rail as Europe in **two decades**.



... of Troubled Assets

- Average **cost overrun** +31%
- 2 in 3 projects have a **benefits shortfall** of on average -41%
- **55% of assets are economically unproductive**, 17% are challenged



Key Challenge to Making Megaprojects Matter: How Can We Do Better?

Challenge

- Megatrends = mega-pressures to change
- Productivity gap
- Uncertainty of cost, schedule, benefits

Therefore...

- Financial/economic underperformance
- Threatened viability

In short:

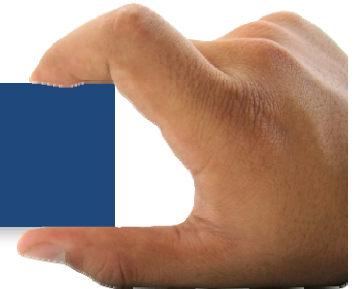
How can we plan and execute megaprojects better?

Agenda

Challenges

Causes

Cures



The Causes of Megaproject Challenges



Report
by the Comptroller
and Auditor General

Cross-government

Delivering major projects
in government: a briefing
for the Committee of
Public Accounts



Report
by the Comptroller
and Auditor General

Department for Transport

Lessons from major rail
infrastructure programmes



Report
by the National Audit Office

Over-optimism in
government projects

DECEMBER 2014

DECEMBER 2013



The art of spending public money wisely

NAO presentations to Civil Service Live, 2015

Max Tse, NAO Director, 10 Sept, Newcastle

Sue Higgins, NAO Executive Leader, 14 Sept, Manchester

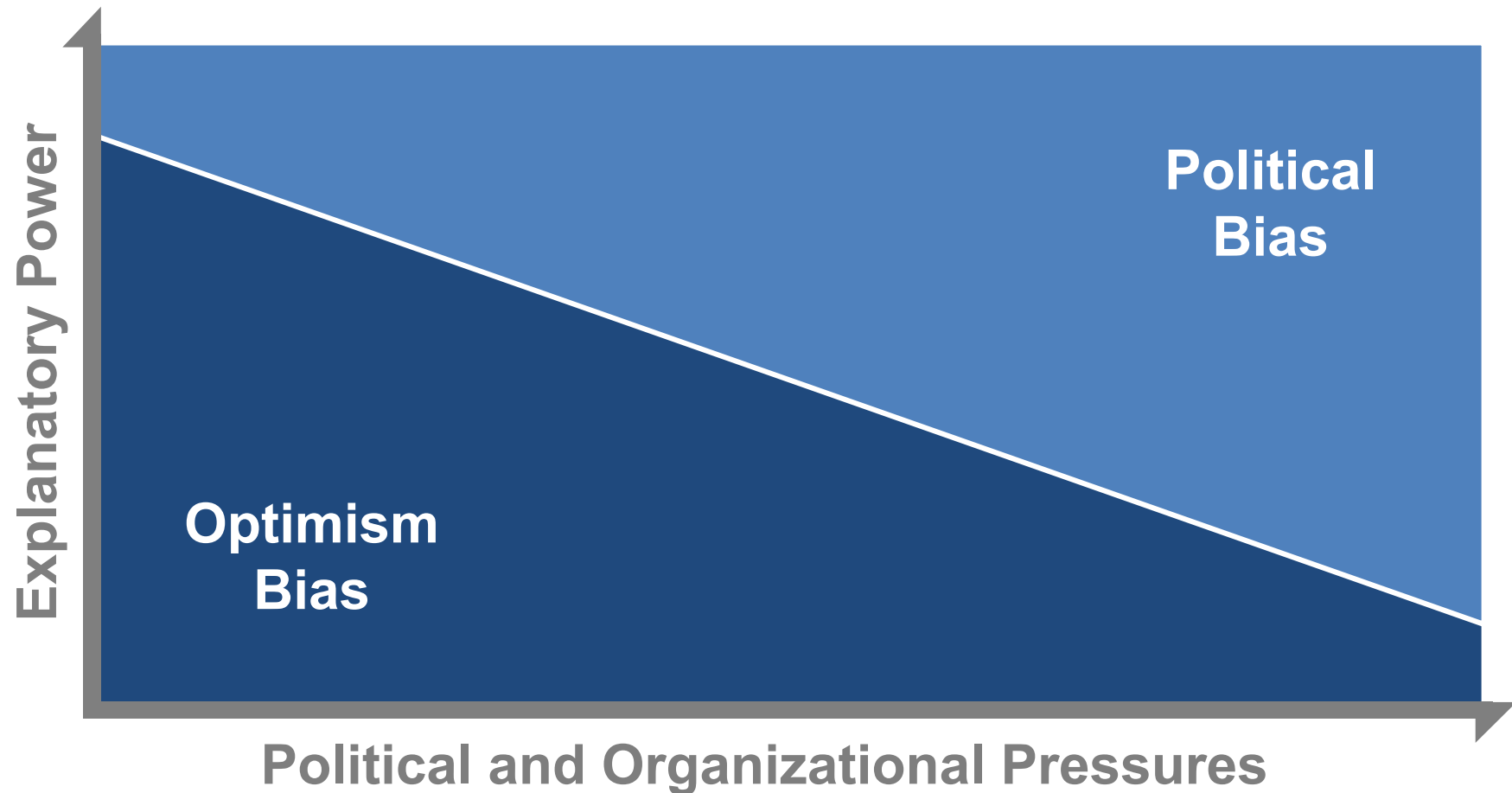
Sally Howes, NAO Executive Leader, 5 Oct, London

Amyas Morse, Comptroller & Auditor General, NAO, 6 Oct, London

2 narratives of megaproject failure

- Mission impossible
- Lack of control in contracts and oversight

Root Causes of Cost Overruns and Benefit Shortfalls



Agenda

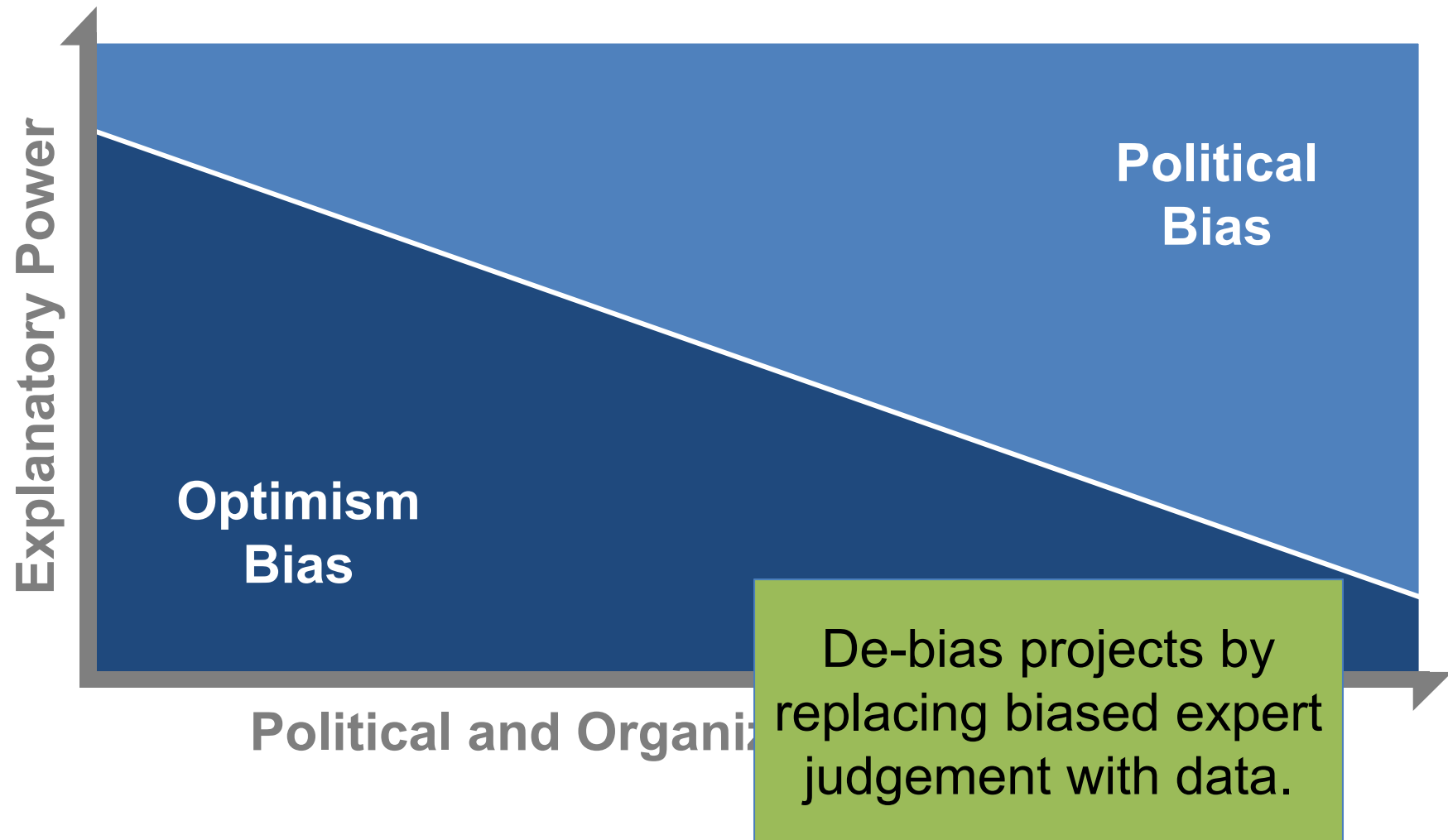
Challenges

Causes

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De-Bias Project Appraisal

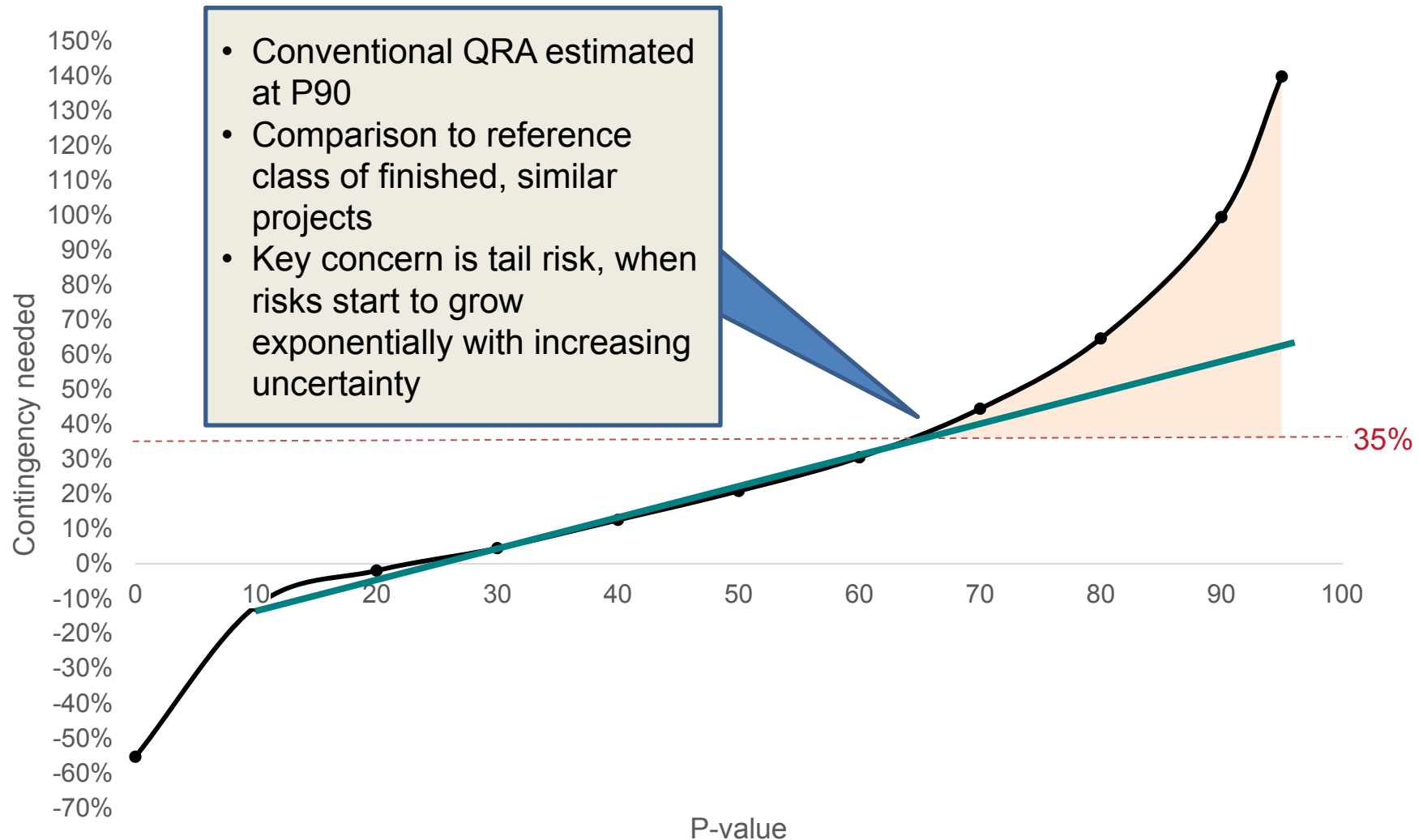


Challenge

Understanding tail risk
is key to avoid bad
megaprojects.



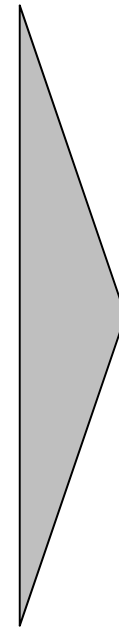
Case Example: HS2



Case Example: Tail Risks in HSR

Identified causes of cost overruns in the tail

- Early delays (procurement, political decision making)
- (Late) design/scope changes, e.g. changes discovered during testing and commissioning; station changes triggered by local government; environmental mitigation
- Geological risks (sinkholes, archeological finds, water tables, ground levelling, ...)
- “Rare” risks, e.g. contractor bankruptcy, political influence (for example on contractor selection), fraud by contractors (for example using poisonous sealants)
- Nominal cost increases due to
 - Unforeseen Inflation
 - Reduced number of rolling stock
- Quality risks and resulting rework
- Cutting of funding
- Unknowns in the design (particularly of safety and operations systems)
- Intermodal integration (long distance bus, commuter rail)



Typically these risk are already on the risk register

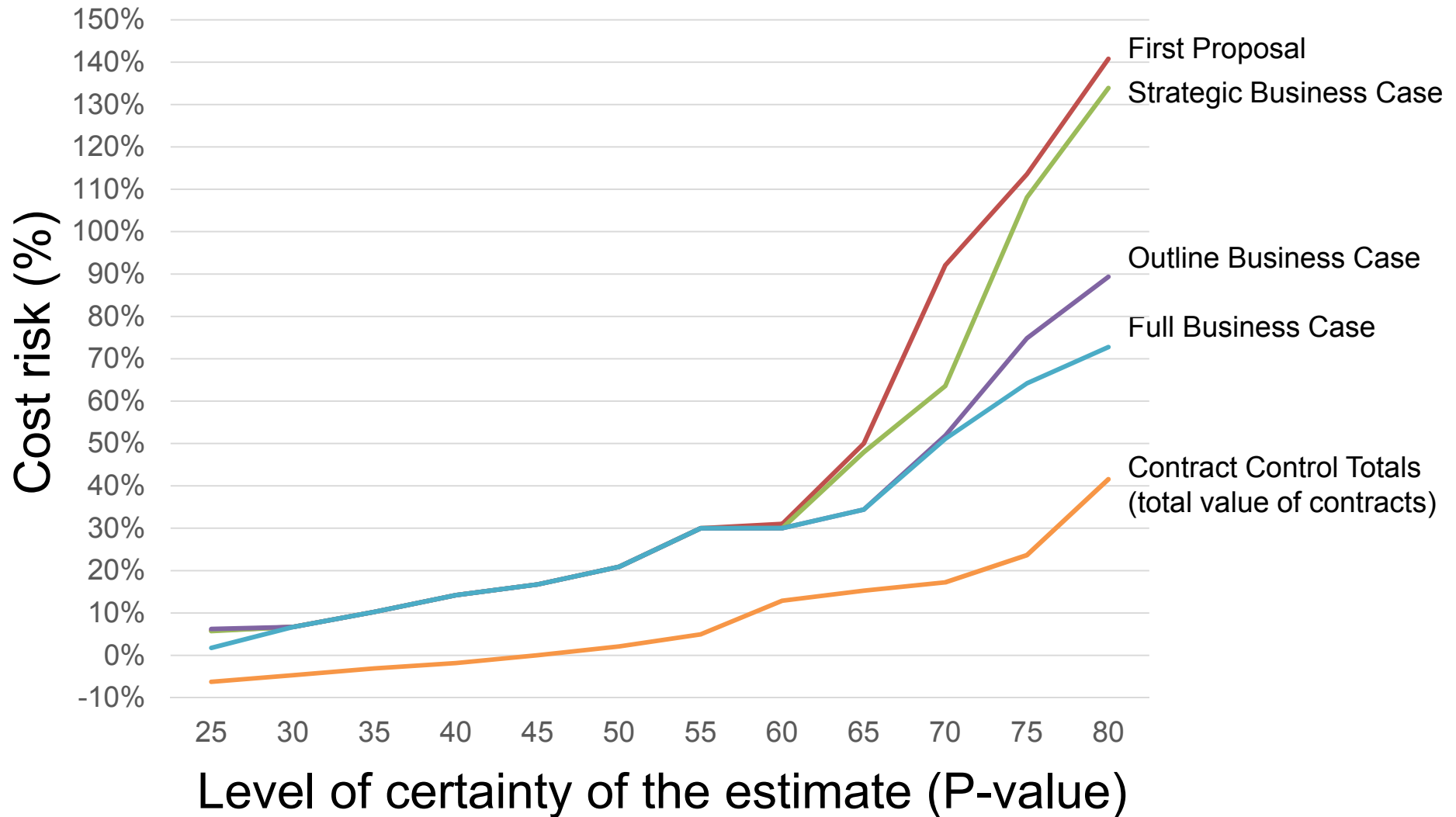
- De-biased appraisal of risks
- Better knowledge of low likelihood risks
- Better understanding of complex feedback loops between risk

Challenge

More, diligent planning
helps getting risk right



Example – Risk Reduction in the Front End of Rail Projects

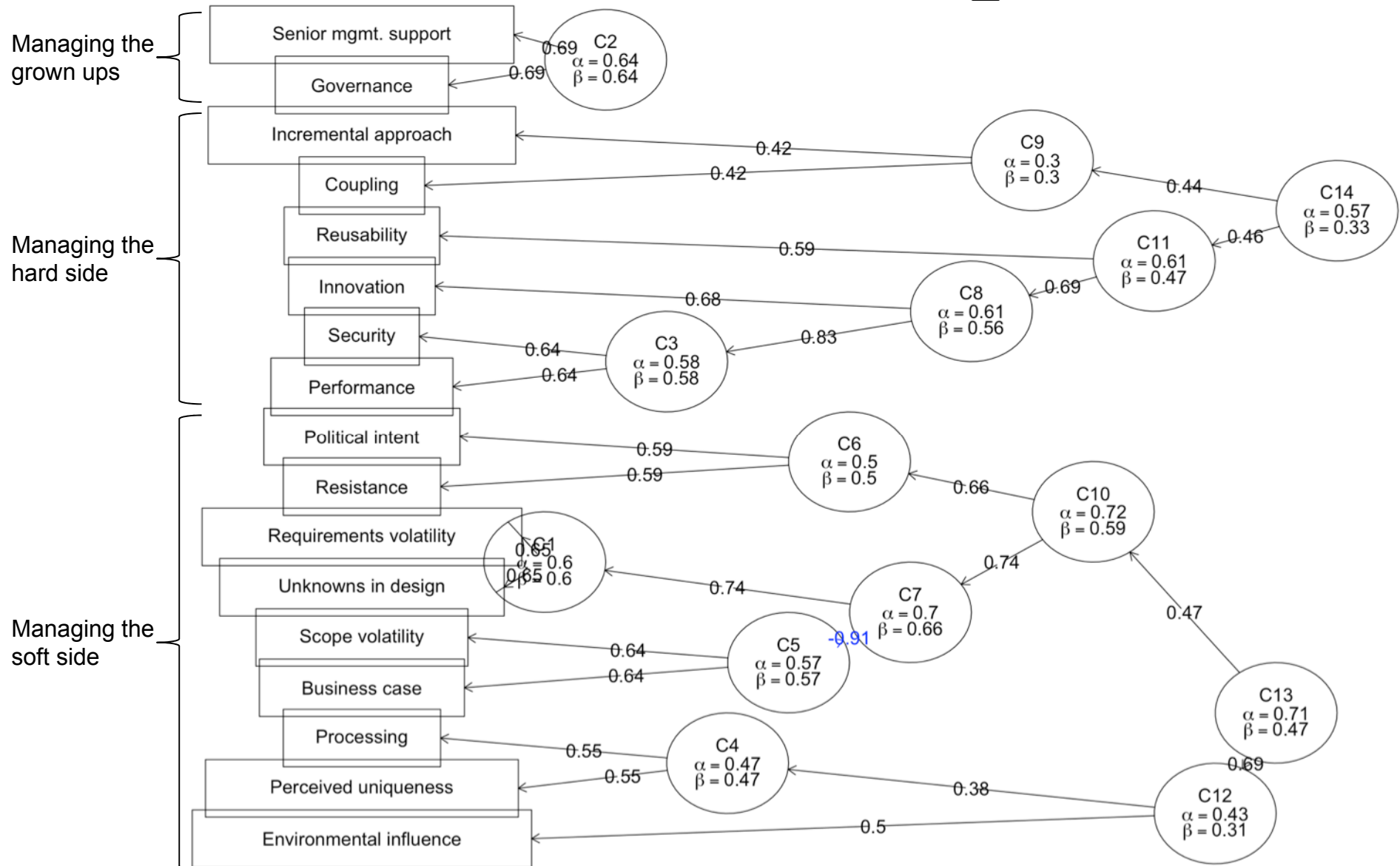


Challenge

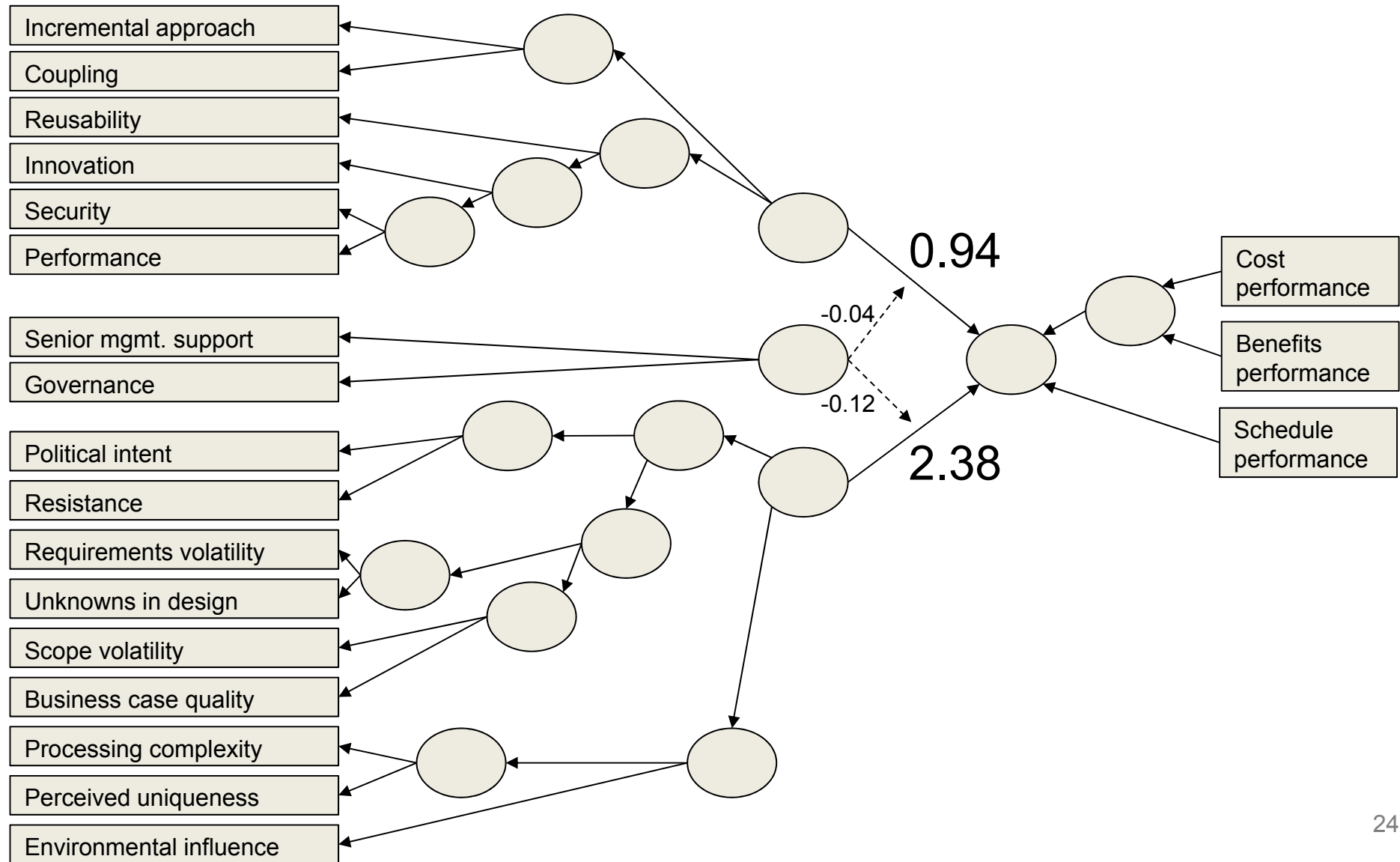
Projects in execution need
to actively reduce risks



What Makes a Project Difficult to Manage?



... And What Impacts Performance?



2 Strategies

