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**OWNER CHALLENGES ON MAJOR PROJECTS:
THE CASE OF UK GOVERNMENT**

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ABSTRACT

Many studies agree that owner organisations are important for successful project organising, but they tend to focus on particular aspects of project organising rather than providing a holistic analysis of owners as organisations. Our objective is to collect evidence of the full range of challenges public sector owners face in managing their major projects. After reviewing the literature on owner organisations, we carry out a case survey of 26 major projects to identify the principal challenges using a content analysis of UK National Audit Office Value for Money reports. Our original contribution is that the findings provide the first comprehensive picture of the full range of challenges of project organising faced by owner organisations. These findings push us theoretically to extend the scope of research in project organising to identify an extended core set of dynamic capabilities for project owner organisations to address these challenges.

Keywords: project owner, three domains, organisational project management, project capabilities; public sector.

OWNER CHALLENGES ON MAJOR PROJECTS:

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INTRODUCTION

There is a growing awareness in project organising research of the importance of focusing on organisation in the owner domain in complement to the existing well-established streams of research on the temporary project organisation and project-based firms in the supplier domain (Cha et al., 2018; Brunet and Aubry, 2016; Turner and Müller, 2017; Winch, 2014). The empirical evidence for this development comes principally from benchmarking data on project performance (Cooke-Davies, 2002; Hui et al., 2008; Merrow, 2011; Merrow and Nandurdikar, 2018) showing that owner capabilities and behaviours are crucial factors in influencing whether the temporary project organisation in the delivery domain is successful. It is also implicit in research on strategic misrepresentation (deception) and optimism bias (delusion) in project appraisal (Flyvbjerg et al., 2009; Pinto, 2014) where erroneous project appraisal by owner organisations creates a process of “lock-in” (Cantarelli et al., 2010; Hetemi et al., 2020). This in turn sets the temporary project organisation up for failure in terms of schedule and budget escalation and the project-based firms in the supplier domain as scapegoats for that failure (Winch, 2013).

However, we have only partial data regarding the challenges owner organisations actually face in project organising compared to temporary project organisations and project-based firms. This is particularly true for public sector owners. Patanakul et al. (2016) focus on the characteristics of government projects, rather what government owners actually do in terms of organisation and behaviour. Winch and Leiringer (2016) provide some insights, but their contribution is mainly a literature review with empirical vignettes rather than an empirical study, and focuses on transportation projects. Others have helpfully “unpacked” the owner organisation by defining various individual roles (Zwikael and Meredith, 2018), but this leaves us without a comprehensive picture of the organisational whole rather than the individual parts. We argue that in order to advance project organising research, we need to understand the whole

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of the owner organisation thereby placing in organisational context particular aspects of project organising such as benefits management or commercial management. Our aim, therefore, is not to find “gaps” in existing research contributions; rather it is to “problematise” (Alvesson and Sandberg, 2011) the existing body of research on owners in project organising with the ambition of providing a more holistic basis for the research agenda in project organising by identifying the full range of challenges that project owner organisations face. Our contribution is therefore aligned with the ambitions of Organisational Project Management (OPM) (Shankar et al, 2017) to provide a holistic approach to project organising while providing much greater empirical granularity than has been available within that perspective to date as well as providing much greater granularity of the owner organisation within the three domains perspective.

We do this by providing an inductive and holistic analysis of the challenges project owners face in delivering their major projects across all the principal project-based sectors with the exception of new product development. We also, in effect, exclude more routine projects such as building and IT upgrades from our analysis because these are unlikely to be of enough strategic concern to attract the attention of government auditors who focus on major projects. We therefore cover the infrastructure development, defence acquisition, and digital transformation sectors. Our approach is a grounded one that is both inductive and problematising (Charmaz, 2011) in that we do not attempt to limit the scope of the findings to any particular theme in current project organising research; to preconceive which challenges “should” be identified; nor to assess in advance their relative importance to each other. Rather, we present the data and analysis openly and transparently in order to provide a sound base for developing the research agenda in both the three domains and OPM perspectives, returning to these questions in the discussion.

We first review what is known about organisations in the owner domain of project organising, thereby clarifying our research question. We then explain the rationale for the selection of the particular owner organisation – or rather set of owner organisations – chosen for study. This is UK central government, which we believe is particularly apposite for two reasons. First, like many other central governments, it covers a wide variety of project sectors. Second, it has played an active role in developing many of the “textbook” project management methodologies and practices. These include PProjects In Controlled Environments (PRINCE 2) and Managing

Successful Programmes (MSP) which now form the basis of training and accreditation offers by the public private partnership Axelos in both the public and private sectors internationally.

We will then present our research method as an innovative combination of a case survey (Larsson, 1993) and content analysis (Krippendorff, 2013) of a data set consisting of National Audit Office (NAO) Value for Money (VfM) reports on 26 UK central government major projects. This method is both grounded and inductive (Charmaz, 2011) and thereby provides the granular empirical basis for the contribution of our research to theory in project organising. This contribution includes: the need to extend significantly the scope of project organising research forwards and backwards over the project life-cycle to encompass both project shaping and outcomes achievement; the identification of an extended core set of challenges which the project owner's dynamic capabilities (Cha, 2017; Killen and Drouin, 2017) need to address; and the need to include commercial issues within the standard scope of project organising research. On this basis we provide theoretical elaboration of both the three domains and OPM perspectives in project organising research.

OWNER ORGANISATION RESEARCH

There is now significant evidence from benchmarking studies that provides greater insight into the importance of owners in project organising. Merrow (2011) provides extensive analysis of a subset of the Independent Project Analysis benchmarking data set on international industrial construction sector projects focusing on megaprojects (> \$1bn at 2010 prices). The overall data set contains data on 318 projects, typically measured at three points during the project life cycle. He concludes that the key organisational practices (at the 95% confidence interval or better) determining megaproject project performance are within the owner domain for the project. The project owner is the investor in, and operator of, the asset being delivered by the temporary project organisation. This analysis has now been reinforced by insights into the leadership competencies required by owner project directors (Merrow and Nandurdikar, 2018). An analysis of the data from the Construction Industry Institute data set (Hui et al., 2008) similarly concluded that "owner domination" operationalised as the proportion of project activities carried out by the owner is positively correlated with high project performance. Cooke-Davies' (2002) benchmarking of 136 projects also shows that the of the owner organisation is critical to project delivery success. Further work from this perspective on "strong owners" (Winch and Leiringer, 2016) has identified a number of different project capabilities required by owner organisations – strategic, governance, and commercial – from a mix of literature review and

interviews with transportation system owners and operators. However, these contributions lack empirical detail on which challenges owners face in project organising.

A recent contribution “unpacks” individual roles in project organising (Zwikael and Meredith, 2018). They define two entities: the “funding entity” and the “performing entity”, which may be internal or external to the funding entity, and identify key project management roles within those two entities. They go on (Zwikael et al., 2019) to identify the “project owner” as the key person accountable for project delivery and benefits realisation within the funding entity in apparent analogy with the Senior Responsible Owner (SRO) in MSP. A limitation of this contribution is that it is separate but parallel to the line of enquiry on the project “sponsor” (Chandler and Thomas, 2015; Helm and Remington, 2005) whose role would appear to be almost identical to that of the SRO as the person accountable for the project and then realising its benefits. Our concern in this paper is with the organisation that appoints (or fails to appoint) the sponsor/SRO rather than with the accountable individual. We therefore prefer the term “sponsor” in alignment with the body of research on OPM (Sankaran et al., 2017) to make this distinction between individual accountability and organisational practice clear.

Our aim in this paper, therefore, is to provide a more comprehensive set of insights into the challenges of project organising in owner organisations by answering the following research question:

What are the principal challenges for the management of major projects by UK central government?

While we have posed our research question quite specifically, we will show how we believe the findings can be generalised in the discussion section of this paper by suggesting that these challenges are what the dynamic capabilities of owner project organising need to address.

We will start to answer this question by describing the unique data set to be analysed, followed by a presentation of the content analysis method deployed for that analysis. We then present the findings in some detail both in a summarised quantitative format and, by choosing the most frequently occurring challenges for more detailed presentation, in a qualitative format. Discussion of the implications of the findings for both research on owner project organising and the more general scope of project organising research concludes our paper.

We contribute to theory in project organising research in a number of ways by moving beyond fragmented contributions that focus on particular aspects of project organising such as benefits management and risk management to owner organisations in the round. Our principal theoretical contribution identifies 1) the need to extend significantly the scope of project organising research forwards and backwards over the project life-cycle to include both project shaping and outcomes achievement; 2) the identification of the extended set of core capabilities of owner project organising over the project life-cycle; and 3) the need to include commercial issues within the standard scope of project organising research. We thereby theoretically enrich the research on both OPM (Sankaran et al., 2017) and owners as one of the three domains of project organising (Winch, 2014) by providing a comprehensive and granular empirical analysis of the challenges that project owner organisations.

THE UK GOVERNMENT CONTEXT FOR MAJOR PROJECTS

The UK central government has long made significant efforts to improve the performance of major projects. An early manifestation of this effort was PRINCE2 and associated methodologies. More recently, it has turned attention to governance structures. Founded in 2012 as the Major Projects Authority, the Infrastructure and Projects Authority (IPA) annually assesses the delivery confidence of the UK's Government Major Projects Portfolio (IPA, 2017a), and NAO reviews these projects in its role as the UK government auditor (NAO, 2017). Nevertheless, performance remains below expectations (IPA, 2017b; King and Crewe, 2013; NAO, 2015e, 2016a).

The National Audit Office (NAO) is the auditor for central UK Government and reports to the legislature (Parliament), not the executive (Cabinet). In addition to its traditional audit functions, the NAO carries out more investigative studies with a view to learning from experience which is published in the VfM reports. Many of these studies are investigations of the performance of investment projects across the range of government activity including economic and social infrastructure, digital transformation and defence. Although the report series is generically entitled Value for Money, the content of the reports ranges much more widely across the challenges government owners face, and only a minority of reports explicitly address value-for-money issues as normally defined.

Typically, but not always, the NAO chooses to study a project that has not performed well, and it may also investigate work in progress on very high-profile projects such as the London

Olympics that are not underperforming in order to provide guidance in project execution or seek to gain lessons learned from an innovative but successful project. Reports on completed projects are typically forensic seeking the reasons for poor (or good) performance and focus on the organisation of the government body responsible for the project (i.e. project owner). Although evidence may be taken from a wider range of stakeholders, it should be noted that these reports are written from an owner perspective. The NAO's remit covers the activities of the government departments that act as investors in, and operators of, the assets delivered by the temporary project organisation which are then used to provide public services of various kinds. It does not include the project-based firms in the supplier domain that are contracted to deliver those assets.

The NAO follows a set of 'guiding principles' for the preparation of its VfM reports (Dalton, 2007). Each report is itself managed as a project. Data collection deploys multiple methods including both qualitative and quantitative information from many different sources including project and departmental documentation, focus groups with project participants, interviews with key stakeholders, and consultation with expert advisors. The data are then 'triangulated' to develop a carefully written project narrative that focuses on the potential learning from the cases with crisp conclusions. Reports are published (now on-line) and sent to the Public Accounts Committee of the UK Parliament (House of Commons) which may then conduct its own public hearings based on the evidence presented to it. An important limitation of the remit of the Public Accounts Committee, and hence the NAO and its VfM reports, is that policy is outwith that remit; the focus is on effectiveness in the delivery of policy, not the wisdom of policy itself.

RESEARCH METHOD

In order to answer this research question, we undertook a *case survey* (Larsson, 1993) of 30 VfM reports using content analysis which is effective for analysing a large volume of textual data, in order to find generate insights through valid inference (Schreier, 2012; Krippendorff, 2013). Figure 1 describes the overall research process.

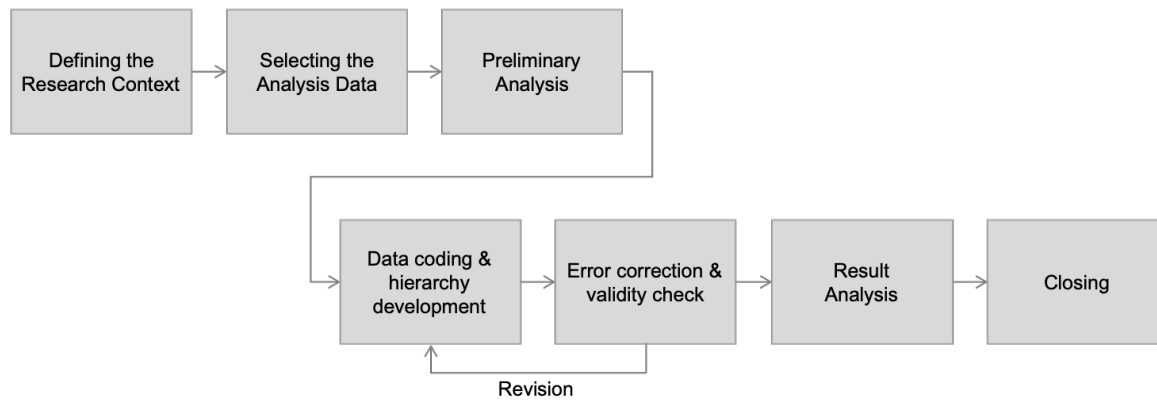


Figure 1. Research process

As of 2017, 1,911 NAO VfM reports had been published that can be fully accessed via the NAO website. These reports cover all aspects of government expenditure and the majority do not cover investment projects but operational expenditures delivering public services. At the time of the empirical work, the NAO categorised their published works by providing the two types of filter - 30 Sector filters and 30 Topic filters. Thus, all of the published reports contain one or more filter labels as meta-data. For example, the report on the Great Western Route Modernisation project is labelled by two filters: “Managing Major Projects” (Topic), “Transport and Infrastructure” (Sector). In order to select the most relevant VfM reports for our research question three criteria were applied: 6 filter labels, publication date, and type of report.

Criterion 1: Filter Label

The first task was to identify those VfM reports which covered investment projects, where ‘investment’ encompasses both asset acquisition projects and service delivery transformation projects. We therefore selected 6 filters (4 topics and 2 sectors) as the filters most likely to identify reports on the management of major projects:

- Topic filter 1: Digital service delivery (DSD)
- Topic filter 2: Managing major projects (MMP)
- Topic filter 3: Operational and programme delivery (OPD)
- Topic filter 4: Transforming public services (TPS)
- Sector filter 1: ICT and systems analysis (ISA)

- Sector filter 2: Transport and infrastructure (TI)

Criterion 2: Publication Date

The selected publication year range is between 2012 and 2016 inclusive because this covered the period since the inception of the Major Projects Authority. Based on these two criteria, 86 reports were identified.

Criterion 3: Type of Report

NAO VfM reports explore diverse UK government issues including project cases, general operational reviews and annual reports. By reviewing the executive summary of the selected 86 reports, 30 reports were identified as a final set of the source of data because they provided a case study of an individual project. The list of the 30 reports, which we take forward for further analysis, is in the additional on-line material. These covered 26 UK central government projects (some were reported on more than once) owned by a variety of UK central government departments and non-governmental bodies such as the BBC and Nuclear Decommissioning Authority as illustrated in Figure 2.

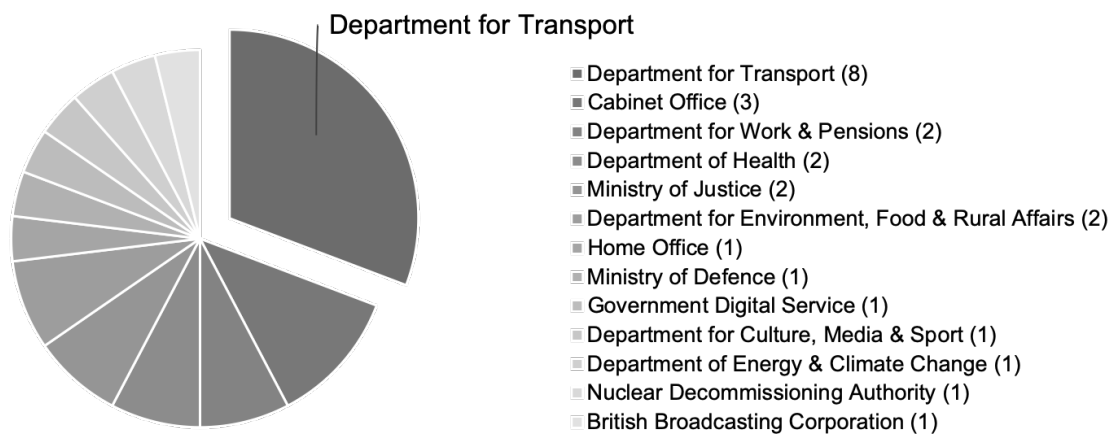


Figure 2. 26 Project cases by government owner (Ministry/Department or non-governmental body)

LEVEL ONE THEMATIC ANALYSIS

There are three main steps for data analysis as shown in Figure 1: Data coding and hierarchy development; error correction and validity check; and results analysis. For coding, the VfM

reports, the *paragraph* is used as the data unit. So far as coding is concerned, “qualitative data collection is inductive in using open, non-directional measures. Qualitative data analysis is inductive by letting key categories and concepts emerge from the data” (Schreier, 2012, p. 25). In other words, coding allocates each paragraph in the 30 VfM reports to the emerging node hierarchy through iterative cycles of analysis. Once coding saturation has been reached and the node hierarchy is finalised the data set is then reviewed to identify and correct any coding errors. 770 of the 2,014 paragraphs coded were descriptive or narrative (e.g. descriptions of the project; linking or introductory paragraphs) leaving 1,244 paragraphs to form the data set to address our research question. These were inductively coded into the 47 level-2 nodes, covering various aspects of project organising. These nodes, in turn, were then abductively coded (i.e. in relation to prior knowledge) against the three domains model to produce the 10 higher level; level-1 nodes which we dubbed *themes*. Upon examination of the node structure, we noted that a number of level-2 codes accounted for less than 1% of the data. We therefore recoded these to existing nodes, sometimes changing the name of the node in reflection of the new content. Table 1 presents the outcome of the coding process showing the nodes and themes in rank order by frequency count of theme.

Table 1. Final data set hierarchy model

Lv 1	Lv 2	Source	Reference	Ref. (%)
1. Technology and Systems		20	170	13.67
	Data legality and security	6	15	1.21
	Data processing and quality	8	20	1.61
	Legacy management	7	16	1.29
	Pilot, test and technical assessment	8	19	1.53
	System and service design	7	15	1.21
	System and service integration	9	19	1.53
	System functionality	9	21	1.69
	System development and management	11	19	1.53
	Technology management	9	26	2.09
2. Governance		26	146	11.74
	Accountabilities, responsibilities and decision making	16	30	2.41
	Assurance, permission and reporting	15	32	2.57

Funding and financial affordability	11	31	2.49
Governance arrangement	20	53	4.26
3. Trade-off Triangle	28	143	11.50
Cost and schedule management and overruns	13	34	2.73
Cost estimation and uncertainty	12	28	2.25
Cost savings	12	20	1.61
Financial control and management	7	28	2.25
Flexibilities among budget, schedule and scope	14	33	2.65
4. Leadership and Strategy	26	137	11.01
Communication and cultural awareness	10	14	1.13
Interdependencies and interface	16	42	3.38
Knowledge and experience	16	27	2.17
Leadership	9	18	1.45
Organisational change and management	10	18	1.45
Stakeholder engagement and management	6	18	1.45
5. Benefits and Value Proposition	24	133	10.69
Benefits realisation strategy	16	64	5.14
Benefit-cost ratios and value-for-money	16	40	3.22
Creating business values and benefits	13	29	2.33
6. Business Case Development	27	127	10.21
Business complexity and forecast	12	34	2.73
International dimensions	7	13	1.05
Plan, objectives and requirement analysis	10	23	1.85
Strategy and business case	20	57	4.58
7. Programme Management	25	122	9.81
Management approach and MIS	11	26	2.09
Performance monitoring and assessment	8	17	1.37
Programme uncertainty and complexity	13	33	2.65
Progress review	9	17	1.37
Risk management and contingency strategy	15	29	2.33
8. Contract and Commercial	16	96	7.72
Commercial approach	7	13	1.05
Contract and procurement	10	32	2.57

Contractual reward mechanism and incentivisation	10	27	2.17
Quality of competition and bidding	5	24	1.93
9. Human Resources (HR)	21	94	7.56
End user perspective and behaviour	12	21	1.69
Expertise and staffing	17	48	3.86
Skill training and management	8	25	2.01
10. Operational Benefits Realisation	19	76	6.11
Impacts on public service operation	12	22	1.77
Operation policy and model management	11	26	2.09
Process management and standardisation	8	13	1.05
Reviews on operation	3	15	1.21

The node and theme names in Table 1 provide only a cryptic clue as to the type of issue contained within each node, so we now provide short summary descriptions of each level-1 theme drawn directly from a review of the text units (paragraphs) coded to that theme. These descriptions are presented in the rank order of challenges identified shown in Table 1.

1. Technology and Systems (13.67%)

This theme covers the technological aspects of the asset being delivered by the project, such as data processing, equipment, pilot testing and systems function/design/integration. Where the technology being acquired has to interact with legacy systems the level of technological knowledge required by the owner is even greater as the suppliers cannot be expected to understand the existing operational technology.

2. Governance (11.74%)

This theme broadly covers the issues around the governance interface between the owner organisation and the temporary project organisation it is initiating. The references coded in this theme discuss the criticality of governance arrangements, financial affordability, transparent progress reporting and setting clear roles, responsibilities, accountabilities for decision making.

3. Trade-off Triangle (11.50%)

This is the core of the discipline of project management as conventionally defined, but viewed from an owner's perspective on the trade-offs that need to be made by the temporary project organisation during asset delivery. The challenges identified in the VfM reports raise the managerial difficulties with respect to flexibilities and overruns of cost, schedule and scope. Among the trade-offs, cost issues including cost estimation, uncertainty, overruns, control and change management are continuously highlighted.

4. Leadership and Strategy (11.01%)

This theme portrays diverse organisational aspects that an owner organisation should manage efficiently in their project organising. The undoubtedly important themes such as leadership, communication, stakeholder engagement and knowledge/experience management are coded here.

5. Benefits and Value Proposition (10.69%)

This theme covers the strategic case for the investment that initiates the project – the reason why the project is being done. In essence it covers the feasibility of the proposed investment, but also covers how the realisation of the proposed benefits of the investment will be organised. In addition to the necessity of estimating benefit-cost ratio and value-for-money, this theme includes developing a benefits management strategy which sets out which organisation is responsible for funding streams and delivering the benefits; realising the expected benefits of the transition; and having a system for identifying, tracking and measuring the benefits.

6. Business Case Development (10.21%)

This theme covers the more technical aspects of the development of the business case, including identifying and analysing the risks to the achievement of that case, and the regulatory environment. In the light of a better understanding of business complexity, producing the strategic business case, driving up the quality of that business case and a more realistic strategy and vision through better research are stressed.

7. Programme Management (9.81%)

This theme covers programme management as conventionally defined in MSP. In this context our data set in this node mainly discusses management methodology, management information systems, performance and progress review and risk management at a programme management level.

8. Contract and Commercial (7.72%)

This theme covers the commercial interface between the owner on the one hand and its suppliers on the other which mobilise the human and material resources required for the project. It should be noted that the perspective taken here is one-sided as only the owner's commercial preparations and practice are reported. Contract and commercial addresses the approach to generating further cost savings from the supply side; establishing commercial roles; commercial negotiations; identifying and strengthening the owner organisation's commercial management capacity and capability; and collaborative working to generate opportunities for future commercial partnerships.

9. Human Resources (HR) (7.56%)

While the project-based organisations within the supplier domain usually provide the majority of the human resources required for the project itself, there are also important HR issues within the owner domain. The owner project team needs to be staffed to ensure that both the governance and commercial interfaces are effectively managed, and staff may need to be deployed to the temporary project organisation in "integrated project teams". The HR aspects of benefits realisation are also coded here including the training of system user staff and their response to the changes required in working practices as outcomes are realised.

10. Operational Benefits Realisation (6.11%)

The transition of the output delivered by the temporary project organisation to the realisation of the expected benefits by the owner organisation that operationally delivers services to the public is a major source of challenge for public sector owners. This is particularly true when one of the assets created by the project is a new organisational form as in digital transformation projects. This theme therefore captures the transition of outputs to outcomes that is at the heart of the business case for the investment.

PRINCIPAL LEVEL-TWO NODE ANALYSIS

Following our review of the findings from the analysis overall at the theme level, we can now dig deeper into the data to explore the nodes with the largest number of text units coded to them which we take as a proxy for their relative importance. This is an important benefit of our case survey content analysis method – we can provide both an overall quantitative analysis of owner challenges to provide a holistic perspective and a “deep dive” qualitative analysis into the most important ones to provide an elemental perspective. So, we now turn to a brief discussion of the six level-2 nodes that each account for over 3% of the data shown in table 1.

Benefits Realisation Strategy & Benefits Cost Ratio and Value for Money

Theme 5 Benefits and Value Proposition contains two notable level-2 nodes: ‘Benefits realisation strategy’ (64 paragraphs coded, 5.14%) and ‘Benefit-cost ratio and Value-for-Money’ (40 paragraphs coded, 3.22%). The challenges here are setting out a suitable benefits realisation strategy by clearly identifying the types of benefits (NAO, 2014c), beneficiaries (NAO, 2013b, 2016e) and required capabilities (NAO, 2015f) that lead to the achievement of estimated value-for-money. Though economic benefits are widely regarded as critical (NAO, 2012c, 2013c; 2014i), the necessity of considering societal benefits is also highlighted (NAO, 2014h). Furthermore, a need for not only value creation (NAO, 2014b) but also value capture activities (i.e. local economic growth) (NAO, 2013b; 2016e) are also found. Responsibility for realising the benefits from a single major project can lie across many different owners (government departments) as the case of High Speed 2 (HS2) shows. The responsibilities of each owner organisation with regard to the funding mechanisms for benefits realisation need, therefore, to be clearly defined in the benefits realisation strategy:

“The Department and HS2 Ltd have recently developed a benefits management strategy which sets out who is responsible for funding and delivering the benefits:

- The Department is accountable for the delivery and funding of the programme’s core benefits as set out in the business case. They must also work alongside other government departments to ensure delivery of the wider programme benefits. Through Rail Group’s management and oversight of Network Rail and the wider rail system including franchises,

the Department is also responsible for delivering benefits to the wider rail system and reducing negative impacts of High Speed 2.

- HS2 Ltd is responsible for delivering the core programme benefits such as reduction in journey times and release of capacity.
- The Department for Communities and Local Government is responsible for coordinating the delivery of local growth and regeneration benefits.
- Local Authorities, in partnership with others such as Local Enterprise Partnerships, are responsible for helping to create the conditions for driving regeneration activity and local growth benefits through predominantly private sector investment. There is a risk that these wider benefits will not materialise if funding cannot be secured.” (NAO, 2016e)

Governance Arrangements

Of the 30 reports, 26 are coded to Theme 2 ‘Governance and ‘Governance arrangements’ was the most frequently coded level 2 node (53 paragraphs coded, 4.26%). Through effective governance arrangements, greater and better oversight (NAO, 2014a, 2014h, 2015a, 2015b), a platform for managing the interdependent elements (NAO, 2016c), roles and responsibilities (NAO, 2013b, 2016d), and leadership and decision making (NAO, 2014c, 2016d) can be secured. In the case of HS2, the necessity of a clear governance model was emphasised for clearer investment decision making, governance structure and assurance:

“The Department and HS2 Ltd have established a clear governance model for the programme. At a high level, the programme reports into a programme board, and major investment decisions are required from the Department’s Board Investment and Commercial Committee, with major decisions being approved by HM Treasury. The next level of the governance structure mirrors both the Department’s and HS2 Ltd’s management structure, with separate boards for phases 1 and 2, and a further board overseeing progress with plans for the operational railway, including trains and depots. As with other major transport programmes such as Crossrail and High Speed 1, the Secretary of State has appointed a Project Representative (P-Rep) to sit in HS2 Ltd and provide assurance about progress with the programme.” (NAO, 2016e)

Other owners were concerned with aligning with the chosen project delivery approach. An agile approach was a part of the Common Agricultural Policy Delivery Programme, but the governance arrangement of the Department for Environment, Food & Rural Affairs was not well aligned with the agile approach that triggered the necessity of publishing customised guidance support:

“Programme and departmental governance was not well aligned to the agile approach. The Department and its delivery bodies were accustomed to more traditional, structured governance arrangements with detailed planning and large staggered releases. We were told by key stakeholders that the Department’s decision to adopt an agile approach, with its more fluid iterative approach and greater freedom for decision-makers, brought new challenges. The Department told us it sought guidance in 2013 from GDS [Government Digital Service] on best practice for agile governance, but guidance on this was not published until June 2014.” (NAO, 2015c)

Interdependencies and Interfaces

Within Theme 4 Leadership and Strategy, Interdependencies and Interfaces had 42 paragraphs coded (3.38%) at level 2. While stakeholder management is an established theme within project organising, the issues captured by this node are broader than the project-centric conception of stakeholder management that dominates current theory and practice. The issue identified here is the interdependencies between different major projects that are not managed as part of an overall programme and often may have different promoting owner organisations. Managing a wider range of interdependencies is a complex and on-going challenge (NAO, 2016c, 2016e) and covers the relationships between major projects promoted by different owners within UK central government. Many reports emphasise that anticipating and managing interdependencies by producing an overall strategic vision is one of the most critical managerial values for the success of government transformation programmes (NAO, 2015g, 2016e). The case of the Thameslink programme highlights the necessity for more active interdependency management to minimise risks, issues and a lack of finances of the transformation programme. For this reason, an Interface Steering Group was established:

“The Department also recognises that it needs to manage more actively the interdependencies between the infrastructure, train and franchise projects. It is

establishing an ‘interface steering group’ to manage internal, departmental interfaces and expects its expanded systems integration team to play a more active role in programme management. This group will be staffed by Network Rail, to manage risks, issues and finances more actively. This is a welcome development, but it is disappointing that the Department did not devote more attention to managing the interdependencies earlier given the scale and complexity of the programme and that external reviews of the programme since 2007 highlighted the challenges and risks around the complex interdependencies between the projects.” (NAO, 2013c)

Better understanding of interdependencies between projects in a more strategic approach can lead to further opportunities to accelerate digital transformation projects. In the case of the Welfare Reforms Programme, the Department for Work and Pensions found a way to enhance the existing business process:

“A strategic approach goes beyond simply managing dependencies between programmes and considers the wider opportunities across government. For example, the Department has now identified opportunities to use HM Revenue & Customs’ real-time information to simplify the process of validating claims from providers on the Work Programme.” (NAO, 2015i)

As a further example, effective collaboration between the different teams in the Department for Transport was emphasised in the management of the Great Western Route Modernisation programme, by managing better governance arrangements and complex interfaces:

“The governance arrangements rely on effective joint working between the different teams in the Department that are responsible for the various elements of the industry programme. There are many interfaces between the Great Western Route Modernisation programme and other rail programmes including Crossrail and High Speed 2. This requires close working across all of the teams in the Department’s rail and high speed rail groups. The programme board must manage these complex interfaces.” (NAO, 2016c)

In a similar approach, the NAO highlights managing interdependencies during the early stage of new operation, in order to achieve the successful transformation of the newly launched service, Digital Identity Assurance:

“In October 2014, the Programme moved its services into public beta. The Programme and departments are working together to continue carrying on work to improve and scale the service over the coming months and years. Digital identity assurance will offer departments the opportunity to support the transformation of their services in a consistent way across government. To achieve this, departments will have to work closely with the Programme to manage their interdependencies and respective responsibilities.” (NAO, 2014b)

Strategy and Business Case

‘Strategy and business case’ (57 paragraphs coded; 4.58%) from Theme 6 Business Case Development is also significant. In the case of National Cyber Security Programme, seven theme-based Cyber Delivery Capability Groups managed the entire delivery of programme, and their collaboration with a wide range of partners helped to enhance the business case covering clearer cost and benefits estimation:

“Given the number and wide range of delivery partners, programme delivery is managed at the working level by 7 theme-based Cyber Delivery Capability Groups; their role is to drive the delivery of their respective elements of the Programme. Their work with delivery partners has helped to drive up the quality of business cases. In the early stages of the Programme, some of these business cases were poor quality, in part because of the uncertainties involved in delivering new projects. They have now improved, and the Cabinet Office requires them to show clearly how money will be used to deliver outputs or activity which link to specific benefits.” (NAO, 2014j)

Expertise and Staffing

The final level-2 node highlighted is Expertise and Staffing contained in Theme 9 Human Resources (HR) (39 paragraphs coded; 3.86%). More than a half of the reports identified the difficulties in the availability of appropriate skills (17 out of 30 reports) both at the senior levels

and in the owner's project team. In the case of Crossrail, for example, the importance of the continuity of the owner organisation's representatives is emphasised:

“Transport for London's membership of the Joint Sponsor Board has been relatively consistent, but the Department's representatives have changed frequently. This lack of continuity could have weakened the Department's understanding and potentially led to delays in decision-making, or uncertainty. However, we do not consider that this has happened on Crossrail, as:

- A small number of departmental staff have rotated on the Joint Sponsor Board, meaning that the Department's representatives understand the programme's background;
- There has been more continuity of Transport for London staff on the Joint Sponsor Board. Transport for London has brought experience of major transport projects to bear; and
- Crossrail Limited is led by a highly capable senior team with a track record of successful delivery in both the public and private sectors worldwide.”
(NAO, 2014a)

DISCUSSION: THE IMPLICATIONS FOR PROJECT ORGANISING RESEARCH

Our research has identified the principal challenges facing project owners in the UK public sector across many all types of major project from defence acquisition through to digital transformation. What are the implications of these findings for research programmes in project organising? A first implication is support for much of the current research agenda in project organising. Project governance issues accounted for 11.74% of the challenges identified, so the emphasis of many researchers on this topic (Ahola et al., 2014; Müller, 2011; Turner and Muller, 2017) is well justified. Equally well justified is the current strong research stream on leadership and strategy (Artto et al., 2008; Holzmann et al., 2017; Lindgren and Packendorff, 2009; Loch and Kavadias, 2011; Müller et al., 2017), accounting for 11.01% of the identified challenges as is research on human resource issues (Huemann et al., 2007; Keegan et al., 2017) accounting for 7.56% of challenges.

Programme management (Patanakul and Pinto, 2017; Pellegrinelli, 1997, 2011), perhaps unsurprisingly, accounts for 9.8% of challenges identified. However, perhaps what is more of

a surprise is the continuing importance of project management defined as delivery against the “iron triangle” of time, cost and quality (Barnes, 1988). While it is widely acknowledged that project organising research needs to move beyond delivery against the iron triangle trade-off criteria (Atkinson, 1999; Pollack et al., 2018) what emerges from our findings is that such broader criteria are a complement to, rather than a substitute for, the iron triangle criteria. Even in UK central government that wrote many of the key texts in the project and programme management disciplines such as PRINCE2 and MSP achieving the basics was identified as a challenge in 11.5% of the data base. The issues around actually achieving the iron triangle criteria of which have largely disappeared from contemporary research in project organising. Perhaps a renewed emphasis on this area would be appropriate through addressing the digital transformation in project information management (Levitt, 2011; Love et al., 2019; Whyte, 2019; Whyte and Levitt, 2011). Following the example of Accenture (<https://www.accenture.com/us-en/services/industryx0-index>: accessed 21/02/20) we might dub this line of enquiry Project Organising X.0.

A second implication is that we have identified some important areas that are not so well covered in current project organising research that amount to around one third of the challenges identified in the content analysis case survey. The first area is at the front-end of the project life-cycle around the theme of Benefits and Value Proposition, and Business Case Development – these challenges might be grouped together as *project shaping* (Miller and Lessard, 2000) in contrast to the challenges of *project delivery* which are the typical focus of project organising research. The second area is at the back-end of the project-life-cycle in moving the output delivered by the supplier domain into beneficial use as expected by the business case. We therefore suggest that we need to extend our concept of the project life-cycle both forwards earlier in the project life-cycle in a *left shift* in project organising research and backwards later in the project life-cycle with deeper understanding of the realisation of business case outcomes from project delivery outputs.

Project shaping is the process by which the owner (usually a government ministry or non-governmental body) works with other stakeholders to develop a business case that articulates the desired value proposition that supports the achievement of a policy objective regarding the delivery of public services. In this process the key stakeholder is HM Treasury (the UK Ministry of Finance) which holds the financial resources required. Shaping is done through a structured process dubbed the “five business cases” (HM Treasury and Welsh Government,

2018) resource. However, there is little research on how this shaping process actually works, although there are some insights from the private sector (Kaplan, 2008; Kaplan and Orlikowski, 2013) and from Norway (Samset and Volden, 2016). Once shaped the project can be passed to the temporary project organisation and the supplier domain mobilised to resource it.

According to MSP, benefits realisation is the process by which the *output* delivered by the temporary project organisation is brought into beneficial use by the owner to achieve the *outcomes* defined at the start of the project life-cycle in the business case and hence improved public services. Benefits realisation is therefore the process by which the value proposition in that business case earlier is tested by the owner to see if it is real. There has been some research highlighting the significance of benefits realisation through developing the project management knowledge framework (Badewi, 2016; Cha et al., 2018), extending the project life-cycle (Marnewick, 2016), benefits layers and stages (Breese et al., 2015), target benefits formulation (Chih and Zwikael, 2015; Zwikael et al., 2018) and business strategies and value creation (Serra and Kunc, 2015). However, much of this work treats benefits realisation as a technical rather than a strategic issue and does not address the organisational challenges project owners face.

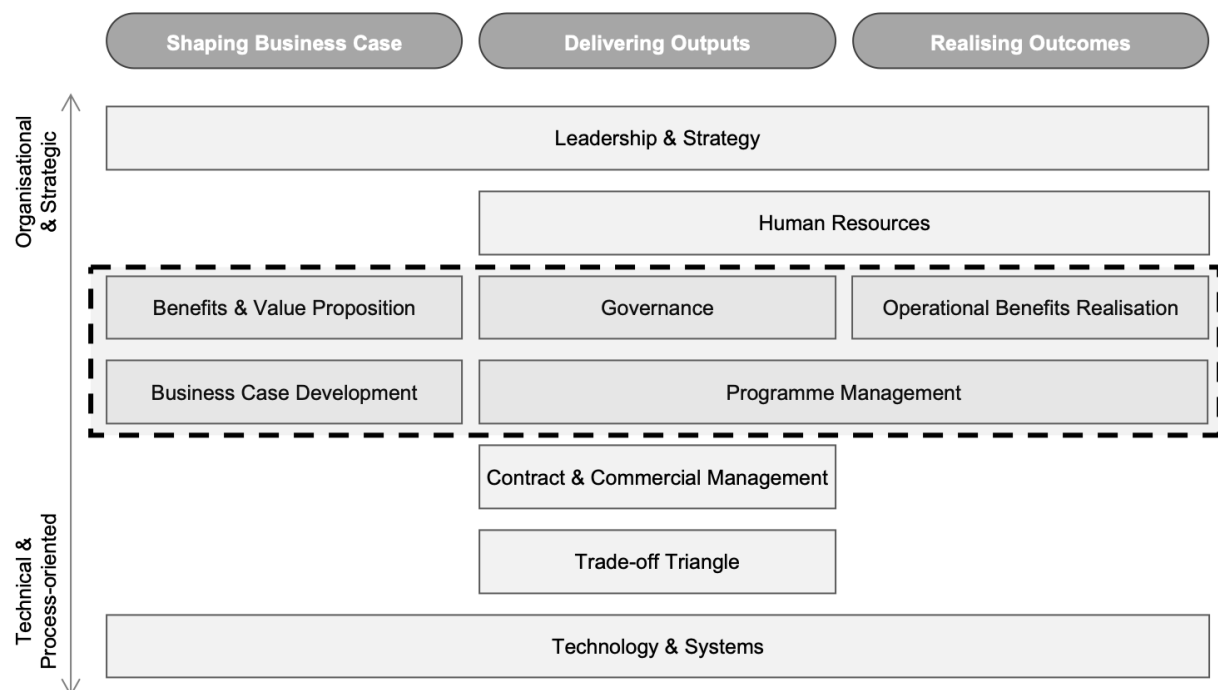


Figure 3. Summary model of owner challenges

Our findings on the holistic nature of project owner organisations and the challenges they face on their investment projects can be summarised as shown in Figure 3. It shows our 10 themes against the project life-cycle (shaping the business case > delivering outputs> realising outcomes) and against whether the theme is more technical and process-orientated or more organisational and strategic. On the evidence from our case survey content analysis, Strategy and Leadership spans the whole project life-cycle and is what holds the process together by communicating, managing interfaces and stakeholders, and drawing on deep knowledge and experience. Human resources are also vital during delivery – shortages of appropriate senior skills were often mentioned here, but also as the project moves the outputs into beneficial use by realising outcomes. This often involves significant challenges for users around training and the more general uncertainties of organisational change. Together, these “soft” issues accounted for nearly 19% of challenges identified and we suggest that they are largely a function of the overall context to the major project provided by the owner organisation and are highly integrated into the owner’s wider strategic and operational capabilities.

Benefits and Value Proposition, Governance, and Operational Benefits Realisation are the crucial underpinnings of successful investment projects collectively accounting for over 28% of the challenges identified, with each theme having its greatest weight at successive points through the project life-cycle. There is also a strong sense of feedback through time across these three because the benefits to be realised are defined during the development of the benefits and value proposition. Business Case Development and Programme Management are more technically orientated than the preceding themes, with particular disciplines at their core supported by a detailed level of formal guidance. For the former it is the Green Book with benefit-cost analysis at its core, while for the latter Managing Successful Programmes articulates the core - at least for UK central government. Hence MSP and the associated Axelos suite of guidance documents form the principal guidance for the Management Case in the Five Business Cases model. Together these account for 20% of challenges identified. Arguably, these five themes form the *core challenges* of successful project organising from a project owner’s perspective accounting almost half (49%) of the challenges identified in the research as illustrated by the dotted line in figure 3.

Contract and Commercial Management and Trade-off Triangle are more technical and processes-orientated and are usually considered as distinct disciplines, yet together they account for over 19% of challenges. Our evidence here is that the former needs to be re-

integrated into the heart of project management in particular, and project organising research more generally. Few projects are delivered without recourse to human and material resources from outside the owner organisation. Whether these suppliers be first tier construction contractors; digital transformation consultants; or manufacturers of defence materiel, they all need to be managed through the commercial interface (Winch, 2014) if project delivery is to be successful. We conceptualise these as the supporting disciplines to address the core challenges identified above.

Finally, we turn to the most significant theme – Technology and Systems – accounting for nearly 14% of challenges. These challenges have a strong IT dimension and are particularly important in the Digital Service Delivery topic and ICT and Systems Analysis sector VfM reports. IT can be intractable where the challenges range from coping with the limitations of poorly understood legacy systems to the rapid pace of change in important areas of advanced technology (Cha and Maytorena-Sanchez, 2019). The widespread embedding of digital systems within, for instance, transport infrastructure projects (Whyte, 2019) means that these challenges are no longer confined to information systems projects. This has two important implications for project organising research. The first is that better cross-disciplinary links with, for instance, innovation research (Davies et al., 2018), would be highly beneficial. The second is that project organising research needs to re-engage with the technologies projects are delivering. Developments such as Building Information Modelling in construction (Whyte, 2019) integrate both product technology information and project management information in applications in nD project management (Ding et al, 2012) which reinforces our point about researching project organising X.0 above.

It is also worth reflecting on what our research has *not* identified as major challenges. Perhaps the most obvious theme in this category is *portfolio management*. This is an important theme in current contributions to the research field (Clegg et al., 2018; Martinsuo, 2013), yet it hardly features as a challenge. There are two possible inferences from this finding. The first is that portfolio management is well-handled within UK government and so it does not feature as a challenge; the second is that the focus of the NAO VfM studies on individual major projects means that portfolio management issues escape examination. Our interpretation of the data suggests that the latter is more likely to be the case and that, therefore, more research is required on this issue.

For instance, the Infrastructure and Projects Authority (IPA) acts as a de facto project management office (PMO) - as a coordinator, controller and a supporter (Unger et al., 2012) - for most UK government projects and programmes, so challenges arising from the management of interdependencies between government departments and IPA is inevitable. However, our data set does not sufficiently reflect such relational challenges. Government project organising is complex, and inter-departmental interdependencies are overarching. In addition to the research efforts on individual projects, we empirically argue more vigorous research attention to the interdependencies between major projects at a strategic level.

A second theme that featured much less strongly than we had expected is *stakeholder management*. Again, this is an important theme in current project organising research (Derakhshan et al., 2019; Winch, 2017), yet UK government owners were not often finding this a challenge with only 1.45% of nodes containing this issue. One possible explanation for this finding is that UK central government leaves much of the task of managing stakeholders during project delivery to the supply side. During project shaping, on the other hand, it is possible that stakeholders are managed politically through the policy process (King and Crewe, 2013) rather than organisationally through the project process and therefore fall outside the remit of the NAO.

However, the data did reveal one interesting aspect of stakeholder management - the management of interdependencies and interfaces between major projects. The NAO comments on above on the three rail programmes (Great Western Route Modernisation; High Speed 2; Crossrail) are an example of this. This is not an issue of portfolio management, because the three projects have three different owners (respectively Network Rail; HS2 Ltd; Transport for London) and portfolio management is, by definition, about the set of projects promoted by a single owner (Killen and Drouin, 2017). Rather, the challenge for UK government here is about a set of independent programmes that share resource bases within the supplier domain and, at key points, physically interact. Again, we suggest that more research is required in this area.

A third area which has not been identified in the data is project sponsorship (Helm and Remington, 2005). The role of the Senior Responsible Owner (SRO) as project sponsor with accountability (in contrast to responsibility) for the delivery of the outputs and their transformation into outcomes is well embedded in UK central government practice (Zwikael et al., 2019), and supported by executive education programmes such as the Major Projects

Leadership Academy. This suggests that the implementation of this sponsorship role within UK central government has been successful.

How does the set of 10 challenges for owners of major projects relate to the concept of project capabilities (Davies and Brady, 2000; 2016)? We suggest that the challenges identified empirically here are what owner project capabilities need to address, so our findings provide a much more granular identification of the bundles of practices that constitute dynamic capabilities (Eisenhardt and Martin, 2000) for project owner organisations within the three domains (Winch, 2014) and OPM (Killen and Drouin, 2017) perspectives. Our findings also illustrate the differences between the two (Pinto and Winch, 2016) perspectives. The OPM perspective focuses on a single organisation – implicitly the project owner organisation – and does not address the inter-organisational dimensions of project organising (von Danwitz, 2018). The three domains perspective, on the other hand, focuses on the inter-organisational interfaces between the owner organisation and both the project-based firms in the supplier domain and the temporary project organisation. It therefore emphasises the importance of the Commercial and Governance interfaces, while Commercial and Contract issues are not included within the OPM perspective.

We are unaware of any empirical research on the project-based firms in the supplier domain of comparable granularity to the research we present here. However, Davies and Hobday (2005: table 3.1) provide an overview of the project capabilities required by such firms. The notable difference from the capabilities identified here is that their analysis emphasises what we have defined here as the supporting capabilities – the commercial and contract and project management capabilities. Notably missing are what we have defined here as the extended core capabilities of owner project organising. This suggests that owner project organising is very different from supplier project organising (Godbold, 2016). The former emphasises the core challenges in figure 3, while the latter emphasises as core the commercial and project delivery challenges that are supporting disciplines for project owners.

CONCLUDING REMARKS

This research was motivated by the question, *what are the principal challenges for the management of major projects and programmes by UK central government?* In order to address this, we conducted a case survey of 26 UK central government projects using content analysis of 30 NAO VfM reports on project performance covering the 5-year period 2012 to

2016. This produced the frequency count of the challenges faced by UK central government in managing its investment projects across all sectors presented in Table 1, with the results summarised graphically in Figure 3.

Based on the findings, we identified 10 themes in the challenges that UK central government owner organisations faced in project organising that we have suggest are the challenges which owner project capabilities need to address. We showed that while supporting themes in project organising such as project management (Theme 3) remain important, accounting for over one tenth of the challenges, newer themes in project organising research around softer aspects such as leadership (Theme 4) and HR (Theme 9) were together more important. These two accounted for nearly one fifth of challenges because they provide the organisational context for the major project promoted by the owner. Most importantly, though, our research was able to identify a set of *extended core capabilities* in project organising as shown in figure 3 to address the challenges of project shaping (Themes 5 & 6) and benefits realisation (Theme 10) as well as to address the more familiar challenges of governance (Theme 2) and programme management (Theme 7). Together with commercial capabilities (Theme 8), project management forms one of the vital supporting capabilities for major project management.

On this basis, we make our theoretical contribution. In summary this identifies 1) the need to extend significantly the scope of project organising research forwards and backwards over the project life-cycle to include both project shaping and outcomes achievement as shown in figure 3; 2) an extended set of core capabilities of owner project organising over the project life-cycle as shown by the dotted box figure 3; and 3) the need to include commercial issues within the standard scope of project organising research. We have, thereby, theoretically enriched the research on both OPM (Sankaran et al., 2017) and owners as one of the three domains of project organising (Winch, 2014). We have done this by providing an empirical analysis that is both holistic and much more granular with respect to the actual challenges that owners of major projects face and hence the dynamic capabilities that they need to address them on the major projects they promote.

An important limitation of the research presented here is that is it limited to a number of owner organisations within the same area of government – UK central government and its major projects. The application to other national governments may vary in the details, but is unlikely to differ in the broader findings – certainly it would appear that the Norwegian government faces a similar set of issues (Samset and Volden, 2016), as apparently does the Canadian

government (Brunet, 2019). We also submit that our findings for public sector owners are likely to be broadly applicable to those private sectors owners that invest in major projects such as the energy sector and financial services sector. Or, to put the point the other way around, we are unaware of any data which suggests that there are major differences between the public and private sectors in project organising except for the much greater level of public scrutiny that public sector owners receive regarding their projects.

REFERENCES

- Ahola, T., Ruuska, I., Artto, K., Kujala, J., 2014. What is project governance and what are its origins? *International Journal of Project Management*, 32(8), 1321-1332.
- Alvesson, M., Sandberg, J., 2011. Generating research questions through problematization. *Academy of Management Review*, 36(2), 247-271.
- Artto, K., Martinsuo, M., Dietrich, P., Kujala, J., 2008. Project strategy: Strategy types and their contents in innovation projects. *International Journal of Managing Projects in Business*, 1(1), 49-70.
- Atkinson, R., 1999. Project management: Cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International Journal of Project Management*, 17(6), 337-342.
- Badewi, A., 2016. The impact of project management (PM) and benefits management (BM) practices on project success: Towards developing a project benefits governance framework. *International Journal of Project Management*, 34(4), 761-778.
- Barnes, M., 1988. Construction project management. *International Journal of Project Management*, 6(2), 69-79.
- Breese, R., Jenner, S., Serra, C.E.M., Thorp, J., 2015. Benefits management: Lost or found in translation. *International Journal of Project Management*, 33(7), 1438-1451.
- Brunet, M., 2019. Governance-as-practice for major public infrastructure projects: A case of multilevel project governing. *International Journal of Project Management*, 37(2): 283-297.
- Brunet, M., Aubry, M., 2016. The three dimensions of a governance framework for major public projects. *International Journal of Project Management*, 34(8), 1596-1607.
- 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: Urban Analytics and City Science*, 37(5), 792-807.
- Cha, J., 2017. Performance of Public Sector Information Systems Projects: The Case of UK Central Government, PhD Thesis, The University of Manchester, United Kingdom.
- Cha, J., Maytorena-Sanchez, E., 2019. Prioritising project management competences across the software project life cycle. *International Journal of Managing Projects in Business*, 12(4), 961-978.

- Cha, J., Newman, M., Winch, G.M., 2018. Revisiting the project management knowledge framework: Rebalancing the framework to include transformation projects. *International Journal of Managing Projects in Business*, 11(4), 1026-1043.
- Chandler, D. E., Thomas, J. L., 2015. Does executive sponsorship matter for realizing project management value? *Project Management Journal*, 46(5), 46-61.
- Charmaz, K., 2011. Grounded Theory Methods in Social Justice Research. In: Denzin, N. K., Lincoln, Y. S. (Eds.), *The Sage Handbook of Qualitative Research*, 4th ed. Sage, Los Angeles: CA, pp. 359-380.
- Chih, Y-Y., Zwikael, O., 2015. Project benefit management: A conceptual framework of target benefit formulation. *International Journal of Project Management*, 33(2), 352-362.
- Clegg, S., Killen, C.P, Biesenthal, C., Sankaran, S. 2018. Practices, projects and portfolios: Current research trends and new directions. *International Journal of Project Management*, 36(5) 762-772.
- Cooke-Davies, T., 2002. The “real” success factors on projects. *International Journal of Project Management*, 20(3), 185-190.
- Dalton, M., 2007. A Risk Breakdown Structure for Public Sector Construction Projects, PhD Thesis, The University of Manchester, United Kingdom.
- Davies, A. Brady, T. (2000) Organisational Capabilities and Learning in Complex Product Systems: Towards Repeatable Solutions. *Research Policy*, 29 931-953.
- Davies, A. Brady, T. (2016) Explicating the Dynamics of Project Capabilities. *International Journal of Project Management*. 34(2) 314-327.
- Davies, A. Hobday, M. 2005. *The Business of Projects: Managing Innovation in Complex Products and Systems*. Cambridge, Cambridge University Press.
- Davies, A., Manning, S., Söderlund, J., 2018. When neighboring disciplines fail to learn from each other: The case of innovation and project management research. *Research Policy*, 47(5), 965-979.
- Derakhshan, R., Turner, R., Mancini, M., 2019. Project governance and stakeholders: A literature review. *International Journal of Project Management*, 37(1), 98-116.
- Ding, L. Y., Zhou, Y., Luo, H. B., & Wu, X. G. 2012. Using nD technology to develop an integrated construction management system for city rail transit construction. *Automation in Construction*, 21, 64-73.
- Flyvbjerg, B., Bruzelius, N., Rothengatter, W., 2003. *Megaprojects and Risk: An Anatomy of Ambition*, Cambridge University Press, Cambridge.
- Flyvbjerg, B., Garbuio, M., Lovallo, D., 2009. Delusion and deception in large infrastructure projects: Two models for explaining and preventing executive disaster. *California Management Review*, 51(2), 170-194.
- Godbold, A., 2016. A Tale of Two Disciplines, *Project*, Spring, 62-63.
- Helm, J., Remington, K., 2005. Effective project sponsorship an evaluation of the role of the executive sponsor in complex infrastructure projects by senior project managers. *Project Management Journal*, 36(3), 51-61.
- Hetemi, E., Jerbrant, A., Mere, J. O., 2020. Exploring the emergence of lock-in in large-scale projects: A process view. *International Journal of Project Management*, 38(1), 47-63.

- HM Treasury and Welsh Government, 2018. Guide to Developing the Project Business Case; Guide to Developing the Programme Business Case. London HM Treasury, London.
- Holzmann, V., Shenhar, A., Stefanovic, J., 2017. Strategic OPM: Why Companies Need to Adopt a Strategic Approach to Project Management. in: Sankaran, S., Müller, R., Drouin, N. (Eds.), *The Cambridge Handbook of Organizational Project Management*. Cambridge University Press, Cambridge, pp. 33-43.
- Huemann, M., Keegan, A., Turner, J. R., 2007. Human resource management in the project-oriented company: A review. *International journal of project management*, 25(3), 315-323.
- Hui, P.P., Davis-Blake, A., Broschak, J.P., 2008. Managing interdependence: The effects of outsourcing structure on the performance of complex projects. *Decision Science*. 39(1), 5-31.
- Infrastructure and Projects Authority (IPA), 2017a. Annual report on Major Projects 2016-17. IPA, London.
- Infrastructure and Projects Authority (IPA), 2017b. Transforming Infrastructure Performance. IPA, London.
- Kaplan, S, Orlikowski, W.J., 2013. Temporal work in strategy making. *Organization Science*, 24(4): 965-995.
- Kaplan, S., 2008. Framing contests: Strategy making under uncertainty. *Organization Science*, 19(5): 729-752.
- Keegan, A., Huemann, M., Ringhofer, C., 2017. Human Resource Management in Organizational Project Management: Current Trends and Future Prospects. in: Sankaran, S., Müller, R., Drouin, N. (Eds.), *The Cambridge Handbook of Organizational Project Management*. Cambridge University Press, Cambridge, pp. 153-171.
- Killen, C. P., Drouin, N., 2017. Project Portfolio Management: A Dynamic Capability and Strategic Asset. in: Sankaran, S., Müller, R., Drouin, N. (Eds.), *The Cambridge Handbook of Organizational Project Management*. Cambridge University Press, Cambridge, pp. 55-69.
- King, A., Crewe, I., 2013. *The Blunders of Our Governments*. Oneworld, London.
- Krippendorff, K., 2013. *Content Analysis: An Introduction to Its Methodology*, third ed. Sage Publications, Thousand Oaks: CA.
- Larsson, R., 1993. Case survey methodology: Quantitative analysis of patterns across case studies. *Academy of Management Journal*, 36(6), 1515-1546.
- Levitt, R. E., 2011. Towards project management 2.0. *Engineering Project Organization Journal*, 1(3), 197-210.
- Lindgren, M. Packendorff, J., 2009. Project leadership revisited: Towards distributed leadership perspectives in project research. *International Journal of Project Organisation and Management*, 1(3), 285-308.
- Loch, C. Kavadias, S., 2011. Implementing Strategy Through Projects. In: Morris, P., Pinto, J., Söderlund, J. (Eds.), *The Oxford Handbook of Project Management*. Oxford University Press, Oxford, pp. 224–251.
- Love, P. E. D., Zhou, J., Matthews, J., 2019. Project controls for electrical, instrumentation and control systems: Enabling role of digital system information modelling. *Automation in Construction*, 103, 202-212.

- Marnewick, C., 2016. Benefits of information system projects: The tale of two countries. *International Journal of Project Management*, 34(4), 1438-1451.
- Martinsuo, M., 2013. Project portfolio management in practice and in context. *International Journal of Project Management*, 31(6) 794-803.
- Merrow, E.W., 2011. *Industrial Megaprojects: Concepts, Strategies, and Practices for Success*. Wiley, Hoboken: NJ.
- Merrow, E.W., Nandurdikar, N., 2018. *Leading Complex Projects: A Data-driven Approach to Mastering the Human Side of Project Management*. John Wiley and Sons, NJ.
- Müller, R., 2011. Project governance. In: Morris, P., Pinto, J., Söderlund, J. (Eds.), *The Oxford Handbook of Project Management*. Oxford University Press, Oxford, pp. 297–320.
- Müller, R., Packendorff, J., Sankaran, S., 2017. *Balanced Leadership: A New Perspective for Leadership in Organizational Project Management*. in: Sankaran, S., Müller, R., Drouin, N. (Eds.), *The Cambridge Handbook of Organizational Project Management*. Cambridge University Press, Cambridge, pp. 186-199.
- National Audit Office (NAO), 2009. *Commercial Skills for Complex Government Projects*. National Audit Office, London.
- National Audit Office (NAO), 2012a. *Improving the Delivery of Animal Health and Welfare Services through the Business Reform Programme*. National Audit Office, London.
- National Audit Office (NAO), 2012b. *Lessons from Cancelling the InterCity West Coast Franchise Competition*. National Audit Office, London.
- National Audit Office (NAO), 2012c. *The Completion and Sale of High Speed 1*. National Audit Office, London.
- National Audit Office (NAO), 2013a. *Carrier Strike: The 2012 Reversion Decision*. National Audit Office, London.
- National Audit Office (NAO), 2013b. *High Speed 2: A Review of Early Programme Preparation*. National Audit Office, London.
- National Audit Office (NAO), 2013c. *Progress in Delivering the Thameslink Programme*. National Audit Office, London.
- National Audit Office (NAO), 2013d. *Review of the Final Benefits Statement for Programmes Previously Managed under the National Programme for IT in the NHS*. National Audit Office, London.
- National Audit Office (NAO), 2014a. *Crossrail*. National Audit Office, London.
- National Audit Office (NAO), 2014b. *Identity Assurance Programme*. National Audit Office, London.
- National Audit Office (NAO), 2014c. *Lessons from Major Rail Infrastructure Programmes*. National Audit Office, London.
- National Audit Office (NAO), 2014d. *Memorandum on the BBC's Digital Media Initiative*. National Audit Office, London.
- National Audit Office (NAO), 2014e. *Procuring New Trains*. National Audit Office, London.
- National Audit Office (NAO), 2014f. *Progress on Public Bodies Reform*. National Audit Office, London.

National Audit Office (NAO), 2014g. The Criminal Justice System: Landscape Review. National Audit Office, London.

National Audit Office (NAO), 2014h. Universal Credit: Progress Update. National Audit Office, London.

National Audit Office (NAO), 2014i. Update on Preparations for Smart Metering. National Audit Office, London.

National Audit Office (NAO), 2014j. Update on the National Cyber Security Programme. National Audit Office, London.

National Audit Office (NAO), 2014k. Update on the Next Generation Shared Services Strategy. National Audit Office, London.

National Audit Office (NAO), 2015a. Automatic Enrolment to Workplace Pensions. National Audit Office, London.

National Audit Office (NAO), 2015b. E-borders and Successor Programmes. National Audit Office, London.

National Audit Office (NAO), 2015c. Early Review of the Common Agricultural Policy Delivery Programme. National Audit Office, London.

National Audit Office (NAO), 2015d. General Practice Extraction Service – Investigation. National Audit Office, London.

National Audit Office (NAO), 2015e. Lessons for Major Service Transformation. National Audit Office, London.

National Audit Office (NAO), 2015f. Progress on the Sellafield Site: An Update. National Audit Office, London.

National Audit Office (NAO), 2015g. Reform of the Rail Franchising Programme. National Audit Office, London.

National Audit Office (NAO), 2015h. The Superfast (Rural) Broadband Programme: Update. National Audit Office, London.

National Audit Office (NAO), 2015i. Welfare Reform - Lessons Learned. National Audit Office, London.

National Audit Office (NAO), 2016a. Delivering Major Projects in Government: A Briefing for the Committee of Public Accounts. National Audit Office, London.

National Audit Office (NAO), 2016b. Government Commercial and Contracting: An Overview of the NAO's Work. National Audit Office, London.

National Audit Office (NAO), 2016c. Modernising the Great Western railway. National Audit Office, London.

National Audit Office (NAO), 2016d. Progress on the Common Agricultural Policy Delivery Programme. National Audit Office, London.

National Audit Office (NAO), 2016e. Progress with Preparations for High Speed 2. National Audit Office, London.

National Audit Office (NAO), 2016f. Transforming Rehabilitation. National Audit Office, London.

- National Audit Office (NAO), 2017. Framework to Review Programmes. National Audit Office, London.
- Patanakul, P. Pinto, J., K., 2017. Program Management. in: Sankaran, S., Müller, R., Drouin, N. (Eds.), *The Cambridge Handbook of Organizational Project Management*. Cambridge University Press, Cambridge, pp. 106-118.
- Patanakul, P., Kwak, Y.H., Zwikael, O., Liu, M., 2016. What impacts the performance of large-scale government projects? *International Journal of Project Management*, 34(3), 452-466.
- Pellegrinelli, S., 1997. Programme management: Organising project-based change. *International Journal of Project Management*, 15(3), 141-149.
- Pellegrinelli, S., 2011. What's in a name: Project or programme?. *International Journal of Project Management*, 29(2), 232-240.
- Pinto, J.K., 2014. Project management, governance, and the normalization of deviance. *International Journal of Project Management*, 32(3), 376-387.
- Pinto, J.K., Winch, G.M., 2016. The Unsettling of "Settled Science:" The Past and Future of the Management of Projects. *International Journal of Project Management*. 34(2) 237-245.
- Pollack, J., Helm, J., Adler, D., 2018. What is the Iron Triangle, and how has it changed? *International Journal of Managing Projects in Business*, 11(2), 527-547.
- Samset, K., Volden, G.H., 2016. Front-end definition of projects: Ten paradoxes and some reflections regarding project management and project governance. *International Journal of Project Management*, 34(2): 297-313.
- Sankaran, S., Muller, R., & Drouin, N., 2017. *Cambridge Handbook of Organizational Project Management*, Cambridge, Cambridge University Press.
- Schreier, M., 2012. *Qualitative Content Analysis in Practice*. Sage Publications, Thousand Oaks: CA.
- Serra, C.E.M., Kunc, M., 2015. Benefits Realisation Management and its influence on project success and on the execution of business strategies. *International Journal of Project Management*, 33(1), 53-66.
- Turner, J.R., Müller, R., 2017. The governance of organizational project management. in: Sankaran, S., Müller, R., Drouin, N. (Eds.), *The Cambridge Handbook of Organizational Project Management*. Cambridge University Press, Cambridge, pp. 75-91.
- Unger, B.N., Gemünden, H.G., Aubry, M., 2012. The three roles of a project portfolio management office: Their impact on portfolio management execution and success. *International Journal of Project Management*, 30(5), 608-620.
- von Danwitz, S., 2018. Managing inter-firm projects: A systematic review and directions for future research. *International Journal of Project Management* 36(3), 525-541.
- Whyte, J., 2019. How Digital Information Transforms Project Delivery Models. *Project Management Journal*. 50(2), 1-18.
- Whyte, J., Levitt, R., 2011. Information Management and the Management of Projects. In: Morris, P., Pinto, J., Söderlund, J. (Eds.), *The Oxford Handbook of Project Management*. Oxford University Press, Oxford, pp. 365-390.
- Winch, G.M., 2013. Escalation in Major Projects: Lessons from the Channel Fixed Link. *International Journal of Project Management*. 31 724-734.

- Winch, G.M., 2014. Three Domains of Project Organising. *International Journal of Project Management*. 32 721-731.
- Winch, G.M., 2017. Megaproject Stakeholder Management. In: Flyvbjerg, B. (ed.) *The Oxford Handbook of Mega-project Management*. Oxford, OUP. 339-361.
- Winch, G.M., Leiringer, R., 2016. Owner Project Capabilities for Infrastructure Development: A Review and Development of the “Strong Owner” Concept. *International Journal of Project Management*. 34(2) 271-281.
- Zwikael, O., Chih, Y-Y., Meredith, J.R., 2018. Project benefit management: Setting effective target benefits. *International Journal of Project Management*, 36(4), 650-658.
- Zwikael, O., Meredith, J. R., Smyrk, J., 2019. The responsibilities of the project owner in benefits realization. *International Journal of Operations & Production Management*, 39(4), 503-524.
- Zwikael, O., Meredith, J.R., 2018. Who’s who in the project zoo? The ten core project roles. *International Journal of Operations & Production Management*, 38(2), 474-492.

APPENDIX 1: 30 NATIONAL AUDIT OFFICE VALUE FOR MONEY REPORTS

Doc Code	Report Title	Publication Date	4-Topic Filter*				2-Sector Filter**	
			DSD	MMP	OPD	TPS	ISA	TI
N_01	Modernising the Great Western railway (NAO, 2016c)	09-Nov-16		o				o
N_02	Progress on the Common Agricultural Policy Delivery Programme (NAO, 2016d)	24-Oct-16	o					
N_09	Progress with preparations for High Speed 2 (NAO, 2016e)	28-Jun-16						o
N_14	Transforming Rehabilitation (NAO, 2016f)	28-Apr-16				o		
N_18	E-borders and successor programmes (NAO, 2015b)	03-Dec-15	o		o			
N_20	Early review of the Common Agricultural Policy Delivery Programme (NAO, 2015c)	01-Dec-15	o		o			
N_22	Reform of the rail franchising programme (NAO, 2015g)	24-Nov-15						o
N_24	Automatic enrolment to workplace pensions (NAO, 2015a)	04-Nov-15		o				
N_34	General Practice Extraction Service – Investigation (NAO, 2015d)	02-Jul-15					o	
N_35	Welfare reform – lessons learned (NAO, 2015i)	29-May-15		o		o		
N_36	Progress on the Sellafield site: an update (NAO, 2015f)	04-Mar-15		o				
N_38	The Superfast (Rural) Broadband Programme: update (NAO, 2015h)	28-Jan-15	o					
N_39	Identity Assurance Programme (NAO, 2014b)	04-Dec-14	o				o	
N_40	Universal Credit: progress update (NAO, 2014h)	26-Nov-14	o	o		o		
N_42	Lessons from major rail infrastructure programmes (NAO, 2014c)	29-Oct-14		o				o
N_44	Update on the National Cyber Security Programme (NAO, 2014j)	10-Sep-14	o				o	
N_48	Procuring new trains (NAO, 2014e)	09-Jul-14						o
N_51	Update on preparations for Smart Metering (NAO, 2014i)	05-Jun-14				o		
N_53	Update on the Next Generation Shared Services strategy (NAO, 2014k)	31-Mar-14				o		
N_54	The criminal justice system: landscape review (NAO, 2014g)	07-Mar-14				o		

N_55	Progress on public bodies reform (NAO, 2014f)	07-Feb-14		o
N_57	Memorandum on the BBC's Digital Media Initiative (NAO, 2014d)	28-Jan-14		o
N_58	Crossrail (NAO, 2014a)	24-Jan-14		o
N_70	Review of the final benefits statement for programmes previously managed under the National Programme for IT in the NHS (NAO, 2013d)	06-Jun-13		o
N_71	Progress in delivering the Thameslink programme (NAO, 2013c)	05-Jun-13		o
N_72	High Speed 2: A review of early programme preparation (NAO, 2013b)	16-May-13		o
N_73	Carrier Strike: The 2012 reversion decision (NAO, 2013a)	10-May-13	o	
N_77	Lessons from cancelling the InterCity West Coast franchise competition (NAO, 2012b)	07-Dec-12		o
N_83	Improving the delivery of animal health and welfare services through the Business Reform Programme (NAO, 2012a)	18-Jul-12		o
N_85	The completion and sale of High Speed 1 (NAO, 2012c)	28-Mar-12		o

* DSD: Digital Service Delivery, MMP: Managing Major Projects, OPD: Operational and Programme Delivery, TPS: Transforming Public Services

** ISA: ICT and Systems Analysis, TI: Transport and Infrastructure