

THE UNIVERSITY OF SALFORD

**School of Science, Engineering
and Environment**

**Doctor of the Built Environment
(DBEnv)**

**How factors of collaboration affect
delivery of construction projects with
a high degree of reliance on building
services; An action research and
cross-case study analysis of
Edinburgh Primary Schools**

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February 2023

Volume 1

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Word Count:

Abstract	excluded from word-count
Introduction	6,993
Review of existing evidence	26,721
Research Methodology Approach	12,784
Preliminary Focus-group Study	4,026
Cross-case Study Analysis	9,484
Discussions and Findings	7,563
Conclusions	1,878
Recommendations	1,663
References	excluded from word-count
Appendices	excluded from word-count
Total	71,112

Acknowledgements

Thanks to all those who have contributed to this research, giving up their time to discuss the aspects herein. A special thank you to Professor Peter McDermott who always had the right advice and a guiding word, particularly when *positivity* was plainly lacking (from me).

For my Dad, who was here when this started but is no longer; “*A Doctor of Bricks?*” he asked.

ABSTRACT

The construction industry has often been criticised for lack of collaboration and the effect this has on delivering *value* to Clients.

This research was undertaken from the viewpoint of a practicing Quantity Surveyor (Professional Doctorate) to investigate how factors of collaborative procurement of building services (*for clarity, the Mechanical, Electrical and Plumbing work servicing the building*) affect the delivery of “Client defined value”. Focusing on the building services aspect was due to the high proportion of build value (£) this represents and the significance that collaboration has on this area.

It was recognised that whilst authors and commentators noted the benefits of undertaking projects collaboratively with the supply chain, there appeared to be a gap in empirical evidence of practical outcomes from this approach. Whilst practitioners espoused that collaboration with the supply chain *should* provide Client value benefits, this was largely not evidenced by the Academy. It is this “gap” this research sought to explore through investigation.

This exploratory / descriptive enquiry in to, what is considered a social phenomenon, combines constructivism and subjectivism, is interpretivist, and deploys a mixed-method approach; favouring a qualitative model in its narrative aspect. Due to the Professional Doctorate route, methods evolved over the research period; they include the use of Literature Review, Focus-groups, a *degree of* Action Research, Social Network Analysis and Cross-case Study Analysis.

Key Findings support the existing literature in that the act of collaboration within construction project teams ***should*** have positive outcomes when enacted correctly and effectively. The research suggests however that the nature of individual actors within construction project teams, their personalities, their ability to trust and be trustworthy, and the way they interact with the project’s *social network*, has a significant impact on the effectiveness of Collaborative procurement approaches. This is potentially more acute in the

area of Building Services especially when considering that “Client Value” parameters do not always consider this aspect discretely. The importance on Client leadership and them dictating their precise value requirements at an early stage is also commented on.

Key words :

Trust, Collaboration, Procurement, Knowledge Transfer, Client leadership

1 INTRODUCTION

1.1 Introduction

This enquiry is within the field of Construction Procurement (defined here as the process of securing all the goods and services needed to bring a construction project to completion). It is a complicated field. The researcher is a practicing Chartered Quantity Surveyor working in private practice in the Scottish Central Belt. The enquiry process has been subject to a Professional Doctorate route, whereby the researcher looks to investigate a practical problem of their working environment; in this case, investigating the nature of collaborative procurement (i.e. utilising the experience of supply chain members) and how this may improve delivery to Client defined value objectives. The interface of the academic and practical aspects of this enquiry affords the use of relevant and live actionable knowledge in the context of application, with the knowledge generated seeking to benefit both academy and practice.

The *Construction industry* is a globally significant sector and can be referred to as somewhat of an all-encompassing nebulous being, but at its very core are people; people delivering, collaborating, conflicting, working as teams, and ultimately people managing and *building*. It sometimes appears straightforward to apply ideas and commentary to the industry as a whole, but the granularity of the industry and the individuals involved means that sweeping generalisations or standard hypotheses are sometimes the antithesis of how the industry may be considered. Williams (2021) espouses that, within the term *VUCA*, Complexity is inherently a function of the other terms in the acronym; Volatility, Uncertainty and Ambiguity, that the 3 of them are factors of complex systems or positions. The Construction industry is potentially a perfect example of *VUCA* and the individuality of those working within it compound the complex nature of it due to the volatile, uncertain and ambiguous nature of the *human engine*. Khaliq (2021) suggests that this increase in a *VUCA* environment indicates that an interconnected system of

individuals from differing organisations requires better, potentially *newer*, collaboration.

So this research attempts to deal with that *individual* nature on a subject which also applies to the whole industry. This induces complexities and this is recognised; generalisations from studies such as this may be difficult to support. Having said that, individuality can only go so far, particularly in an industry such as construction, where there are limitations set by contract, legislation, commission, professional guidance, and corporate governance.

Given the individual nature of the research and of the researcher, the use of the first person in writing elements of the thesis is considered appropriate, alongside the third person references. This is particularly relevant in section 1.2; being particularly personal.

1.1.1 Summary of Chapter and approach taken

The following is a summary of each chapter's contents, and outlines the approach taken within this enquiry.

Chapter 1 : Introduction

This includes an outline of the researcher, the premise of the problem at the centre of the enquiry, and then outlines the research Aim, Objectives and Research Questions. It goes on to describe the research approach and outlines the methodology.

Here it is worth discussing the process undertaken, given that this was carried out through a Professional Doctorate route; this induces further iterative actions whilst formulating the research landscape and may mean there are structural differences in this compared to a more usual PhD route. Whilst the approach is further outlined in chapter 1.5, it is summarised here;

- Preliminary reading, theme identification and reflection on practical issue to be addressed

- Formulation of initial research proposal and outline methodology
- Continued review of existing evidence, ongoing throughout subsequent activities
- Preliminary Study, involving a review of existing literature and a Focus Group primary data collection technique, under an Action Research paradigm
- Preliminary output and review of continued research
 - Practical intervention based on Preliminary Study findings
 - Reframe research based on significance of context in enquiry
- Revise methodology based on reframed research; adopt Cross-case study approach including Social Network Analysis and interviews of project actors
- Carry out fieldwork; Pilot case study undertaken on school project prior to practical intervention, followed by three further case studies on similar school projects.
- Collate and analyse responses, produce findings.
- Author conclusions, recommendations and further narrative aspects

Chapter 2 : Review of existing evidence and literature

The reality here is that there has been an ongoing review throughout the doctoral journey, as outlined above, due to the iterative nature of the process. The preliminary reading enabled themes to be identified. The more fulsome review for the Preliminary Study, initially, and then in support of the reframed research following further highlighted themes (from Preliminary Study output), focusing also on the revised aspects of the research methods adopted, provides the majority of the review. Finally, given the duration of the overall study, the latest examples of evidence in the research field have been incorporated appropriately. Where this has been subsequent to the field work, this is noted.

Chapter 3 : Research methodology approach

This chapter describes the theoretical research approaches considered, utilised, rejected and adjusted as necessary. It is noted that whilst the research is ostensibly divided in to 2 distinct components, the Preliminary Study through Focus Groups and then the follow on element utilising Cross-case study analysis and Social Network Analysis, the over-arching consideration is that this enquiry is carried out under an Action Research paradigm. The systematic observation, data collection, analysis and reflection (Plan, Act, Observe, Reflect) in order to impact on practice, make an intervention, and further analyse and reflect upon how that may have had an affect is primarily the nature of Action Research / Action Learning.

It describes the justification and reasoning for selection of the research approaches used and what prompted the adjustment following the Preliminary Study. It goes on to outline the case study's research questions, linked to the objectives, the propositions formulated (and the alternatives), describes the Units of Analysis, and how these are ultimately connected to ensure suitable outcomes. It also notes criteria for interpretation of the data to formulate findings and how the quality of the case study design is judged.

There is an explanation as to why an element of Social Network Analysis was introduced; combining the qualitative data being collected with a degree of quantitative, in an attempt to enrich the overall research method.

There is reflection on all aspects of the research methodology and methods deployed, and on the practice based aspects of what has been undertaken through this research.

As well as discussing the ethical aspects of carrying out research through practice, it is at the end of this chapter where the academic ethics considerations and the process undertaken are described.

Chapter 4 : Preliminary Study – action research output

Here the themes discussed and the questions around these are outlined along with the approach to the Focus groups and their consolidated

responses. The review of existing evidence that was the pre-cursor to the Focus Groups forms part of Chapter 2. In addition to the thematic question areas there was further validation by the groups of two related pieces of research regarding the subject matter; these are also referred to in the overall outcomes. The output emergent themes from the Focus groups are then outlined and form the key areas of further enquiry, including highlighting additional areas for review of existing evidence and an underlying issue of the need to deal with the context-heavy aspect of the research subject matter. The chapter conclusion describes the process of the transition and direction change between the Preliminary Study and the further elements of the research as well as the intervention made in practice, and how this then had an impact on the main cases selected for the cross-case study.

Chapter 5 : Cross-case study analysis

The outline of the case study approach is provided here, including the practical considerations, how practice had an impact on the research (and vice versa), and the nature of the setting for the case study projects. The finalised themes of the case study element of the research is described following the refinement in the period between the conclusion of the Preliminary Study and the design of the Cross-case study element.

It also highlighted an additional case study available as comparison, albeit this was not undertaken in quite the same way as the main case studies. The analysis and comparison of the case studies is made within this chapter with the chapter concluding with narrative and statistical review and the synthesis of these aspects, as the mix of the qualitative and quantitative approach directs. It should be noted that the individual case studies are contained within appendix D (Volume 2).

Chapter 6 : Discussions and findings

Whilst the conclusion of chapter 5 detailed a number of significant findings from the Cross-case study, this chapter takes this further as it recaps the

problem and how the research responds to this, both in an Academic and Industrial sense. It poses the question as to the success of the enquiry response and in turn answers this. Further observations are made against the two related pieces of research regarding the subject matter as well as the propositions formulated earlier; this research's findings against these items are discussed.

It goes on to describe the findings from all aspects of the enquiry and discuss them under the thematic headings as well as other aspects that arose from the fieldwork and its analysis.

Chapter 7 : Conclusions

This chapter reflects on how the research contributes to knowledge; how it had identified the gap for the enquiry and that this gap has been closed. It also notes discrepancies identified alongside noting limitations considered and discussed. It discusses *current* considerations given that the research was concluded in significantly troublesome times in regards how the construction industry (as well as the broader environment) has been impacted by global and national issues.

Chapter 8 : Recommendations

Following the output from the research, this chapter makes comment on the potential future direction of research in the area of collaborative procurement of buildings highly reliant on building services, and other connected subject matter. It also discusses the implications for practice in the same areas and how a number of the findings might be generalisable beyond the immediate scope of the research.

It also comments on the researcher's view of the Professional Doctorate approach and notes their own experience on the process.

1.2 Personal Biography, Professional Doctorate choice and journey

“Construction Economics is a sufficiently unusual specialization that it may often be interesting to know how and why each of its practitioners came to it”
(Chang, 2015, p.92)

I came to the Construction industry from an entirely different background (Terrain Analyst in the British Army and Photogrammetrist) and initially was looking for involvement in an industry producing tangible *products* and legacy. I have been fortunate to be specifically involved in the Building Services aspect of projects. This area of the industry is widely seen as being more complex than other aspects of construction, leading to an increased probability of confusion, conflict, and potential failure.

It was also apparent that the scope for conflict generally in construction was high and, in my view, detracted from delivery. It is a view that appears prevalent throughout literature in this field. The conflict aspect was not one that I had considered when deciding to change career. With the inherent complexity and relative paucity of knowledge, it is my view that research around the use of early collaborative approaches in the procurement of buildings services would be a rich seam to mine.

I was originally aspiring to make a significant change to the manner that buildings with a high degree of building services are procured, in order to deliver better “value” outcomes for Clients. It was initially a business-driven aspiration, with my Employer and I looking to create a *Unique Selling Point* in collaborative procurement leadership in Scotland (primarily) and wider if success dictated. As Chynoweth (2013a) says, I was seeking to carry out research which would contribute directly to my professional role by developing my practical knowledge in an academic setting.

This aspiration has been somewhat tempered by the realisation, stemming from the literature review undertaken in support of the Preliminary Study, that despite the documented narrative on the benefits of collaborative procurement

there has been little success in systemic collaborative practices and therefore less advancement in the Construction industry improvement agenda.

The aspiration was also tempered by the guidance of the Academic staff involved in the Professional Doctorate Workshops. They advised that the scope of the original research outline was likely to be too exhaustive and unlikely to be achievable in the context of the model's limitations. The conclusions of the Preliminary Study had indicated that there are high degrees of "context" inherent in the subject matter, and I was unclear how this could be decontextualized in order to be able to study the subject in the way I had outlined in the original research proposal. Therefore an alternative methodological approach was investigated and adopted which could better deal with the context-rich environment of the research, but one that still sought to generate explicit knowledge and deliver practical outcomes.

The proposal had indicated the use of Action Research, with an Action Learning Set as the vehicle for affecting change and facilitating the research outcomes. I was unsure if this would be an appropriate way to progress.

However, with the subject matter being at the heart of my professional work practice, there were a number of events which aligned and led to a re-focusing of the research direction.

Firstly, it is noted that, despite the outlined potential change in research direction, one of the recommendations from the Preliminary Study was;

- *Seek to develop an opportunity with public sector Clients to utilise one of the recently published construction strategies on live projects, incorporating the learning from this.*

I am a Consultant Quantity Surveyor and have the City of Edinburgh Council (CEC) as one of my Clients. I am, as part of a team, delivering a number of projects through their frameworks. The first case study project is the first in a number of Primary Schools, which was undertaken as a *Traditional Work*

Package Procurement from their Framework. On starting the construction phase, it was obvious the project could have been procured through a more effective model. The Project Team and the appointed Contractor undertook to work collaboratively to deal with a number of issues arising. The Project Management team and I agreed, on the basis of my ongoing research, to look into advising CEC on a more collaborative model of procurement for the next three primary schools. This alternative approach review was undertaken by myself and incorporated elements of *two-stage open book* and *cost-led procurement*. It was also agreed that I would undertake a review of the ongoing project to highlight the issues surrounding the procurement approach. The proposal to procure three further schools under a more collaborative approach was, arguably, the most significant practical action undertaken following the Preliminary Study outcome; it is fundamental to this research.

I provided alternative procurement proposals, based on an element of experience and the output from the Preliminary Study, by way of a paper issued to the pertinent members of CEC (Procurement department, Senior Responsible Officer (SRO), and Project Officers). The proposals were accepted, with the SRO advising that this approach should be utilised for the next three Primary Schools (rather than carrying out a trial project initially), and that I was to provide an outline guidance note on the approach to be followed.

The documentation relating to my advice provided to the Client Team is in Appendix A. The documents are;

- Alternative Procurement Approaches (Dated December 2017)
- Procurement Outline Approach (Dated February 2018)

Alongside, and in light of, this, my Research Supervisor noted in a supervisory meeting that the *Action Research* approach might not be the best vehicle, as a specific method, to undertake the research, as it may be difficult to “stage an intervention” or fashion a change through this research medium. The possibilities of carrying out case studies of buildings with a high reliance on

building services and undertake a cross-case study analysis was investigated alongside this.

However, an intervention had been made, in that the alternative procurement proposals stem from (in part) the research carried out in the Preliminary Study. This lent itself to the Action Research previously touched upon or potentially an Action *Learning* outcome, and therefore required considering within the methodology assessment.

The programming of four Primary Schools, all with circa 30% of construction costs assigned to Building Services, which aligns with the programme of research is noted as being particularly serendipitous, on the basis that the Preliminary Study outcomes and subsequent intervention as part of the research had an impact on my working practice and my professional service.

The methodological research pathway is summarised in Figure 3.10.1 (refer chapter 3) but as the development of the enquiry was impacted by a number of factors outlined above, so the flexibility of a suitably considered research approach adjusted, as necessary. However, the fundamental of any doctoral research had the stable foundations of aim, objectives, theoretical positions, research questions and the like, and so the enquiry as a whole was able to be undertaken, despite some significant practical considerations driven by internal and external factors.

The motivation to “make a difference” remained a significant driver, and this is further enhanced by the practical application of this research. I believe there will be addition to the Academy’s body of knowledge regarding Building Services procurement, an area noted within the review of existing evidence as being underrepresented.

1.2.1 Why Primary schools?

The researcher suggests that Primary Schools are considered suitable research subjects on the basis that they have significant reliance on suitably designed and operated building services. Their function requires them to be

suitably ventilated, heated and lit (to exacting standards), with curricula delivered over increasingly complex IT.

It is acknowledged that Primary Schools may not be the most highly serviced buildings, but utilising these for a study in regards reliance on building services is valid.

Utilising the RICS's BCIS database, randomly selecting (apart from analysis #32619, which is Case study 0) Primary School analyses of a similar floor area to that of Case study 0, and taking the re-based average of the building services cost as a percentage of the construction costs, gives us an average of **36%**. With this aspect being over a third of the overall value (of school projects), proportionally higher than other singular elements or

BCIS analysis reference	Building Services as a % of construction cost
#32619	31
#32493	29
#32496	48
#32391	38
#32495	35
#32390	33
#32565	35
#32336	40
#32002	33
#31951	35
#32237	37
average	36
<i>from BCIS (RICS)</i>	

Table 1.2.1 BCIS reference school projects

sourced work packages, the importance of understanding the issues surrounding, and the undertakings of delivering, the building services appears to be key to potential success. Add to this that the building services are arguably the most complex aspect of the construction activities, that they require a high degree of supply chain design, co-ordination and best practice advice from delivery agents, and it seems self-evident that this area of construction attracts research in to its efficiency and requirement-meeting attributes. A similar analysis to above notes that, comparatively, New Build Hospitals would have **43%** of the construction costs for building services, and Scientific research facilities **44%**. Generalisability in this enquiry's outcome is likely, and if this is so then these types of facilities could benefit from findings.

1.2.2 The perceived problem

The premise of undertaking research through practice is to deal with a particular issue to generate outcomes in the professional field by making implicit knowledge explicit using academically accepted techniques supported by both practical and academic evidence (Chynoweth, 2014) .

The problem outlined therefore is that the nature of procurement of schools, and particularly of the building services element, may be considered sub-optimal without early engagement and collaboration from those involved in delivery, from Client to Building Services Subcontractor and specialists. This may then lead to a low opinion of the construction industry from those client bodies engaging to deliver education facilities, with a similar view on their ability to attain value for money in these projects.

Whilst there will be some excellent examples of school project delivery, the nature of the construction industry, and the practitioners involved, is likely to perpetuate the outlined issue and there are likely to be sound reasons for carrying out procurement in a more collaborative way.

The review of the relevant literature later in this thesis supports the essence of the problem described, and in addition a potential *gap* is identified between Practice and Academy in the wider adoption of collaborative procurement methodologies.

1.3 The *gap* between industry and the Academy; a *Practitioner's reflection*

Whilst undertaking review of existing evidence it was noted that a potential gap between industry practitioners and the Academy existed. Pinsent Mason (2016) state that there is a wealth of published commentary on construction collaboration, but minimal written guidance on practical or commercial issues in relation. My own experience is that some in the industry, apocryphally, consider the academy output somewhat irrelevant and not actionable in practice. Chynoweth (2013a) notes that the manner of how the research in this field is approached, including over simplicity or pre-occupation with the academic audience, may be a barrier to potential inclusion of key

stakeholders within industry. In a parallel way, there are those in the Academy that reject the input from industry research as potentially lacking the rigour of a more scientific approach. Where positivist epistemologies predominate, with the idea that a single, scientific, reality is observable, the notion that there are elements of *messiness* or multi-factor variation having influence on academic response may attract derision. However, the availability of various methodologies, forms of data, and multi-evidential triangulation adds weight to the argument for a study that crosses the academic-industrial divide, and is a model that is widely adopted in other fields of study (e.g. management theory studies, organisational psychology) (Hodgkinson & Rousseau, 2009). Chynoweth (2013a) observes the lack of co-authorship of research and conference papers and attendance at built environment research conferences by those from industry. He also states that the production of knowledge that meets the needs of both the academy and industry aligns with the concept of “actionable knowledge”.

Attempts at closing the “perceived relevance gap” (Chynoweth, 2013a) and introducing industrial relevance into studies to provide a research-based contribution to practice (Bourner, Bowden & Laing, 2001) has led to a diversification of research programmes to meet the needs of a changing social, political, and economic atmosphere, allowing increased primacy to practice knowledge (Costley, 2013). Increasing acceptance of the workplace being able to be central to specific applied knowledge creation, along with the changing motivations of those practitioners striving for doctoral studies, has led to an interchange of some features from PhD’s being found within alternate doctoral programmes (and, significantly, vice versa) (Costley, 2013), and a propagation and rapid broadening of doctoral level programmes (Boud & Tennant, 2006) being introduced alongside traditional PhD programmes and their regulations, mind-sets and systems (Costley, 2013), even though some harbour suspicions that these alternatives are not as rigorous as conventional PhDs (Costley, 2013) (Costley & Lester, 2012). These

alternatives include Professional Doctorates. There is acknowledgement that knowledge of this nature is crucial to delivering in dynamic markets and is not only derived from universities, but other centres such as industry, government, and consultancies (Gibbons, Limonges, Nowitny, Schwartzman, Scott & Trow, 1994). Others offer the idea that it is experience rather than reason that provides for robust knowledge (Oyegoke, 2011), and Practitioner Research is perhaps central to the carrying out of high quality scholarly research within the tenets of practical relevance (Hodgkinson & Rousseau, 2009), to attempt to close that gap noted. Given, as Chang (2015) notes, that funding availability largely drives levels of academic research and that the construction industry's low levels of innovation and underperformance are a factor in its lack of attraction to amounts of funding commensurate with its national economic contribution, it may be that practitioner research, with less reliance on direct funding, offers a suitable augmentation to the academy.

The modern practitioner performs in the midst of the most up to date knowledge, be that applied knowledge or otherwise. So the best industry practitioners should have a foundation of theoretical knowledge, and further those with the highest of qualifications should be the most effective. By introducing academic rigour to a practitioner's arsenal, they are able to develop their industry in a much more systematic manner (Fulton, Kuit, Sanders & Smith, 2012). The identification of problems and the highly contextualised application of scientific principles affords the learner-practitioner a more mindful approach to practice, with evidence that the academic approach is transferred into their working manner in a positive way (Hodgkinson & Rousseau, 2009). It is, however, acknowledged that it can be difficult to pinpoint an *exact* contribution that a specific research project is able to make in practical application (Chynoweth, 2013). It is commented that there is a significant lack of practical guidance on team working and collaboration for the industry (Pinsent Masons, 2017).

For practitioners in the Built Environment with highly contextual backgrounds (Costley, 2013) a PhD, with its disciplinary narrowness (Bourner *et al*, 2001),

rigour and potential inflexibility, may not meet their needs to attain doctoral level recognition for their profession-based aspirations and to lay out their credentials as a leader in their field (Costley & Lester, 2012). Whilst rigour requirements should not be glibly rejected (Oyegoke, 2011), the widening of the doctoral level pedagogy, deploying diverse, not necessarily academic based, learning materials from the practitioners area of study allows for a relevance which their field may call for in order to place them in esteem (Boud & Tennant, 2006), essentially meeting career and academy needs of these practitioners (Bourner *et al*, 2001) (Costley & Lester, 2012) and the wider demand for specialist knowledge generally (Gibbons *et al*, 1994) with the research providing a difference in the practical field (Chynoweth, 2013). It is argued that the applied sciences, in which Built Environment research resides in order to be relevant, are richer than the pure (natural) sciences in application, though poorer and less deep in regards theorem, but that the over-arching theories are not that distinct (Bunge, 1966). Applied knowledge, in the context of research into practical application should not necessarily be seen as being generated by external influencers, but understood as being embedded within, and inseparable from, the activities of the practitioner (Chynoweth, 2013a). In the field of the Build Environment, where the research is of human-made, human-derived, objects or phenomena with significant influence of context and history (Hodgkinson & Rousseau, 2009) it is acutely more important to ensure the gap between researcher and practitioner or built asset users is narrowed.

To ensure this, the *language of research* must be grasped by the practitioner-academic in order to parley in the academic field and display rigour and clarity in all that is written. A lack of this fundamental understanding may lead to mis-categorisation of research approach and undue complications in process (Koskela, 2008) or the inability of the practitioner-academic to author in the correct textual conventions, thus failing to legitimise their professional expertise as academic knowledge (San Miguel & Nelson, 2007), for it is argued that it is essential to tie practical problematic solutions to the

underlying body of theory (Oyegoke, 2011) according with the philosophies and methods of the class in which they reside (Chynoweth, 2013).

The underlying knowledge of the theory of the practical application improves the chances of that application being carried out correctly, and then that correct application can lead to a greater understanding (Bunge, 1966), with the resultant contribution to practice being underpinned by appropriate and recognised knowledge (Chynoweth, 2013). Thorough, rigorous, research by practitioners, rather than limiting this to scholars alone, can provide more diverse knowledge targeted at application for practice, and tends to meet the relevance requirements to a greater extent (Hodgkinson & Rousseau, 2009).

The UK's Quality Assurance Agency for Higher Education state that, typically, holders of doctoral level qualifications will be better able to make judgements on complicated issues, have enhanced communication skills, and provide greater contribution to the development of their specialised fields through new approaches. In addition to this they have significant, high quality, transferable skills which makes them eminently more capable to respond autonomously in their professional role (QAA, 2014). This enhancement in their conceptual thought processes transforms their application in practice and translates into improved action (Fulton *et al*, 2012). This development of partnering between academia and practice, bolstered by the appropriate training in the academic rigour, can meet the mutually beneficial requirements of usefulness without eroding the needs of either (Hodgkinson & Rousseau, 2009).

An initial review of evidence tends to link enhanced collaboration with improved project performance and yet there is no correlative evidence of large-scale adoption of wholly collaborative procurement arrangements. It is here that the "gap" that this research looks to investigate is positioned. This is equally relevant in the specific area of Building Services procurement where there is a gap in itself within the available evidence. The building on what is already known through utilisation of the relevant practitioner knowledge,

avoids potential industrial criticism of the academic, and artificial in this context, starting position of “feigned ignorance” (Chynoweth, 2013a). There is still a requirement to fully identify the problem, but there is no requirement to ask if there is a problem initially; Both academy and industry agree there is.

Hodgkinson & Rousseau (2009) note “the need for ongoing attention to knowledge transfer” and to learn from studies into this transfer between practitioner and researcher, and the networks and collaborations. This ostensibly summarises the research being undertaken, in that it is looking at networks, the level of collaboration as well as knowledge transfer and that it is being undertaken by a researcher-practitioner which comes with its own degree of knowledge transfer. In this way, this research hopes to fill an element of that gap between Industry and the Academy, as well as within the area of collaborative procurement of Building Services. Chynoweth (2013) notes that the focus of research that wishes to advance operationally significant knowledge *within* practice must be concerned with the *nature* of that practice; this research looks at the nature of the subject matter primarily and is informed by the practice it studies. Taking Chynoweth’s (2013a, p.9) description of “practice-informed research” as being research;

Which defines its purpose primarily in terms of the immediate practice needs of once of the built environment professions, rather than by reference to the policy, theoretical or other concerns of the built environment academic discipline; and

Which uses the researcher’s experientially gained professional practice knowledge and understanding as a methodological device, both as direct and legitimate source of data, and also as a tool for enhancing the quality and insight of the analysis.

It is hard not to argue that this summarises the manner of this research.

1.4 Research Aim, Objectives and Research Questions

1.4.1 Aim

The aim is;

To investigate how the factors of collaborative procurement of building services affect the delivery of “Client defined value”.

The “factors” noted above are drawn upon within the existing evidence review and the most significant were then investigated in the fuller research.

The issue of decontextualizing the research has been addressed in presenting the Aim, in that it includes the elements of context highlighted within the Preliminary Study. *Embracing the context* of the subject matter emerged from discussions held at one of the Professional Doctorate Workshops. It reflects the position of the research in embracing the tacit, *context rich*, knowledge of the practitioner and is somewhat removed from a more scholarly approach where context and experience are attempted to be removed from the enquiry (Chynoweth, 2013a).

In practical terms, the research, reflecting the researcher’s professional assertion that conflict within project delivery teams leads to poor outcomes, looks to investigate how the factors of collaboration can be determined, reviewed, and ultimately improved. The Pinsent Mason (2017) report on Collaborative Construction put it succinctly when it stated the industry “contracts for failure, rather than success”.

1.4.2 Objectives

Research Objectives should be specific tasks that will be undertaken within the research and be stated clearly as intended measurable outcomes (Gray,

2009). They should be key to achieving the Aim, be tangible, and be able to be “ticked off”.

Table 1.4.1 outlines the objectives, explains the reasoning to expand on the research rationale, and advises measurability as Gray (2009) states objectives should be measurable. The objectives also describe a sequential timeline of requirements for the research programme. These objectives were identified relatively early in the process through an outline preliminary literature search and overview, in part, testing the researcher’s own observations as a practitioner in the field.

1.4.3 Research Questions

The direction of the overall research and the definition of the investigation is formulated through a number of research questions or propositions; these help to establish boundaries (Gray, 2009), and define limitations of the research. These research questions are fundamentally linked to the research philosophy, the information sought, and even how it is to be attained, and can be considered the most important step taken in a research study (Yin, 2003).

The purpose of the research questions is to focus on topic or topics, define potential questions with the research tool used, guide areas of reading or who should be the focus of potential questioning. They help with the planning of the research model and ultimately, if authored well, direct what exactly it is the research seeks to answer; what knowledge is to be constructed (University of Oxford, undated). They can be open and explanatory and are described as essential as they are used in defining the enquiry, setting the bounds of the research so that it does not become unmanageable. They direct the researcher or other research staff engaged, and perform as the frame of reference when undertaking key areas of the fieldwork or during analysis of outcomes (O’Leary, 2020).

It is recognised that whilst the initial research questions are posed, they may be redrafted, amended, or added to as the research develops (Gray, 2009).

This is particularly pertinent in research of this nature.

	Research Objective	Explanation	Measurability
1	To conduct a focused, contextual, literature review in the key areas of Trust, Early Engagement, Supply Chain involvement, Building Services, Knowledge transfer, Social Network Analysis.	Preliminary review undertaken for first element of research model; then extended. The key areas mainly stem from the preliminary study, along with an area of research which the author believes is a suitable vehicle for analysis. The extended literature review should provide clear themes/propositions for the research to be undertaken around or to test.	Yes, the review is fundamental to the research generally, will inform the follow on phases of the research, and should have a degree of triangulation with the findings and conclusions
2	To design a suitable research strategy and identify research methods to investigate behaviours within teams, which affords the research to take advantage of the active involvement of the researcher on 4 Primary School projects.	Whilst the industry position that the Author finds himself in lends itself to Case Study Analysis (with a degree of Action Research), a comparative analysis of potential research strategies should be investigated.	Yes, the outcome of the assessment of research strategies will be the defined approach.
3	To investigate how trust might impact on collaborative behaviours in the procurement of Building Services.	Trust was noted as key factor from the preliminary study outcomes and the effect of trust relationships within collaborative teams is seen as essential. The Author has read on the subject of Social Network Analysis and believes there are opportunities for its use in this research	Yes, the research will be designed around this investigation and the outcome provided within the thesis.
4	To examine how early engagement of the Building Services supply chain impacts on delivery of Client defined Value.	Further key factors identified in the preliminary study and forming part of the advised procurement approach to be utilised in the upcoming school projects.	Whilst the method of analysis is yet to be determined fully, by comparing the first school with the following schools, the impacts should be measurable.
5	To understand how defining Client value might have an impact on project delivery.	The definition of value by the client is nominally the measure of a successful project. This includes the procurement approach delivering to their requirements.	The analysis of comparables (approach to be defined) will provide an outcome within the thesis and is therefore measurable.

6	To analyse the research outcomes in order to offer conclusions and recommendations for potential improvement	The out turn of the research will be a number of observations on the subjects being considered. There may also be a degree of industrial commentary on the practical outcomes of the application.	Yes, the successful award of the Professional Doctorate following validation.
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Table 1.4.1. Research objectives

The initial research questions posed in the Preliminary Study stage of the research were;

- What are the commonly perceived issues with construction projects where early engagement and collaboration is not undertaken? (Exploratory and Descriptive)
- Does the literature indicate that there are further issues in regards building services procurement? (Explanatory and Normative)
- What other themes are prominent in the literature in regards the area of research? (Exploratory and Descriptive)
- To what extents do Quantity Surveying or Commercial practitioners agree with the common themes derived from the literature? (Exploratory and Correlative)

The response to these initial research questions is discussed in Chapter 4.

The outcomes from the Preliminary Study then enabled a *re-focus* of the overall research and the research questions posed as the central emphasis of the research are;

- How do levels of Trust between project actors impact on project delivery? (Exploratory and Descriptive)
- How do the levels of trust affect the transfer of key project knowledge? (Exploratory and Normative)
- How do different actors' perceptions of the levels of trust between them and the other team members affect intra-project relationships? (Explanatory and Normative)

- How does the level of definition of Clients' value objectives impact on the performance of delivery teams; how does it impact on their ability to collaborate effectively? (Explanatory and Normative)
- How does collaborative procurement of building services affect projects "Client defined value" outcomes? (Exploratory and Descriptive)
- How might the *designed intervention* (the advised procurement approach) have an impact on the case study projects under consideration? (Exploratory and Correlative)

The nature of the questions are also noted above to assist the determination of the placement of the questioning in an appropriate research paradigm or methodology and understand how these relate to the case study design approach.

Exploratory, in this sense, aligns with what Gray (2009) describes as being useful when deciding if something is *worth researching*, discovering what is happening. It is about *understanding*, rather than explaining. He states that exploratory studies can be carried out through use of literature review, talking to practitioners, or conducting Focus-groups or interviews.

Explanatory questioning looks to try and explain what the information is accounting for within a study. Concerned with what is as existing.

Descriptive questions seek to ask what is currently happening or has happened.

Normative questions look to see how what is happening compared to what *should be* happening. Concerned with what *ought to be*.

Correlative questions look to interrogate the relationships between variables and the strength of these.

(Gray, 2009) (Chynoweth, 2013)

1.5 Overall Research Approach; methodology outline

In line with the researcher's broader aims in making a more sweeping change within the industry, the Preliminary Study started out with a more widespread consideration. This Focus-group study was designed, following initial review of existing literature, to review the factors which appeared to have a higher degree of relevance to the subject matter in the areas of Construction procurement failings, the complexity of Building Services, Collaborative procurement methods, procurement improvement leadership, and construction industry improvement direction. This was within the overarching paradigm of the original research approach of an Action Research methodology.

The outcomes of this *funnelled* the research to a more focused assessment of factors for the second phase of the research and was supported by continued review of literature. It became clear that the initial aspiration for the research, being the *significant change* to the industry through an Action Research intervention, was unlikely to be achieved and so the research developed to be more exploratory and to determine the contributory factors involved in collaborative procurement models and related elements. But an intervention was actioned from the output of the initial phase, by way of practical advice to a client body.

Likewise, the research methodology evolved as the timeline continued and sub-outcomes presented themselves. Whilst the Preliminary study was undertaken within the auspices of Action Learning / Action research, the continued study was undertaken through the medium of Cross-Case Study Analysis; which in itself led from the Action Research intervention.

The case for the Preliminary Study having been effective in its own right is clear; in that the outcome of the initial study *affected* a change made to procurement of 3 schools by the Client due to the recommendation made. A recommendation made partially on the basis of the review of existing literature and the Focus-group outputs (the Action research), as well as experience. Figure 1.5.1 attempts to briefly describe this overall research approach.

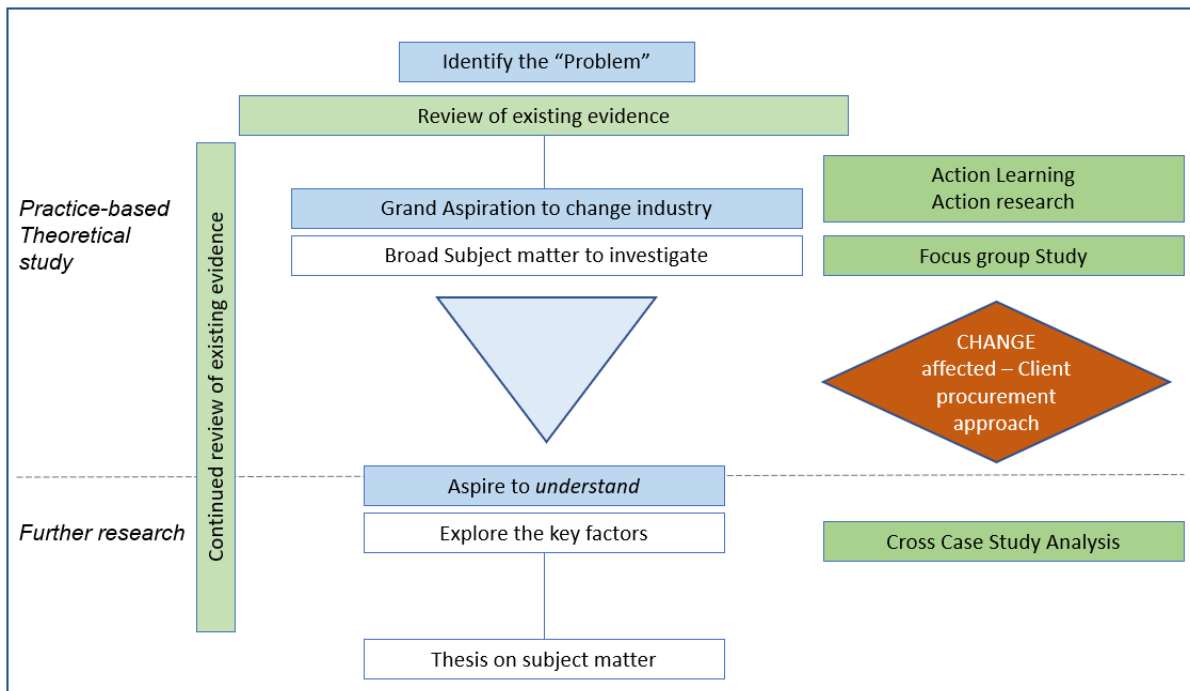


Figure 1.5.1. Overall Research approach

Within the framework described in Figure 1.5.1 it is important to highlight that at the point of transition from Action research to Cross-case study analysis, the “*aspire to understand*” element was focused around the key, but developing, factors and the propositions that emerged from the existing evidence and the Focus groups. The key areas being collaboration approaches, procurement of building services, knowledge transfer, professional relationships, client defined values, and (emergently, but significantly) trust relationships in a project team setting. The case study design responded to these factors in order to test and explore same throughout the second phase of the research. They also finalised the view on the “Unit(s) of Analysis” which responded to the outcomes of the Action research phase also.

2 REVIEW OF EXISTING EVIDENCE AND LITERATURE

2.0 Review undertaken and its development

The key outputs from the original review, being the themes discussed within the Preliminary Study, are synthesised initially and then further reviewed. The full discussions resulting from the initial literature review and the Focus-group discussions are included in chapter 4.

2.1 Evidence review and synthesis

2.1.1 Defining the scope of the review

At the outset, the following key areas of existing literature were reviewed;

- Industry and Client perceived failings of construction procurement, and how the industry has performed in this regard
- Historic approaches to general construction procurement
- Building services; their complexity and procurement approach
- Collaborative Procurement methods
- Procurement improvement leadership
- Current industry direction for improvement

Following the outputs from the Preliminary Study, further key areas were also reviewed. These are

- Trust, *generally*, and amongst construction practitioners
- Inertia of willingness to be involved in collaboration
- The sharing of knowledge

The following areas of research are not generally being reviewed in a deeper context;

- The definition of what constitutes *Client Value*; albeit the very definition of value is critical to potential improvements (Pinsent Masons, 2017); a Thesis in itself.
- Building Information Modelling (BIM); arguably a key driver in advancing collaboration and co-ordination but excluded as a discrete topic for review. One commentator notes that whilst BIM is a useful tool which benefits from collaboration, it does not necessarily change the collaborative behaviours automatically because of its use, and that some elements of the sector see it adding more cost rather than value (Pinsent Masons, 2017).
- Mathematical and analytic procurement selection models
- The main construction contracts or associated case law in relation to how the implications of the outlined themes may be impactful or contrary.

2.1.2 Industry and Client perceived failings of construction procurement

Construction is considered essential in national economies (Chang, 2015) and a key industry sector with importance on the nation's development (7% of GDP noted in 2011 (Cabinet Office, 2011)) and infrastructure requirements, as well as supporting growth of other sectors (HM Government, 2013). However, there are many instances of commentary on construction's failings, on how it needs to be improved, and on under performance. Court (2016) states that there have been *no fewer than 75 reports* on the construction industry going as far back as 1934, and asks when will a change be affected permanently? It is an industry categorised by its market failure (Farmer, 2016) and an unimpressive track record which the World Economic Forum (2016) attributed to a number of factors including persistent fragmentation, inadequate collaboration with supply chains (Fulford & Standing, 2013) and insufficient knowledge transfer between projects. One of the most recent publications from government, repeating Latham (1994) and Egan (1998), identifies specifically that the lack of collaboration is an industry-wide failing, and that the industry is not learning from projects due to the fragmentation of

the team, post completion (Edmondson, 2016) (Khalique, 2021)), as well as the differentiation and division of activities, with a focus on short-term performance being a constraint on improvement (Bresnen, 2013) which should be abandoned (Constructing Excellence, 2009). Its laggard productivity output has been widely commented on and significant improvements in various aspects of its operation have been subject of numerous publications (Fulford & Standing, 2013). Construction 2025 states that the construction industry in the UK is more fragmented than those in rival countries' (HM Government, 2013). This includes the Client base which the industry serves (HM Government, 2013), compounding the issue. It is worth understanding that Construction 2025 is a *partnership* between the Engineering and Construction industry and the UK government with the goal of delivering transformative improvements.

There are many instances of construction's successes, but these are under reported. The body of criticism far out-weighs the body of praise in this regard. For every London Olympic Park delivered on budget and on time through an innovative partnership between the industry and Government (HM Government, 2013), there are multiple Scottish Parliaments (figuratively speaking) to counter success. An industry at its best being excellent, but having significant scope for improving (Constructing Excellence, 2009). It is stated that if the industry does not change it will encounter a long-term and unstoppable decline (Farmer, 2016).

Unable to deliver repeatedly

Despite the Construction Industry being well established within the nation's economy, it is noted that it is unable to repeatedly deliver procurement solutions that provide successes, with the fragmented approach adopted making the management of processes overly complex, and leading to repeated criticisms (Masterman, 2005) (Love, Edwards, Irani & Sharif, 2012) (Vilasni, Neitzert, & Rotimi, 2014) (Mentieth, O'Carroll, Curtis & Sawyers, 2014). It is the fragmentation of the interfaces between the differing aspects of

design, construction, and use that lead to the resolution of issues being undertaken in a defensive and adversarial philosophy (Holti, Smalley & Smith, 2007). The divisive and fragmented nature of construction leads to complex and conflicting problems arising repeatedly (Cheng, Li, Love & Irani, 2003). Fragmentation is stated as one of the root causes depriving construction practitioners of the skills required to develop effective collaborative relations (Jelodar, Yiu & Wilkinson, 2016), and noted as a factor in the construction industry's inability to deliver fully to Client requirements (Latham, 1994) (Egan, 1998). This could be due to poor co-ordination of all parties stemming from inadequate initial communication (Gluch, 2009). Clients should be detailing their specific requirements with greater clarity before entering into procurement arrangements and have the project out-turn as part of these considerations (Pinsent Masons, 2017). Measures of success may be abstract concepts with no widely standardised definition (Zhang & Fan, 2013), so Clients need to be precise. Lack of this precision ultimately leads to delivering poor performance (Jelodar *et al*, 2016), and related criticisms. It is also stated that this is exacerbated by Client requirements being notoriously hard to define, with elements of ambiguity, opacity and inaccuracy, and that wider stakeholders sometimes have conflicting requirements which stretch the brief, and the ability to meet it, to breaking point (Taylor, 2020) which means collaborative activities become more difficult (Pinsent Masons, 2017). Farmer's (2016) report on the construction industry re-emphasises fragmentation, lack of collaboration, and lack of improvement culture as some of the 'symptoms' of failure. It is clear that the industry requires change and how it is perceived by Clients and the public (HM Government, 2013). Farmer (2016) also states poor industry image as another 'symptom'.

Not getting procurement right?

Some construction Clients openly state that the industry appears to be incapable of offering repeatedly successful procurement models (Tookey, Murray, Hardcastle and Langford, 2001) with the inappropriate selection and

offering of these models being established as one of the industry's key failings (Bowen, Pearl & Edwards, 1999) (Dissanayaka & Kumaraswamy, 1998) (Olanrewaju, Anavhe, Abdul Aziz., Chen, & Han, 2016). Prospective project failures leading from poor, or ill-informed, Client decisions on procurement can stem from the industry's inability to align Client drivers effectively with best practice advice and reasoned procurement rationale (Luu, Ng, & Chen, 2003a) (RICS, 2013) (Watermeyer, 2012).

Some state that those Clients that are reluctant to undertake procurement that differs from their traditional approach, may change their deeply rooted stance in this regard if consultants were to edify Clients on the potential benefits of adopting alternative models (Mosey, 2009). It is recognised that changes in procedural conduct and attitudes are needed to increase Client satisfaction (Ofori, 2012), better the likelihood of project success (Vennström & Eriksson, 2010), and that this adjustment in Client's attitude reinforces the improvements through connecting design and production (Cornick & Barre, 1990) (Cole, 2017) and the practitioners involved.

Bowen *et al* (1999) found that Clients appeared to consider themselves to have a higher level of knowledge of procurement than their professional advisors perceived that they had. This may derail practitioner advice, should there be a Client perception that the Client already "knows better". It means that those practitioners who have a wider knowledge and experience of alternative solutions (whereas the Client may not) might not be able to convince the Client. Even when there is convincing evidence which proposes alternative approaches, changing attitudes of those who perceive they are better informed and have familiarity with a procurement method (Arain, McFarlane, Mah and Zahed, 2014) (Jayasuriya & Rameezdeen, 2011) is difficult (Mosey, 2009). Eriksson & Westerberg (2010) support this, stating that Clients, particularly those with experience, tend to opt for procurement strategies that they have the better understanding of, even if project specifics may dictate a different approach is more suitable. Others say that Clients' previous experience is doubly more likely to affect a procurement decision

than their own consultant's advice (Bowen *et al*, 1999). And whilst some argue that this manner of Client feedback is useful in selecting procurement methods when project specifics are considered analogously (Lam, Gibb & Sher, 1997), the poor positioning of the Client/advisor relationship noted above may lead to the assertion that some procurement selection is considered lacking in logic and discipline, hap-hazard, and ill-timed (Lam *et al*, 1997) (Masterman, 2005) (Luu *et al*, 2003a).

Further to that contention, Ambrose and Tucker (1999) stated that the majority of construction Clients, whilst being satisfied with their current procurement system, were wholly dissatisfied with their previous procurement systems. This intimates that Clients are willing to make a change in how they procure buildings if they are not satisfied with the offering. For alternatives to be considered, construction professionals will be required to provide the correct and relevant information, providing the opportunity to make this change.

However, there is criticism in some areas of the predominance of policy and compliance over real development and collaboration in procurement selection (Meehan & Bryde, 2010) and that there is minimal collaboration or cross-functional cooperation with the entire supply chain (World Economic Forum, 2016). The solution, some say, is to deliver change through performance-based selection of team members, collaboration and communication (Jelodar *et al*, 2016). The effectiveness of communication in itself is a factor of the building of trust relationships and of the ability to collaborate successfully (World Economic Forum, 2016). Policy initiatives should consider how the professionals who are to deliver solutions work and how they view potential implementation (Bresnen, 2013). Court (2016) asks, pertinently, if collaboration within the industry needs a re-imagining to deal with criticisms and flaws.

Complex procurement landscape and working together

Procuring built assets is framed in an environment where there are multiple procurement choices (Jayasuriya & Rameezdeen, 2011), yet the industry is

roundly criticised for using only a very slender range of those available (Meehan & Bryde, 2010). With a market that is arguably at its most competitive following a damaging recession (as at 2019, prior to the COVID-19 impact), with financial limitations being more acute due to economic uncertainty as a factor of the impending (as at 2019, prior to BREXIT being enacted), exit from the European Union, and with Clients' attitudes to risk changing, there is clamour for effective procurement strategies to be available for delivery (Ambrose & Tucker, 1999) in an environment of complex choices in the models for that delivery (Construction Innovation Hub, 2020).

Within this complex setting and despite the literature recognising that procurement is a crucial function of relationship setting between the Client, the team, and the contractor (Pesämaa, Eriksson & Hair, 2009), misunderstandings of the best approach to procurement still arise regularly and have negative effects on performance of practitioners. This is compounded when procuring the designers and constructors of building services (Marsh, 2003) as it is perceived that some practitioners do not have the required knowledge or appropriate skills (Olanrewaju & Anahve, 2015). The poor perception of performance is, in some parts, considered a factor of contract-based approaches to procurement (Goodier, Soetanto, Fleming, Austin & McDermott, 2006) (Hasnain & Thaheem, 2016). Even the best performing construction relationships are generally formulated and governed through contractual arrangements (Jelodar *et al*, 2016), although Construction 2025 states that the UK Construction industry has a good reputation for collaborative contract forms (HM Government, 2013), an example being the NEC suite of contracts. The suite reflects government priorities and continued evolution of their processes for collaboration (NEC user group, 2017). They note the need for procurement methods to evolve and improve, involve early contractor integration, and the drive for collaboration. The act of collaborating improves the practical relationships within the contract frame and encourages improvements, rather than focusing on litigation and liabilities (Cheng *et al*, 2003). Hibberd (2019) reflects that there other forms of contract, such as Joint

Contracts Tribunal (JCT) *Constructing Excellence*, which embrace early involvement, promotes integrated teams, require transparency and underpin collaboration. It is to be noted he was a previous chair of the JCT; however, his comments remain valid.

Procuring Practitioners

Construction, whilst being a highly technical industry, has at its basis individuals who direct and deliver projects (Strahorn, Gajendran & Brewer, 2015), with some stating that the people involved are the industry's biggest asset (HM Government, 2013) and that execution relies heavily on the expertise of individuals (World Economic Forum, 2016). It is argued that this human aspect of construction, or rather the poor performance of the practitioners, has more of an effect on project success than the selection of an appropriate procurement strategy (Dissanayaka & Kumaraswamy, 1998). Masterman (2005) states that Clients are failed by procurement practitioners and consultants in the manner of advice given regarding construction procurement, sometimes being ill-informed and inconsistent with best practice. This has a direct effect on service provision to Clients (Tassabehji & Moorhouse, 2008) and further tends to deliver poor decisions, as the basis of these are flawed (Bowen *et al*, 1999) (Masterman, 2005). Marsh (2003) and Tookey *et al* (2001) seem to agree, and further argue that whether this is done unwittingly, with bias, or through a lack of experience or knowledge, the effect remains the same. Pinsent Masons (2017) note a reluctance in industry professionals to suggest procurement alternatives where there is unfamiliarity or inexperience on their part. Taylor (2020) states that, along with an underlying current of inexperience, limited skillsets, lack of resource and time pressures can be contributory factors to disputes basically arising within projects due to poor service. There are strong links between how organisations work together and disputes arising (Scottish Parliament, 2019). It represents a significant failing in professional discipline, particularly at the complicated interfaces that construction involves (Honor, 2016). Others state

that the nature of construction professionalisation means that current practices and methods are more likely to be maintained, rather than change instigated (Bresnen, 2013).

Some state that practitioners within the industry, as well as being reluctant to change, have a lack of learning culture, and that these same practitioners are unlikely to examine their professional performance or reflect on their knowledge and beliefs (Vennström & Eriksson, 2010). Mosey (2009) articulates that some practitioners still advocate traditional forms of procurement habitually (Jayasuriya & Rameezdeen, 2011) due to their professional caution, rather than because of the proven track record or efficiencies in procurement approach. Others state that those professionals most likely offering advice are also the least likely to advocate change (Ambrose & Tucker, 1999), although they offer no corroborating evidence in support of this assertion. This is despite the fact that the UK Office of Government Commerce have said that the traditional procurement route should only be adopted if proven value for money improvements can be evidenced (Eadie, McKeown & Anderson, 2012). There is evidence that tendering on the basis of lowest cost does not equate to best value (Constructing Excellence, 2009) and that this reliance on conservative approaches to traditional models of procurement have limited productivity growth across the industry and lead to inefficient project management and further fragmentation (World Economic Forum, 2016). The predominance of the traditional, arms-length, procurement methods is being dismantled; a culture of *sharedness*, of trust-based formation, common goal congruence, and an understanding of shared goals and expectations are being encouraged (Cheng *et al*, 2003). Selection criteria needs to ascertain who is best placed for project delivery rather than who has submitted the lowest tender price; looking for longer term value with a wider remit than capital cost (Pinsent Masons, 2017).

Better provision in a complex environment

With conventional procurement going out of vogue (Mudi, 2016) the increasing complexities of modern construction procurement require practitioners to enhance relevant knowledge by being abreast of recent developments, develop their technical skillset, and ensure their competency is best suited for delivery (Tassabehji & Moorhouse, 2008). Without an awareness of the spectrum of more effective, bespoke, procurement approaches, the practitioner will likely find themselves limited and ineffective (Masterman, 2005). If, as the World Economic forum (2016) state that, collaborative approaches are critical to the future of construction, those who consider this a radical approach may need to adjust mindsets accordingly. Whilst traditional procurement methods are best suited to relatively simple projects with a lack of technical or contractual complexities and where out-turns are unambiguous (Mosey, 2009), scope being fixed and clear (Pinsent Masons, 2017), there are instances where there is complexity and still the first choice procurement model is advised as traditional. Does this then not recognise the reality that construction procurement might misalign with the real-world acceleration of change, by which Harvard Business School refer to the trend by using the term VUCA; *Volatile, Uncertain, Complex and Ambiguous* (Court, 2016). These are all potential descriptions of the Construction industry and are highlighted as significant to decision making processes for the procurement of building services. The areas of strategic planning, cost management, supply chain management and operational contexts are all subject to VUCA (Fridgeirsson, Ingason, Jonasson & Kristansdottir, 2021). Padmaja (2019) comments that the construction industry has been operating in a VUCA environment for some time, that it is part of the industry's make-up, and goes on to suggest that some traditional skills are potentially obsolete, which means that adjusting process paradigms may be required, though not blindly and not for change sake. Supply chains have laboured in VUCA environments, made more complex by recent global events such as the COVID-19 pandemic (Reddy & Kalpana, 2021).

Even before the complexity induced by recent global events, it was noted that creating project specific procurement models was favoured over the commonly understood strategies (Tookey *et al*, 2001). May it be that the best procurement approaches for complexly serviced buildings might be of a bespoke nature? Mosey (2016) states that bespoke arrangements can be seen as being expensive to implement and may be difficult to access by the supply chain. In the instances where final design and co-ordination of building services, for example, is to be passed to the contracting entity, advising a traditional or conventional procurement strategy is likely to be misaligned with the project's requirements (Rawlinson, Nugent & Dedman, 2013). Whilst most standard forms of contract do not engender a collaborative environment, making it difficult to collaborate fully (Pinsent Masons, 2017), the publishers of the NEC suite of contracts note that there is a demand for integration of teams when projects have a degree of complexity (NEC User group, 2017).

Working as a team

As well as individual performance, the dynamic of the project's team and their performance is a significant factor in project delivery (Dissanayaka & Kumaraswamy, 1998) (Love *et al*, 2012) (Strahorn *et al*, 2015). For people to commit time and energy to collaborating the subsuming of one's ego and individual objectives in place of "the team" is required; some find this difficult (Hayward, 2021). Hibberd (2019) says that there is a requirement on collaboration, in turn reliant on trust, fairness and honesty (personally or individually driven), for procurement processes to be successful. For construction professionals to promulgate collaboration, there is a requirement for broader understanding of the other professionals in a team's discipline (Beaumont, 2015). Project delivery is a team effort which requires collaboration, honesty and integrity from its members to be able to be productive, innovative and efficient (Thomas, 2019). Collaboration does not happen instantaneously and must be developed in an environment of

purposeful effort, trusting relationships and professional commonality (Smith & Robinson, 2021).

Individual reflection can assist in widening one's understanding of the issues outside of the immediate professional specialisation (Lee, 2009) and it is suggested that this understanding and inter-professional working gives rise to knowledge creation, innovation, and practical application (Eraut, 1985). Percy (2021) comments that, in addition, this good manner of collaboration will fortify intra-team relationships. When communication between team members is poor, the likelihood of success is considered to be low, as conflicts are more likely (Mosey, 2009). Trust and collaboration need to be more prevalent when conflict is unavoidable so that the parties can converse on the difficult subject matter without judgement and in a de-personalised way, and reach suitable resolution more effectively (Pinsent Masons, 2017). Vaaland (2003) notes that *some* conflict may be unavoidable, even necessary, but still advocates that it needs avenues for resolution.

Another view is that, where the nature of a construction project is diverse or of a temporary nature, it is unrealistic for professionals to base their relationship on trust (Jelodar *et al*, 2016) and that this hinders the development of necessary relationships. The requirement for trust is potentially further enhanced when new teams are formed, as those involved have no basis to attribute trust having had no past relationships with other parties (Brewer & Strahorn, 2012). This being a particularly pertinent point of noted fragmentation from project to project given that trust may only be built over the duration of a project or multiple projects (Khalfan, McDermott & Swan, 2007).

The issue around defining "Value"

If requirements are considered hard to define, then the term "value" is equally complex. There are a number of differing perspectives; Clients likely having different views. It is not the intention of this review to tackle defining "Client value". Whilst it is acknowledged that value needs to be considered against a range of broader criteria, other than simply cost (Construction Innovation Hub,

2020), Thomas (2019) provides a reasonably simple *equation* based on comments from one Richard Saxon (a founding member of Constructing Excellence), which is suitable for the purposes of this research. It states that Value is represented by what benefits a Client receives *divided* by the sacrifices they have to make to get what they want.

$$\text{Value} = \frac{\text{Benefits Derived (Get)}}{\text{Sacrifices Made (Give)}}$$

Figure 2.1.0 Defining Value (Thomas, 2019)

2.1.3 Construction procurement and its complexities

It was stated by Dissanayaka & Kumaraswamy (1998) that a significant proportion of the existing literature appears to agree in regards construction procurement being increasingly complex with complicated “*components and inter-relationships*” (Goodier *et al*, 2006), due to projects generally being unique in nature, constrained by (sometimes unrealistic) programmes, and lacking in certainty for a number of reasons. This uniqueness in itself creates elements of uncertainty and risk (Brewer & Strahorn, 2012), due to different Client characteristics and requirements (Ng, Luu, & Skitmore, 2005). There are difficulties in establishing a pan-industry consensus on virtually all aspects of construction that represents the entire industry (Pinsent Masons, 2017). Procurement generally is a constantly evolving, dynamic field, with construction procurement not only having to deal with the influence of a number of social, political and environmental factors (Goodier *et al*, 2006) (Olanrewaju *et al*, 2016) (Meehan & Bryde, 2010), but also being plagued by subjectivity (Cheung, Lam, Wan & Lam, 2001) (Kumaraswamy & Dissanayaka, 2001), indecision and vagueness. And this is carried out with only a simplistic toolbox of applicable rules which are unable to be fully defined for delivering effective procurement method selection (Luu, Ng, & Chen, 2003). The very complexity of procurement methods that larger and

more multifaceted construction projects appear to demand provides procurement practitioners with challenges above and beyond the mere balancing of Client and project requirements, the assessment of risk, and the nature of the project delivery. The considerations of the Client and their views, the location, the economic climate, the political environment, and the asset specifics, mean that what might be right for one project, may be inappropriate for another. The complicated interdependencies between issues and the stakeholders means that procurement solutions are sometimes hard to identify (Pedler & Trehan, 2008).

Early engagement, setting agenda

Clients may require the early-stage guidance (Smith & Love, 2015) (RICS, 2013) of a consultant to be clear in building trust, setting goals (Jelodar *et al*, 2016), and to aid decisions of engaging in non-traditional procurement, facilitating collaboration and early engagement with construction practitioners, and formalising these arrangements in a way that is understandable and compliant (Mosey, 2009). Ambrose and Tucker (1999) say that what Clients and their consultants need is an effective, yet simple, system to enable them to make appropriate procurement choices. Others say that Clients expect their consultants to be creative and offer innovations in this area (Smith & Love, 2015) (Cheung *et al*, 2001). The measure of the appropriateness of a suggested procurement system is on how it best accommodates the project particulars and peculiarities (Ambrose & Tucker, 1999) (Olanrewaju *et al*, 2016). Similarly, Dissanayaka & Kumaraswamy (1998) state that acknowledging the type of Client and the project priorities would tend to lead to some procurement approaches being better than others, with relative strengths and weaknesses (Vilasni *et al*, 2014). They go on to state that by linking the relative strengths of the procurement sub-systems to the positive project outcomes, analysis of future procurement approaches can be undertaken. However, they do conclude that the influence of procurement sub-systems are not as significant as other factors such as the characteristics

of the Client or the contractor and how their values correlate (Dissanayaka & Kumaraswamy 1998).

No one simple solution

Ambrose & Tucker (1999) suggested that the Design & Build (Design & Construct) procurement approach was most likely to provide a “*single all-encompassing procurement system*” and provided narrative on why this might be so. They then appeared to contradict themselves, going on to say that it is difficult to provide an ideal-for-all system, and that the best alternative was to seek the best combination for each separate set of project circumstances (Arain *et al*, 2014). Design & Build has been criticised as not being the panacea it pertains to be, particularly in the areas of singular point of responsibility and protecting the client. It is suggested that the opposite may be true and potentially fragments responsibility and derogates accountability. The Clients requirements can sometimes be hard to meet, especially when cost is considered a priority and the contracting agencies involved seek to reduce key areas to ensure margins remain suitable. In addition the ideal of earlier cost certainty and a quicker overlapping process is not always the case especially when clients are slow in decision making or seek to make late changes. Design & Build *can* work very well but key areas around design ownership, delivering value within Client requirements and the final outcome being sub-optimal mean that it is not always the correct procurement selection (Park, 2017).

The idea that a Design & Build procurement solution could be all encompassing has recently been challenged again, with the publication of an independent report on the failings of elements of construction at a number of City of Edinburgh Council (CEC) schools by Professor John Cole CBE. These were procured through a Public Private Partnership (PPP) contract arrangement on the basis of a Design & Build delivery model. A number of the recommendations from this report appear to direct future CEC construction procurement to avoid the very aspects of, what are perceived as, some of the

benefits of Design & Build. Whilst he is careful to not indicate that the issues encountered are endemic, he does note that the issues arising are likely to be widespread (Cole, 2017).

Construction Management (CM) procurement models are arguably the best in providing the Client the opportunity to engage directly with the supply chain on a number of levels. In addition, with the requirements of open-ness and interdisciplinary *discipline* required to successfully use a CM approach it appears to also lend itself to a heightened degree of collaboration. It even appears to assuage some of the issues inherent with “lump sum” traditional procurement, in the areas of lack of early contractor involvement, limited transparency or ability to collaborate, poor risk and design management, supply chain profit reduction, and poor procurement application which does not deliver value for money. However, CM is not an appropriate procurement route for a vast number of projects and is heavily reliant on strong leadership and decision making from Clients, with all those party to delivery having to play their part effectively and, due to this, there is no other method of procurement that is more sensitive to the abilities (or inabilities) of the team. It is also only really appropriate for a Client with a solid understanding of and ability to manage risk, and for those with the requisite skillset to be fully *hands on* (Rawlinson, 2017). Active participation from those at the top of the management structure is advocated in order to foster alliances and collaboration (Cheng *et al*, 2003). No single route is likely to be able to satisfy all parties on all projects (Lam *et al*, 1997) (Masterman, 2005) but this satisfaction of requirements remains a crucial condition for the achievement of project success (Dissanayaka & Kumaraswamy, 1998). Some even say that it is this satisfaction that is synonymous with project success (Olanrewaju *et al*, 2016) and whilst this is not directly linked to Building Services per se, it has a fundamental impact of satisfactory outcomes in this complex regard.

2.1.4 Building Services procurement – further complexities

Further complexity is introduced to overall procurement when consideration is given to building services, particularly when the project requires a high degree of these. When it comes to provision of Building services there are those who consider this area of the built environment as a “Dark Art” (Gribben, 2011). The lack of awareness of requirements, the technical jargon, and sometimes rapid developments in the field can mean that some members of the built environment avoid involvement, denigrating understanding and practice. It is documented that there is a considered requirement for areas of improvement in the procurement of building services (Pollitt, 2009). As many built assets increasingly incorporate more technology and strive to attain superior sustainable credentials, the potential lag in knowledge of advisors must be somehow mitigated to ensure the best advice is given. Edmondson (2016) points out that traditional procurement routes mean that suppliers of innovative building services solutions are reluctant to offer these ideas in case they are not successful in being awarded the contract. Early involvement of these specialists could mean that the innovative solutions are offered in return for equitable commercial reward, commensurate with the *value* they add (Pinsent Masons, 2017). There is a wide-spread perception that there are not enough progressive or forward-thinking individuals or companies within the industry (World Economic Forum, 2016), but that these more enlightened *forward-thinkers* can act as disruptors of the industry and compel innovation and change (Pinsent Masons, 2017); And yet traditional procurement methodologies prevail.

The UK Government clearly reflect the current normal stasis in stating;

“the nature of construction procurement frequently restricts collaboration between Client and supply chain; particularly at an early enough stage to fully explore options for innovation” (HM Government, 2013, p.61).

Farmer (2016) agrees with his assertion that early involvement of Contractors in the design stage is a key element of a “good project”. This also engenders successful experience and knowledge transfer (World Economic Forum, 2016), particularly pertinent to engineering disciplines, which may, in turn, enhance or at least signpost value for money improvements.

Relying on a system that is not quite right

Design, integration, and co-ordination of building services may suffer due to the perceived issues with a particularly cost sensitive and problem inducing aspect of built assets. Building services can typically constitute around 30-50% of the cost of a project (Reeve, 2015), more if the building is particularly reliant on service infrastructure. RIBA practice bulletin 527 discussed this aspect and the relationship on small, yet complexly serviced, building projects. The bulletin’s conclusions inferred that there are significant issues at the interfaces of design, integration, and co-ordination in building services (McKay, undated) which is significant when it is considered that “*building services play a central role in contributing to the design of a building*” (designingbuildings.co.uk, 2016). Does this infer that improvements and good value are diminished because of these issues? Some Client’s requirements in regards sustainability, complying with certain *Building Bulletin* guidance, Passivhaus certification and achieving a required BREEAM level place even greater emphasis on this aspect, as the building services can be integral to these approaches.

Inappropriate advice on the procurement and delivery of building services can have a profound effect on project out-turn and value when compared against client needs, especially when full cognisance of building systems are not understood at an early stage. There is higher likelihood of risks and uncertainty at the earlier stages of a project, and these may be understood and potentially minimised by involving specialist advice (Pinsent Masons, 2017). It is argued that conventional procurement models are incompatible

with the procurement, design, co-ordination, installation, and commissioning of building services (Rawlinson *et al*, 2013) (Yusuf, Mohammed, Yusof & Misnan, 2012) as they focus primarily on contractual and risk allocations (Chong & Preece, 2014), without giving the proper concern to specialist design and construction requirements (Yusuf *et al*, 2012) and yet they continue to be deployed widely and, at times, inappropriately as noted earlier due to both Clients and advisors lacking confidence in advising alternatives or due to familiarity with convention. It is imperative that the design phase takes full cognisance of the delivery and operation phase (World Economic Forum, 2016) to improve productivity and long term value for money. It is reported that some suppliers maintain that procurement is being conducted in such a way so as not to consider the allocation of risk in an equitable manner, making engagement in these interactions overly onerous (Crown Commercial Service, 2016). There are significant practical commercial and logistical issues in the application of full collaboration cascading down the supply chain, making it difficult to make a cultural change (Pinsent Masons, 2017). The appropriate and equitable allocation of risk and affording specialist supply chain members the opportunity to input appropriately is noted as a key requirement for more effective procurement engagement under a design and build model (Currie & Brown, 2019). Simply trying to push as much of the risk to the supply chain as possible appears to cause a disproportionate degree of conflict-inducing problems on construction projects (Taylor, 2020) and may mean limits on maximising value for money alternatives. Without an appropriate and equitable division of risk and how this is allocated between parties, it is difficult to collaborate effectively (Pinsent Masons, 2017) and provide betterment to those involved.

We could do better

It is stated by Rawlinson *et al* (2013) that the majority of the construction industry recognise that building service installations could be procured in a manner which better serves Clients interests, translating to valuable

outcomes, and that the success of these installations is reliant on an appropriate procurement system being derived on a project-specific basis (Lam *et al*, 1997). Traditional, single stage, tendering is criticised as potentially exacerbating cost pressures (World Economic Forum, 2016) and not providing direction, inducing conflict by ensuring that everyone involved defends their own interests, encouraging adversarial relationships and dispute (Pesämaa *et al*, 2009), and that it does not foster cooperation in the coordination of building services (Lam, 2013). Some argue that this manner of adversarial contracting should be abandoned completely (Zuo, Ness & Zillante, 2006), that it is “contracting for failure, rather than success” (Pinsent Masons, 2017), that it may make it difficult to form trusting relationships (may even induce mistrust) (Khalfan, McDermott & Swan, 2007) and the nature of relationships which lack trust are unlikely to provide success at project level (Brewer & Strahorn, 2012). Argumentatively, it is stated that moving to new models of procurement or contracting actually may increase risk of conflict in itself initially as historic methods still impact on undertakings (World Economic Forum, 2016).

Rawlinson *et al* (2013) states there appears to be a shared view that provision of building services is an aspect of construction which could be procured in a better way, serving Client interests more effectively, attaining better value through tender with design of enhanced quality (Taylor, 2020), with significant problems arising in the construction stage (Yusuf *et al*, 2012) due to the poor procurement arrangements and other causation factors flowing through the project (Taylor, 2020). Some argue that the traditional approach of separating design from construction is at odds with the nature and complexity (Arain *et al*, 2014) of building services and that it requires procurement professionals with the appropriate knowledge and skills (Olanrewaju & Anahve, 2015) to engage with building services contractors to derive valuable input at the early design stage (Rawlinson *et al*, 2013). Some argue that undertaking a partnership approach with suppliers and the like can provide opportunity and reduce inefficiencies in the process (Thomas, 2019). Further, some state that those

with the deeper knowledge and specialism in specific aspects of building services should be utilised (Edmondson, 2016); i.e. involve the supply chain.

Involving the best of the supply chain, appropriately

It is stated that not all consultants or designers are fully competent in all aspects of building services design (leading to poor service provision). It follows then that these knowledge gaps need to be filled by others. The industry has the ability to fill these gaps in perspectives (Bresnen, 2013) and understanding by integrating construction practitioners and building services deliverers with requisite skills and knowledge to create a fully balanced and effective team (Danton, 1980).

Some members of the downstream supply chain, even though they have a significant input into the design of building services (Yusuf *et al*, 2012) (Love *et al*, 2012) and provide advanced technical solutions (Pinsent Masons, 2017), consider that usual procurement relationships between them and upstream players are traditional and adversarial, largely driven by costs, being based on the historic master-servant model (Watermeyer R. 2012a) or through aggressive bargaining (Holti, *et al*, 2007) with an immature approach to risk transferral down the chain (Constructing Excellence, 2009). It is an approach that Mosey (2016) said we should be moving away from. Governmental strategy publications state that the industry fails to provide the right conditions for supply chains to prosper (HM Government, 2013). Some state that the smaller downstream organisations have been ignored in efforts to improve throughout the sector (Goodier *et al*, 2006). Whilst this provides a source of risk, there are still some that argue that alternative strategies may be available, but that some operatives may find them unrequited (Mosey, 2009). West (2016) argues that it is often the subcontractors that provide innovations, but that they are rarely party to any collaborative models. All members of the supply chain should have concerns satisfied, not just Clients (Slivon, Howell, Koskela & Rooke, 2010) (Hasnain & Thaheem, 2016) particularly in modern construction procurements which desire fast-track

completion with high delivery expectations (Caron, Marchet & Perergo, 1998), and out of sequence working (Watermeyer, 2012). It is stated that there is a need to create the correct conditions for the supply chain to thrive, develop and invest in technologies to ensure they are able to deliver (HM Government, 2013).

Whilst the evidence talks of improvement and ideals of collaboration in the delivery of Building Services, it is considered that a gap still remains in the evidence; there appears to be a lack of academic and industrial writing on the out turn, the impactful improvement, of collaboration in this specific area. This is the premise of the problems outlined for this enquiry.

2.1.5 Collaborative procurement practices

“There is a dearth of practical guidance on collaboration and effective team working in the industry” - (Pinsent Masons, 2017, p.12)

Whilst existing construction procurement systems have performed, there is room for improvement in methodologies by adoption of successful measures, and to allow for more collaborative planning at the early stages of projects (Chong & Preece, 2014). Some state that traditional procurement models do not fully use the key skills of some construction industry participants and that these models do not nurture cooperation when considering the delivery of building services (Lam, 2013). Others attribute poor performance to the continued use of traditional procurement manners which do not utilise collaboration and the inability of participants to integrate effectively (Baiden, Price & Dainty, 2006). Traditional approaches may provide situations where, by the time the Contractor is engaged, there are already issues within the project; issues that the Contractor or supply chain may have been best placed to advise on at an earlier juncture (Pinsent Masons, 2017). Low levels of trust between parties within a traditional contractual arrangement is not considered optimal. An increase in trust is likely to improve cooperation and increased

efficiencies (Kadefors, 2003). Longer term, improved, relationships are achieved through structured mechanisms promoting cooperation between the various members of teams (Cheng *et al*, 2003) and ensuring obstacles to this are removed.

Breaking down barriers, joining together

It has been argued that an approach which advocates an adversarial contracting stance (e.g. traditional procurement) is not conducive to improvement and should be abandoned entirely (Zuo *et al*, 2006) (Fulford & Standing, 2013). This radical suggestion and a proposal for deep rooted change draws into question the scope and likelihood of a procurement shift, and what may be the unintended circumstances (Bresnen, 2013). In support of this fundamental change, Edmondson (2016) states that a case for collaboration is clear and that there is a need to work together to combat inefficiencies, and Fulford & Standing (2013) note that collaboration can reduce waste and provide productivity enhancements. But Farmer (2016) states that the industry has an issue with the concept of collaboration, and it is this that is at the root of its inability to change and improve.

Kadefors (2003) suggested that there is a major problem with procurement and within contracts as these develop behaviours and activity that seems contrary to how intuitive humans understand the relationship and trusting exchange within a cooperative interchange, and so spontaneous collaboration is mired, and projects deteriorate when difficulties are encountered.

It is important to clarify the use of the term “collaboration” in the context of this research. Mosey (2016) states that it is important to avoid vagueness around the concept of collaboration, as the language has been used as a catch all term for “working together”, joint ventures, partnering, alliancing, and networking (Hughes, Williams & Ren, 2012). Some suggest that collaborating is part of being human (Smith & Robinson, 2021). But defining its use is difficult, when we consider that actors in the construction industry see it from differing viewpoints, as clarified by Hughes, *et al* (2012). The Oxford English

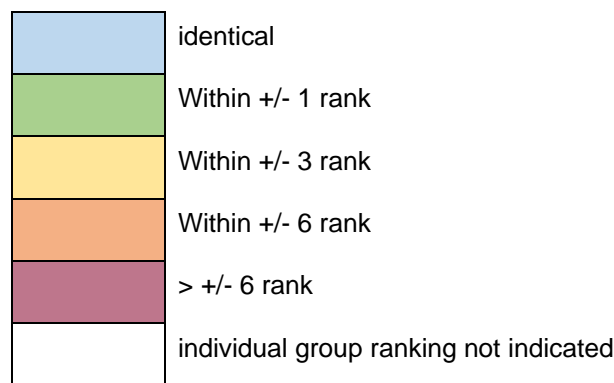
Dictionary (2017) define Collaboration as “*The action of working with someone to produce something*”, and is used, in this research and broadly, to describe all forms of circumstance where individual parties work together to produce an improved outcome. Practically, there is inconsistency and uncertainty in what is meant by collaboration and where working practices in a collaborative sense are employed (Pinsent Masons, 2017). Some comment that to be fully collaborative, parties should have truly aligned goals, a stake in the other party’s success, an investment in supplier and customers alike, and a drive to achieve a ‘win-win’ outcome (Constructing excellence, 2017), accomplishing everyone’s objectives (Staykova & Underwood, 2017). Court (2016) says that the act of collaborating should be driven by something bigger than the act itself; a broader alignment. Other views are that collaboration “means working smarter, not harder” (Conway, 2018) that it is the glue between project participants (Mosey, 2016), that it is key to the creative process, of error recognition, and of solving problems (Percy, 2021). This positive outlook of collaboration is somewhat challenged by the view that construction collaborations are customer driven and do not consider the supply chain effectively (Akintoye, 2007), and that elements of the industry feel that collaboration is expensive and time consuming (Conway, 2018). Elements of this view were provided over a decade ago – have things improved dramatically since then? Others state that collaboration has been used effectively in procurement, but as a principle has yet to truly infiltrate internally into business and industry operationally (Chakkol & Johnson 2015). However, Greenwood & Wu (2012) expressed a clear correlation between collaborative working and better project performance.

Hughes *et al* (2012) attempted to identify the key aspects within collaborative construction projects so as to define the nature of collaboration in UK construction by gathering data from experienced industry practitioners. They asked the subjects to determine if a number of aspects derived from literature were essential to (3 points), desirable for (2 points), or nice to have but not necessary (1 point) for collaborative projects, with the scores being totalled.

They considered that those aspects scoring 130 or more total points should be considered essential, those that score between 78 and 129 would be desirable, and between 52 and 77 would then be nice to have or unnecessary. Table 2.1.1 shows the top 20 aspects in ranked order for ALL respondents, their scores, and compares the rankings to that of the individual rankings of the Client and Contractor groups surveyed.

Top ranked aspects of collaboration

A comparison is carried out on this information in regards the similarity of the ranking from the Client and Contractor groups against all respondents on the following basis;



It indicates that there is general agreement between the groups, in that 50% of the rankings either agree or are within 1 rank position of all respondents. However, there are number of significant aspects which do not correlate and may indicate a disparity between Client and Contractor groups. Hughes *et al* comment that, depending on a person’s role within construction, the definitions of collaboration differ but that there appears to have been an improvement in collaborative approaches in construction compared to prior research (2012). They also advocate that “*further work should be carried out on the essential aspects*”.

All respondents ranking	Aspect	total score	Client ranking	Contractor ranking
1	An environment of open dialogue exists between all parties	148	1	2
2	A common aim is shared by all contributors to the project	143	2	7
3	Early warning systems for any problems are integral to the project	142	4	1
4	All team members contribute to the project	141	7	4
5	An environment of mutual trust exist between all parties	141	6	5
6	Collaboration creates a problem-solving environment	141	3	6
7	Everyone understands the other team members roles and responsibilities	140	11	8
8	Team spirit exists between all personnel involved in the project	139	8	9
9	The contract supports collaboration	139	9	10
10	Collaborative projects encourage more effective information sharing	137	10	11
11	Risks are allocated fairly to the parties	137	12	16
12	There are regular meetings between the various parties (client and supply chain)	137	17	3
13	The project operates in a non-adversarial environment	136	5	18
14	Relationships between the parties are managed	134	14	15
15	The pain share gain share mechanism is fair to both the client and the contractors	134	16	17
16	Everyone respects the input of the other team members	131	13	12
17	There is early involvement of key members of the supply chain	129	19	13
18	Collaboration produces a win/win outcome	125	21	19
19	Collaboration promotes long term relationships	123		14
20	The client and supply chain should achieve a reasonable profit margin	122		

Table 2.1.1: The 20 top ranked aspects of collaboration (Hughes *et al* (2012))

Observations from review above are.

- There is a significant difference in the ranking of “There are regular meetings between the various parties (Client and supply chain)”, with the Contractor group ranking this 14 positions higher than the Client group
- There is a significant difference in the ranking of “The project operates in a non-adversarial environment”, with the Client group ranking this some 13 positions higher than the Contractor group
- The two aspects above scored similarly (137 and 136 total points) and are ranked by all respondents in adjacency.
- “Collaboration promoting long term relationships” appears to not be as high on the Client’s agenda as it is for Contractors and all respondents.
- The “Early involvement of key members of the supply chain” is ranked 17th by all respondents, 19th by Clients, and 13th by Contractors. Significantly, this aspect has an overall score of 129, making it *desirable*, but not essential, based on the research referenced.

The Government’s own analysis appears to reflect a number of the ‘essential’ aspects above, stating that a number of ‘crucial’ factors for successful delivery of construction projects include;

- Equitable financial arrangement
- Early Contractor engagement
- Continued supply chain involvement in design development
- Strong relations and collaboration with suppliers

(HM Government, 2013).

Brewer & Strahorn's (2012) discussion of "components of trust" identified between trustworthy parties also align with the "aspects" noted by Hughes *et al*, listing specifically;

- Integrity
- Honesty
- Reliability
- Consistency
- Fairness
- Loyalty
- Openness
- Good communication

They also note that the exchange of information (aspect ranked at no.10 in the comparative research) is better in an environment of trust, ultimately facilitating effective project outcomes (Brewer & Strahorn, 2012). However, in their conclusion, they note that trust is "desirable" rather than 'essential'.

The earlier the better?

Earlier consideration of procurement requirements is something that is suggested, including earlier contractor (Hamza & Greenwood, 2007) involvement and collaboration (Mosey, 2009). There is evidence that Clients are tending to request accurate advice earlier, with key information feeding into their business case objectives (Race, 2015). It is suggested that significant improvements can be achieved by close and early integration of suppliers within projects (Edmondson, 2016), and that this approach can lead to significant added value (Farmer, 2016). It is said that earlier engagement with the whole supply chain assists in delivering innovation (Scottish Parliament, 2019). A procurement approach which integrates design team and key supply chain members promotes more effective collaboration (Pinsent Masons, 2017). If arrangements are made at an early stage, transparently,

honesty, blame avoidance and trust is created and acts of self-interest dissipate (Jelodar *et al*, 2016). Another potential improvement for team effectiveness and delivery is a greater understanding of team dynamics by the sponsors and Clients particularly in the areas of accountability and blame (Pinsent Masons, 2017). Transparency is one way of fostering other procurement desires (Dickinson, Oyegoke, McDermott & Hawkins, 2010), engenders trust and enables collaboration to be more effective (Pinsent Masons, 2017). Those that can collaborate effectively with other construction disciplines, it is stated, will increase their worth in the realm of Client value creation (Pinsent Mason, 2016).

The idea of earlier appointment of contractors is not new, with it being noted as a potential route for improvement in 1964 (Mosey, 2009). The valid and useful input from contractors and specialist suppliers who are more likely to have better knowledge of products and systems and where inefficiencies are best targeted (Edmondson, 2016), has been recognised for some time and various organisations and public bodies have attempted to foster an environment for collaboration for at least the past two decades to deal collectively with issues rather than in isolation (Slivon *et al*, 2010). Mosey (2016) states that the supply chain is key to unlocking efficiencies through collaboration. Partnering arrangements defined the epitome of collaboration, but with the most recent economic downturn (*pre-2020*) some agencies have turned away from this structured approach due to the inferred longevity of these arrangements (Hughes *et al*, 2012). Some state that the entire supply chain should be considered as *partners* in the delivery of projects (World Economic Forum, 2016), which in turn can reduce costs in a number of areas and reduces the burden of learning and training (Thomas, 2019) and assist in plugging knowledge gaps.

Knowing what you do not know is just as important

Whilst some state that there appears to have been little success (Withers, 2014), others seem to conclude that there appears to be a genuine desire to

engage with Contractors to seek technical solutions and reduce the inherent risks that procurement can bring (Gardiner, 2015). Clients are looking to the industry to provide solutions to make construction leaner, more profitable, and more effective. Good (2023) says that openness and collaboration are key to delivering solutions and engendering opportunities. Collaboration can help mitigate project risks, garner resilience between agencies, optimise resource, and provide a basis for innovation (Chakkol & Johnson, 2015). Drawing on the knowledge of all stakeholders, including cooperation with those up and down the value and supply chain, even with *adversaries* (Percy, 2021), can lever enhancements to delivery (World Economic Forum, 2016). If Taylor (2020) is correct when he asserts “many Clients either underestimate or overstate what they do not know” then the involvement of stakeholders and supply chain in identification of risks and issues should minimise the impact this might have on inappropriate procurement decisions. Akintoye (2007) appears to agree with this in that greater cooperation can lead to successfully dealing with project risk and uncertainty, but he does go on to state that it is not all collaborative approaches that will lead to success.

Those party to contracts have been keen to reduce the heavy resource cost involved in tendering and execution through collaborative arrangements, and there is evidence of achievements in this area (Hamza & Greenwood, 2007). West (2016) says that the very drafting of a contractual relationship should not be overly burdensome and should encapsulate not only the Client and contractor values, but also be the blueprint for the relationship they are entering into, clearly defining priorities and objectives. This can only really be done by early and collaborative planning. However, it should be noted that effective teams can still, and do, deliver out with collaborative working and/or contractual arrangements (Pinsent Masons, 2017).

What is stopping us?

Collaborative action is generally inhibited by a multitude of competitive (Mosey 2016), cultural, and participative challenges (Bresnen, 2013), but even the

most stringent contractual arrangements will require an element of relational requirements (Jelodar *et al*, 2016), with UK government guidance stating that teams should be selected based on their ability to work collaboratively (Burnard & Muse, 2014). “Collaborative Working is about people” (Mosey 2016), but it is important to understand that organizational collaboration should be reflected in cascaded cultures and individual’s behaviour at project interaction level (Constructing Excellence, 2015a). This creation of organisational culture is seen as a potential barrier to widespread collaboration and integration (Chakkol & Johnson 2015) with organisational leadership setting the agenda for collaborative ways of working (Khalfan, McDermott & Swan, 2007). Leadership and people management need to be effective to enact a cultural change, including the ability to convince those taking part why a change in behaviours is necessary (Cheng *et al*, 2003). Farmer (2016) appears to corroborate this when he states that one of the major barriers to improvement is behavioural resistance to change. Additionally, Pinsent Masons (2017, p.44), reflecting Farmer’s view on resistance to change indicating more traditional working practices state *the key barriers to effective supply chain collaboration include:*

- *Poor Client or Client-side advice at an early stage*
- *Poor scope definition*
- *Lack of focus on outcomes or alignment of objectives*
- *Poor procurement decisions*
- *Allowing contractors to have limited opportunity to propose improvements or influence design as scope is fixed at point of engagement*
- *Poor supplier selection*
- *Poor engagement and communication with supply chain*

Developing relationships

The problems created by relying on the obligations under a contract to coordinate construction works has been commented on by government and industry (Goodier, 2006). The UK Cabinet Office say that the relationship with the supply chain should change from historic associations to a more collaborative process where the entire supply chain is fully aware of the Client needs and values (Cabinet Office, 2014a). They state that this model of supply chain integration leads to innovation and should drive a change in the cost base and risk in construction projects (Cabinet Office, 2014a). *Real* collaboration may not be about it being imposed specifically by the obligations within a contract but may be allowed by the flexibility within a contractual relationship to allow for the parties to develop their own, project specific, collaborative approach (Pinsent Masons, 2017); this in itself means earlier engagement predicates more *organic* collaboration. It is important to think seriously how the supply chain is utilised and trusted to deliver collaborative improvements (Chakkol & Johnson 2015). This may only be deliverable in an arena of mutual respect and trust, by forming effective relationships and through collaboration (Jelodar *et al*, 2016). The reciprocity of mutual trust is important to realise benefits from collaborative relationships (Brewer & Strahorn, 2012) and is also an important factor in trust-building (McDermott, Khalfan & Swan, 2005). The long-term nature of collaborations in the industry is an indicator that equitable reciprocity is maintained and that commitment to a beneficial relationship is strong (Cheng *et al*, 2003). Fragmentation through poor relationships remains as a challenge to the “value chain” and the lack of dialogue lends itself to problem creation (Modus, December 2016). Edmondson (2016) states that open dialogue between all members of the team, including suppliers, is the best means of driving efficiencies into construction.

Some state that procurement strategy selection which does not account for selective supply chain input is likely to increase the occurrence of conflict, delay, and risk (Mosey, 2009) (Osipova & Eriksson, 2011). Some feel that the integration of valuable construction practitioners is key to determining the

appropriate procurement strategy for every project (Davidson, 2009) (Vilasni *et al*, 2014) and that project performance, generally, will improve through more cooperative procurement arrangements (Eriksson & Westerberg, 2010). The emphasis for the building of trust should focus on project performance notwithstanding the commercial reality of contracts within the industry (Khalfan, McDermott & Swan, 2007) whether these are old contract models or new procurement routes.

Is new always best?

It is said that the new procurement models tend to be delivered through collaborative integration (Cabinet Office, 2014a) (Osipova & Eriksson, 2011), that this approach puts the management of risk and value at the heart of the project (Chakkol & Johnson 2015), and that collaboration has become the new normative baseline, being simply “common sense” (Bingham, 2016). Others, however, take a differing stance and state that there still remains an issue with the forming of better relationships and collaboration within the industry (Jelodar *et al*, 2016).

It is equally important to recognise when collaboration would not best serve a project, or when collaboration becomes an objective itself, being a distraction (Eriksson & Westerberg, 2010). It is not every construction project that requires a high level of relational arrangements (Jelodar *et al*, 2016) and advice given will necessarily direct Client decision making in this respect (Olanrewaju *et al*, 2016). Some argue that smaller, simple, projects tend to attract negligible improvements from early engagement with the supply chain (Mosey, 2009), whilst others say that it is applicable to even the smallest of projects (Bingham, 2016), and that every building is better with an integrated team approach (Edmondson, 2016). Pinsent Masons (2017) assert that collaboration may not be a one-size fits all approach and that some of the supply chain may be better suited to collaborative working than others, or that only certain aspects of projects may be suited to that approach. They also state that some members of the supply chain may bring virtually no benefit to

a collaborative environment which may mean additional difficulties are induced; careful selection is advocated. Percy (2021) states that there can be disadvantages of collaboration through the inducing of confusion, overly complex arrangements and a lack of ownership.

Whilst Clients need to decide if the supply chain's abilities are best directed to a collaborative procurement method (Cabinet Office, 2014a), understanding the scope and size of a project and when to recommend a collaborative approach, and engaging with complicated supply chains (HM Government, 2013), may be best suited to the role of the practitioner who is engaged to assist the Client in their procurement decisions (Vilasni *et al*, 2014). Those Construction professionals who have experience of the activities required of collaborative and relational arrangements are often best placed to provide consultancy advice (Jelodar *et al*, 2016), objectivity (Cheung *et al*, 2001), and strategic direction (Olanrewaju *et al*, 2016). It is noted that a number of Clients express an elevated degree of satisfaction where collaboration has been the basis of the arrangement (Bresnen & Marshall, 1999).

Whilst some argue that additional pressures are created (Burnard & Muse, 2014), others say that individuals involved in a project which is undertaken in a collaborative environment are said to display improvements at a personal level (Masterman, 2005). The enforcement of trust is virtually impossible but by creating an environment of clear communication and collaboration, it is argued that teamwork is fostered, and a relational based contractual arrangement will provide positive outcomes (Jelodar *et al*, 2016) (Slivon *et al*, 2010) (Osipova & Eriksson, 2011). The development of a team performing at a high standard is predicated on high levels of co-operation and team solidarity, and whilst this may be coerced, the best performing teams undertake co-operation on a continuous and intensive basis which reflects best practice behaviours within that team (Erdem & Ozen, 2003). Teamwork is an indispensable element of collaborative working, and the terms are used interchangeably (Pinsent Masons, 2017). There is significance in the quality of relationship between the main project practitioners and how this has a

profound effect on project performance. There is growing recognition that collaborative activities are one of the vital aspects of producing positive project outcomes (Pinsent Masons, 2017); well cooperating teams and team members are more likely to deliver in complex project settings, it is not a solo effort (Zhang & Fan, 2013).

Is collaborating compromising?

An industry which has a poor track record of cooperation between parties, has then to take a further leap forward to collaboration. Construction, it is argued, must then attempt to break away from procurement and contractual models that have historically held parties as adversaries in competition and maintained distinctions between each's goals and values (Bresnen & Marshall, 1999). It is the nature of the industry that the winning of contracts is generally done in competition, as this provides (arguably) better Client value, and aligns with legislative requirements. Firms are able to benefit from collaborative activities within their own supply chains, with evidence that this leads to efficiency and effectiveness, and is linked to better performance (Paluri & Mishal, 2019).

If we consider the Thomas-Kilmann conflict mode instrument (Thomas & Kilmann, 2015), as figure 2.1.1, there are key areas that correspond to the Construction Industry approach to project delivery. In locating "Competing" on the model, the Contractor must demonstrate a high degree of assertiveness, but conversely demonstrate a lack of cooperativeness. This is a traditional approach. It shows a short-termism and adversarial approach which reflects a conservative construction industry culture (Hughes *et al*, 2012). Those who are conditioned to work in this way are unreceptive to a change to collaboration and integration (Farmer, 2016).



Figure 2.1.1. The Thomas-Kilmann conflict mode instrument

For a Contractor to be “Collaborating”, they must remain at the same level of assertiveness, but apply an equal degree of cooperativeness. In this they must attempt to find solutions to the other party’s concerns or issues, and this may require additional efforts in exploring un-common ground, or in finding solutions to inter-party problems. In order to enter into this manner of arrangement a degree of “compromise for the greater good” must be made, with a trusting relationship at the heart of that compromise (Court, 2016).

How this compares to the assertion that in knowledge production “collaboration must turn into competition” (Gibbons *et al*, 1994) is unclear, but they do state that because of this “ingenuity is required”. Collaboration is not currently the norm within the industry, is an approach which may be alien to many, and potentially needs an improvement in the leadership of teams involved.

2.1.6 Procurement improvement leadership

“*Strong leadership will be vital in driving lasting change*” - (HM Government, 2013, p.15)

The World Economic Forum (2016) note that “even a small improvement” to an industry that is as significant as construction will provide substantial benefits. Amongst the 30 measures they note as being required for transformation are:

- Enhanced management of the supply chain
- Innovative contracting models with balanced risk allocation
- Rigorous project monitoring
- More knowledge and best practice sharing
- Cross industry collaboration throughout the value chain
- Innovation-friendly and whole-life-cycle orientated procurement

These measures are directed at company, sector and governmental level.

It is stated that collaborative working is essentially a strategic consideration, with direction from an executive level (Chakkol & Johnson, 2015). This is echoed in the construction industry where organisations are considering long term objectives (Goodier *et al*, 2006) (Wao, 2015) (Arain *et al*, 2014) and differing perspectives on delivering value (Holti *et al*, 2007). Jelodar *et al* (2016) state that there has been a general shift towards better collaboration and the development of relationships to identify potential issues (Holti *et al*, 2007), better solve problems, and deliver successful outcomes. Competitive advantage and other improvements are achievable, it is argued, by including the entire supply chain, from Client to suppliers, in an integrated way (Hughes *et al*, 2012) (Mosey, 2016), and that benefits multiply by taking a strategic long-term view of cooperation (World Economic Forum, 2016).

This manner of collaboration indicates a long term, Client-centric, business focus, but those wishing to be involved in such approaches must start by understanding the dynamics involved in the investments required (Holti *et al*, 2007). Using specialist suppliers to be part of integrated assessment of value is proving to be of worth in some fields and there is increased recognition of this approach in other industries (Anderson & Katz, 1998). However, Jelodar *et al* (2016) also state that orchestrating this manner of relationship in a construction environment may reduce flexibility of those party to it and ultimately make the relationship goals unrealistic. Whilst Farmer (2016) summarises that potential drivers for change may come from outside the construction industry, Edmondson (2016, p.1) counters the idea of adopting models of improvement from other industries, as has been suggested by reports into the construction industry; “*manufacturing and contracting are very different businesses*”. Chang (2015) notes that others in the construction academy, such as Hillebrandt and Ives, recognise that standard economic theory may not be applicable to construction due to it having “special features and special problems”. Others say that the industry has struggled with the comparison to manufacturing due to it being taken too literally, and that it should be about what we can learn from their processes, not how we can replicate them (Constructing Excellence, 2009). One example being the vertical integration of activities and supply chain members for economic benefit (Green, 2020). Whilst Akintoye (2007) compared the success and failure factors in collaborative relationships for both construction and manufacturing and states that they are not dissimilar, Pinsent masons (2017) highlight that the industry is differentiated by its notoriously fragmented nature, that it is not a *commodity purchase*, and has struggled to attain a *leadership voice* for improvement.

The Client is always correct... with direction

There is increasing pressure from Clients to attain their objectives (RICS, 2013) and gain better project out-turns through alternative procurement

arrangements (Lam, 2013) adapting procurement techniques specifically to match the Client's priorities, values and requirements (Smith *et al*, 2004) (Slivon *et al*, 2010) (Ive & Chang, 2006) and positively shape the future of the industry by adopting "value-based procurement systems" (Goodier *et al*, 2006) rather than merely focusing on Client type and project attributes (Olanrewaju *et al*, 2016). This is a difficult proposition, particularly when there are incompatibilities in trying to achieve all outcomes to an equally equitable state (Ambrose & Tucker, 1999) (Cheung *et al*, 2001). However, there are those that state that, despite the complexities inherent in construction procurement, it should be feasible to repeatedly select the most appropriate procurement strategy by logically utilising the Client defined project objectives to shape the policy of selection (Tookey *et al*, 2001) (Lam *et al*, 1997). Watermeyer (2012a) agrees with this, saying that as procurement is a process it should be able to be standardised.

Masterman (2005) states that fixing complex Client and project specifics needs a combination of traits of existing procurement models to be best able to fully integrate the requirements. Dissanayaka & Kumaraswamy (1998) stated the same opinion when they postulated the idea of creating different procurement systems by assembling the preferred options of procurement sub-systems to make the most compatible procurement route. Eriksson and Westerberg (2010) concur when they say that advisors best serve their Clients when the procurement solution concurrently satisfies the performance criteria set and delivers project success. Ultimately, it is stated by Ambrose & Tucker (1999), the aim of combining specific traits to define a procurement system is to be able to provide the project on budget, on time and to the defined quality requirements. Others disagree, saying that the very combining of potentially sub-optimal elements is unlikely to provide an ideal solution, and that it is more likely to provide a compromise approach with degrees of weakness (Ambrose & Tucker, 1999); an '*inconsistent trinity*' where some degree of compromise is required or vulnerability induced (Ive & Chang, 2006). This view is supported by the numerous research methods directed at

finding an ultimate ideal for procurement selection for all projects considered yet to be either definitive or successfully tested (Bowen *et al*, 1999). Lam (2013) states this succinctly, saying it is known that there is no standard solution or best buy amongst procurement systems. It is probably more likely that more than one single route alone will be able to satisfy varied objectives (RICS, 2013). Ive & Chang (2006) state that no procurement system can have absolute advantage over others due to the hierarchical aspects of construction contracts and the extrinsic factors within administering the contracts deployed. The basis of procurement decision making principles of a balancing within the triangle of the relationship between Time, Cost and Quality is compared to Ive & Chang's (2006) similar proposal in regards other key elements of a Client's position on vulnerability to key areas of their project. Refer to figure 2.1.2; This indicates that there is inherent complexity within procurement decisions in the linkage between the drivers and requirements, as well as an acceptance that compromise is likely to be inherent in the process and that the decision outcome may prove problematic in some areas during delivery. It also may be that to mitigate compromise and issues, other, more inclusive, procurement techniques may have benefit.

When to do the right thing

Whilst some state that earliest engagement allows constructors to innovate, reduce costs, and advise from their knowledge base (Cabinet Office, 2014a), preferably from just after outline design stages to get the best out of a collaborative arrangement (Pinsent Masons, 2017), others state that the timing of contractor involvement should be carefully considered (Masterman, 2005), making a thorough assessment of when contractor or specialist engagement is likely to have the most beneficial impact

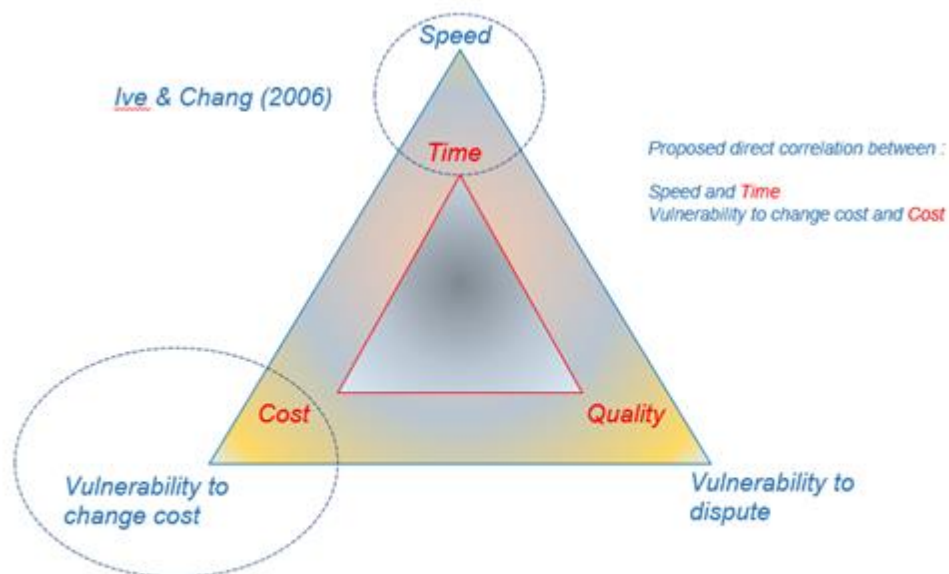


Figure 2.1.2: Procurement Decision complexity, derived from [Ive & Chang \(2006\)](#)

(Mosey, 2009). It is noted however that a Client's ability to influence large parts of their project diminishes as the project progresses, so early engagement with the supply chain will provide greater benefits but may reduce the Client's ability to select a traditional procurement approach (Mosey, 2009) (Masterman, 2005). It is stated that the *higher* you are in the demand network (i.e. a large Client with significant programmes of work), the more scope you have to influence the scope of supply chain integration and ultimately improve aspects of value related outcomes (Holti *et al*, 2007). Pinsent Masons (2017) state that *substantial industry Clients with large portfolios, including public sector bodies*, should be leaders in advocating change as they require innovative and new methodologies from the construction industry and that they are pivotal to the articulation of the behaviours required for collaboration.

There is a noted Europe-wide consensus in the emphasis on the importance of strategic early engagement (Vernikos, 2015). The UK government's Construction 2025 document details aspirations for collaborative working in the future (HM Government, 2013) (Race, 2015). The UK government Cabinet Office extended this aspiration and fully endorse the integration of teams and

earlier supplier engagement (Cabinet Office, 2014a), and state that it is important that Clients enter into projects with the confidence that their procurement strategy is best suited to their needs. Instilling this confidence may prove difficult given the earlier commentary on Clients adhering to procurement systems they fully understand and have used before, and when they believe they have a higher degree of knowledge in this area than their advisors. Whilst Clients may want transformation and improvement in their procurement undertakings, it is still the case that they do not want to be guinea pigs (World Economic Forum. 2016).

Governmental strategic leadership

The UK government's "Construction 2025 - Industrial Strategy: government and industry in partnership" (2013) outlines defined aspirations for the UK construction industry to deliver transformation. It states how the government desires to work with the industry, build long term relationships, and sets the strategy for this affiliation and potential improvements. Amongst these aspirations are a 33% reduction in costs and a 50% reduction in overall delivery programme of projects. Amongst the outlined visions, including an efficient industry that drives across the industry and the wider economy, there is a call for clear leadership, provided by a Construction Leadership Council.

The Construction Leadership Council includes a cross-consensus body of individuals from senior industry posts and representatives of government departments, who are held accountable for delivering actions and implementation. There is however criticism of the democracy of the council members' appointments and that it is not truly pan-industry nor diverse. It is said that it would also benefit from greater access to high quality research (more collaboration with *the Academy* potentially?) and better directed in forming a positive agenda for construction (Pinsent Masons, 2017).

Despite the noted criticism, the strategy also notes that Government must continue to provide procurement leadership, but states that this leadership should be by governmental and Client groups. Bonham (2013) states that

Governments have an ethical obligation to lead the industry, including the private sector, for the public good. It is argued that the public and private sectors should cooperate to a higher degree to generate innovation (Akintoye, 2007). The government strategy goes on to state that responsibility for leadership lies with Clients as much as the industry. Pinsent Masons (2017) say that the key for driving collaborative approaches is Client leadership. Earlier publications state that the time for Client leadership has passed, that during recessions Clients struggle to lead (Constructing Excellence, 2009), and that it is for the supply chain to demonstrate added value through innovation and the like (Constructing Excellence, 2009). However unclear this seems, there is much to do to improve leadership to provide value through procurement. An unwillingness to collaborate coupled with a lack of strategic leadership leads to improvement being inhibited and further marginalises the industry (Farmer, 2016). Pinsent Mason (2016) note there is an absence of appropriately weighty industry leaders who are prepared to commit to arguing for a collaborative change nor to enable environments in which this change can be developed. The Scottish Parliament (2019) have concluded in their review of the Scottish Construction Sector that industry-wide leadership is needed in regards collaboration and a culture change, and that without it barriers to effective procurement will remain.

Some comment that whilst this governmental drive is positive in closing the gap between policy and application, there still remains a gap. Leadership from government is considered more powerful when its agencies lead by example, acting in a professional, leading, role (Bonham, 2013). The further closing of the gap is partially the responsibility of the supply-side of the industry, and they should reflect the demand-side in the aspects of collaborative procurement, early engagement, and value delivery by well-considered integration (Constructing Excellence, 2017). Pinsent Masons (2017) note that it is a considered view that it is construction Clients (the *demand chain*) that are best placed to take the initiative and provide leadership in collaborative working practice, but they also state that the supply side of the industry is just

as familiar with and capable of leading in a collaborative sense. They also note that the majority of construction activity is undertaken by Small and Medium Enterprises (SMEs), the lower orders of the supply chain, and that it is their behaviours towards the act of collaboration that are key to effective team working and delivery. Holti *et al* (2007) state that the principal reason for collaborative integration is that, at its best, it can produce better value for Clients and users of built assets, as well as enhanced returns for the supply division. Ultimately it is one of the key requirements of a Client from their advisors, their supply chain and the industry; optimal value for money (Green, 2020). The movement for change continues, with a recent European forum on contract and commercial management, where a speaker stated that with the world changing at a faster pace, the industry should respond by changing procurement habits to induce better collaboration (Fullalove, 2015). This may mean a change in attitudes and improvements in skills.

Adjusting attitudes and developing skills

Clients are becoming more sophisticated in regards their procurement requirements and are distinguishing that they should be able to insist on procurement strategies which are befittingly adapted to their specific requirements (Masterman, 2005) (Olanrewaju *et al*, 2016). There has also been a positive change in attitudes and dealings between Clients and constructors over recent history (Alharthi, Soetanto & Edum-Fotwe, 2014), reflecting a culture shift in workplace attitudes generally (West, 2016). Any commitment to change in these manners of arrangements ultimately start at the Client level and cascade down (Jelodar *et al*, 2016) (Watermeyer R. 2012a). This cultural change is required if industry practitioner's perspectives are to be aligned (Eadie *et al*, 2012) with Client understanding.

Whilst many Clients understand the benefits of an integrated procurement approach (Smith & Love, 2015), those that have the sophistication to implement this approach are rare (Masterman, 2005). The question is raised as to the appetite of Clients to invest additional resource and costs in this

significant and demanding change in approach (Anderson & Katz, 1998) (Masterman, 2005) (Mosey, 2009) (Yusuf *et al*, 2012). But it is asserted that both government and influential construction sector groups are encouraging the development of capabilities for collaboration and the integration of supply chains as it is perceived to deliver enhanced Client value (Holti *et al*, 2007). Edmondson (2016) categorically states that there is *evidence* that developing collaborative systems leads to big returns by reducing elements of the transactional aspects of traditional procurement, particularly in overhead costs. He also states that whenever organisations commit to collaboration, results have proven to be very good; Yet he provides no substantiation to this. Bold statements, particularly as Holti *et al* (2007) also indicate that the measuring of tangible improvement is difficult, due to bespoke aspects of projects, the delivery context within projects, and the standard of measurement differing between Clients or agencies. They go on to say that evaluating improvement cannot rely on universal measures and ultimately should be based primarily on the definition of individual Clients' requirements. In general terms, in regards benefits of forming collaborative teams, a Stanford University study intimated that success and perseverance rates were improved by significant amounts in those individuals who believed they were working together on a project, rather than in those who worked alone (Khalique, 2021). An effective team has become the superlative model of delivery and behaviour for many organisations, with the synergies being maximised through strong social and professional interactions within the team structure, an essence of team spirit (Erdem & Ozen, 2003) and suitable leadership.

The benefits and importance of effective leadership cannot, according to Pinsent Masons (2017) be underestimated. They also reflect that leadership is also about a balancing act of achieving project objectives against financial performance, and that effective *followers* are also required; including followers that lead when necessary. However, the literature is conflicted to some degree on the nexus for leadership. Whilst some suggest it should be

government led, with them defining and implementing holistic strategies (World Economic Forum, 2016), others state Clients, and others again comment that the supply chain should be at the forefront of improvement. Recommendations from the Farmer report (2016) state that all parties should work together, improve relations, and deliver the programme of change. Pinsent Masons (2017) state that as well as government, *more support and direction is needed* from the professional bodies and the Academy. Improvements should be realised if all construction project stakeholders act in concert and collaborate (World Economic Forum, 2016). Bresnen (2013) notes a “middle-out” approach, whereby those with the greatest opportunity to influence and enable are best placed to capture the energy for change. Whilst one view may be that consultants are best placed to advise on commerciality and the legalities of whatever contract form due to their ability to independently enact more effectiveness through a team approach to procurement, there is a more cynical view. This is that self-interest within some consulting areas may be contra to the promotion of more effective, collaborative team based, procurement due to the potential increased remuneration from a more traditional ‘blame and claim’ approach (Pinsent Masons, 2017).

A safe pair of hands and learning lessons

James Wates (2016) describes a utopia of construction professionals working cross-discipline to drive value into the supply chain, learning from experiences and each other, aligning visions for Clients and the industry generally. He espouses the need for an oath, not unlike the Hippocratic Oath, which correlates precisely to the standards of professional competence that are prescribed by the RICS. The nurturing of practitioners’ softer skills is also important in order to best develop negotiation skills to enhance value and be the epitome of best practice (Goodier *et al*, 2006). The aspect of the professional’s ability to learn from previous lessons is imperative here as a lack of reflection may lead to poor judgement and even poorer decision-

making in future procurements (Finlayson, 2016), where as well utilised reflection can increase respect and trust of practitioners, enhancing their credibility (Branson, 2007) and deliver better solutions from accumulated experiences (Ng *et al*, 2005). It is noted by Government that the construction industry appears to fail in learning lessons of successful innovation and its utility in future projects (HM Government, 2013). The lack of knowledge transfer between projects, or lessons learned not being incorporated on sequential projects, is noted as a weakness of the industry at all levels and limits continuous improvement (World Economic Forum, 2016). Learning lessons from earlier projects, and sharing this appropriately, is noted as one of the key factors of effective framework arrangements (Pinsent Masons, 2017). Co-ordination of aspects of procurement and how information is shared with the supply chain is something that requires careful management and consideration (Michie, 1981) and this consultation, it is said, is best suited to the role of the Quantity Surveyor (Wao, 2015) as the arbiter of cost management (Yusuf *et al*, 2012), or at least one with the requisite skillset, and as a convergent focus for other team members (Olanrewaju & Anahve, 2015). Dealing equitably with all team members would be a requisite for a Quantity Surveyor or Project Manager to endanger collaboration (Pinsent Masons, 2017). Quantity Surveyors can drive competitiveness by being more involved in the upstream supply chain (Olanrewaju & Anahve, 2015), whilst being aware of downstream needs. Yusuf *et al* (2012) state that this collaboration both up and downstream is best developed by the Quantity Surveyor, as this then provides “a reliable cost estimate for the procurement of building services”, but also maintains commercial confidentiality (Dickinson *et al*, 2010). However, some state that there is a subtle difference in ability between the consultant Quantity Surveyor and Contractor’s Quantity Surveyor, in that the latter is best placed to offer management of building services procurement more competently due to their specific experience (Olanrewaju & Anahve, 2015).

An understanding of trends, barriers and issues which cause difficulties is required of the practitioner who wishes to cure the ills of procurement (Goodier *et al*, 2006). Kevin Louch, quoted in Construction 2025, states “*construction relies on people of all capabilities coming together and doing their bit to deliver successfully*” (HM Government, 2013, p.7). Collaboration of this manner is not easy – it takes significant investment of time, resource and energy to make it effective (Hayward, 2021). Bonham (2013) agrees with this, stating the industry is strengthened through a collaborative, people-centred, practice model. She notes that implementations of integrated methods acknowledges the need to consider actions and interactions of the people involved. It is people who are at the heart of making things happen on successful projects (Pinsent Masons, 2017). Relationships between the people working together to deliver projects are crucial to successful collaborative working (Shelbourn, Bouchlagem, Anumba & Carrillo, 2007). The World Economic Forum (2016) state that it is *people* who have the most importance in transformation, but that the industry as a whole should work collectively (*industry collaboration* being the third most important transformation area in the World Economic Forum’s view) to achieve the change across multiple dimensions.

Managing the team players

Some say that it is the effective management of the right combination of practitioners that can develop success, even with the most contractual of arrangements. But that the opposite is also true, poor management and the wrong characters can lead to failures in collaborative and relational models (Jelodar *et al*, 2016) (Gluch, 2009). Shelbourn *et al* (2007) note that leadership is a crucial issue to ensure successful collaboration within construction projects. Others comment that the ability or willingness of construction professionals to enact the leadership of collaboration to make improvements should be questioned, and that it might be that those outside of construction professional bodies that may be best to drive collaborative

change within construction (Bresnen, 2013). Effective leaders should be able to enable teams to collaborate successfully, but it is equally the case that the leader should collaborate to be effective (Levermore, 2021). Some within the industry may not have the tools at their disposal to enact this and even be the *central issue* within a collaborative arrangement. It is with these complicated leadership landscapes that those trying to drive the industry forward are required to operate in, sometimes during uncertain and volatile circumstance.

2.1.7 Current industry direction for improvement

It has been cited that if the construction industry is to find improvements, it is likely to derive its origins from the procurement process (Olanrewaju *et al*, 2016). Some argue that the effective control and positive governance of construction projects relies on a “holistic and systematic approach” when considering project procurement needs (Eriksson & Westerberg, 2010) (Masterman, 2005) (Love *et al*, 2012) rather than the traditional cost, programme and quality criteria only (Goodier *et al*, 2006). This means that procurement practitioners and advisors need to ensure their skills are sophisticated and suitable and be flexible in order to react to differing Client procurement requirements (Tassabheji & Moorhouse, 2008) (Masterman, 2005) (Goodier *et al*, 2006) (Mudi, 2016). Some state that there is a lack of flexibility in the approach to construction procurement and that once a procurement strategy is mooted it is unlikely to be deviated from (Ambrose & Tucker, 1999). Modern procurement strategies need to consider that projects develop and encounter change, and that this will need reacting to (RICS, 2013).

Building relationships for the long game

It is postulated that long term arrangements with suppliers who have displayed attributes aligning with the Client's values (Pesämaa *et al*, 2009) (Chong & Preece, 2014) should be formulated, and that the maintenance of these relationships is something construction Clients with a portfolio of

projects should aspire to (Anderson & Katz, 1998). Commentators say this approach provides the following benefits;

- Long term collaborative relationships can provide economic and logistical advantages (Masterman, 2005) because of the stability underscoring the association (Davidson, 2009)
- Fosters honesty and openness, leading to mutual respect and trust (Doyle, 2006) (Zuo *et al*, 2006) (Strahorn *et al*, 2015)
- Lowering the likelihood of selecting an inappropriate contractor/supplier through further tendering procedures (Eriksson & Westerberg, 2010) (Pesämaa *et al*, 2009)
- The enhancement of cooperation between all parties and the erosion of confrontational project settings (Masterman, 2005)
- Removes barriers to inefficiency in individuals, companies, and the supply chain (Davidson, 2009)
- Success through commonality in problem-solving when projects have issues (Masterman, 2005) (Osipova & Eriksson, 2011)
- Make efficiency gains, making projects more affordable, and ultimately making the construction industry more competitive (Cabinet Office, 2014b).
- Gets *new answers* to *new questions*; drives innovation (Mosey, 2016)

Bingham (2016) re-iterates much of the above and states that collaboration is the bedrock of improvement on many fronts in the construction industry. Farmer (2016) insists that collaboration is essential for improved construction, along with better alignment of industry and its Clients. Fulford & Standing (2013) seemingly state the same with them emphasising openness within a collaborative culture. Openness is interlinked with honesty and integrity, key aspects of collaboration (McDermott, Khalfan & Swan, 2005). Bonham (2013) positively expresses that collaboration and communication is evolving in line with new professional practices and government Client influence. However,

Farmer (2016) states that governmental direct influence is limited, but that they remain a key agent for improvement.

The benefits of collaboration

Constructing Excellence (2015) state that there are tangible benefits from the implementation of collaborative practices and that these are applicable broadly. Their “Top 10 benefits of Collaborative working” are;

1. Opportunities and risks are more transparent and manageable.
2. Solutions are more appropriate and more buildable.
3. Everyone is able to contribute; you get to use all the experience in your team not just some of it.
4. More innovation from all team members.
5. It is more enjoyable and more satisfying.
6. Shared problem-solving leads to better problem resolution.
7. Time and cost are more predictable, so are outcomes and profit.
8. Whole life implications are actually considered.
9. It is cheaper.
10. It is quicker.

Whilst a number of these seem self-evident and are supported by other authors, some appear less easy to corroborate. There appears to be no supporting evidence provided, and there is other literature reviewed which contradicts some of these benefits. Holti *et al* (2007) state that there should be suspicion of over-generalised claims of collaboration and integration delivering superior performance in all instances, and that practitioners should be abreast of the specific parameters of benefit measurement and how enhanced performance will be quantified. One example of contradictory commentary is from Pinsent Mason’s report “Collaborative Construction: More myth than reality?” (2016) which noted that it was perceived that collaboration may induce additional costs and be time consuming, in direct contrast to numbers 9 and 10 above. Constructing Excellence appear to represent a cross section

of “industry participants from all backgrounds” (2015), but in this instance they do not indicate how the “Top 10” is derived. Having said that, 4 of the 10 Benefits have a direct correlation to aspects considered “essential” in Hughes *et al* (2012) research.

Chakkol & Johnson (2015), provide 13 benefits of collaboration in their report on collaborative working. Of these 13 benefits, 6 have a correlation to Constructing Excellence’s list, these are;

- Innovation
- Better problem solving
- Operational efficiencies
- Employee Satisfaction
- Overall business performance
- Cost reduction

They also reflect these benefits in a list of identified skills for acting collaboratively. This intimates, on the basis that Chakkol & Johnson are not specifically talking about Construction, that there is some corroboration of Constructing Excellence’s assertion of benefits. However the assertions potentially lack academic rigour and are therefore worthy of further investigation.

It is still a wheel, but is it a better one?

This entire supply chain collaborative involvement was seen as a potential some 20+ years ago (Bresnen & Marshall, 1999); is it finally something being realised? It is stated that infrastructure megaprojects are displaying more collaborative and incentivised arrangements (Farmer, 2016), and an increased focus on the application of *BS11000 Collaborative Business Relationships*, requiring a greater involvement from the entire supply chain with their earlier engagement, and collaboration principles at the heart of

these projects (Rowse, 2015). An arrangement of fair incentivisation is required for fuller collaboration to be undertaken, and this is largely to do with adequate payment and profit achievement (Pinsent Masons, 2017).

BS11000 states that, by following its guidance, competitiveness and performance can be enhanced (BSI, 2010) and that the standard provides consistency and structure for integration of collaborative practices. Does the size of these projects mean there is more appetite and resource to afford collaborative practices rather than in smaller projects? Is it therefore suggested that collaboration is not a scalable commodity?

Khalfan, McDermott & Swan (2007) make some interesting observations in regards the size and complexity of projects which is summarised in Table 2.1.2 and indicates that there are complexities, and perhaps even contradictions, in defining the scalability of collaborative practice in simplistic terminology.

Project size	Positive trust aspect	Negative trust aspect
Large	<ul style="list-style-type: none"> · More time and scope to develop lasting trust relationships · More likely to invest in trusting relationship (individually and organisationally) · More opportunity to enter in to collaborative contract model 	<ul style="list-style-type: none"> · More operatives may lead to less opportunity to create trust relationships with wider team · Higher complexity equates to higher need for trust · More interfaces allows more opportunity for trust failure
Small	<ul style="list-style-type: none"> · Less people; easier to manage trust relationships · Less supply chain members enhances trust communication · Lower risk involved, may enhance trust availability 	<ul style="list-style-type: none"> · Limited number of trust opportunities · Shorter time frames may equate to less trust investment · Trust relationships might be task oriented rather than more strategic

Table 2.1.2: Project Size and Complexity, Trust aspects; developed from Khalfan, McDermott & Swan (2007)

The Construction 2025 strategy has led to the opportunity of carrying out trials of three new models of procurement:

Cost Led Procurement

Integrated Project Insurance

Two-Stage Open Book

It is the vision of the strategy that these trials projects carried out under the new models will provide evidence of efficiencies and set the standard for best practice (HM Government, 2013).

This researcher comments on the “new-ness” of these models, in that procurement to cost caps and open book approaches have been utilised historically. Another example is that open book accounting is noted prior to the strategy’s publication as being increasingly common (Constructing Excellence, 2009).

Pinsent Masons (2017) state there is *hard evidence* that new procurement approaches promulgate more efficiencies and effectiveness in both design and construction. They also state there are benefits in whole life costs and that these improvements should be influential for the industry’s Clients and consultants in making more informed procurement decisions.

2.1.8 Initial outputs and continued review

From the outputs of the initial literature review in advance of the Preliminary Study and the subsequent discussion of the themes arising in the Focus-groups, the key elements of the further research were noted as;

- whilst defining Client value is subjective, it appears that the industry is inefficient in delivering successfully
- Collaboration has been on Construction’s agenda for some years but has yet to prove its efficacy
- Building services add a further level of complexity in construction, and this largely lends itself to a more collaborative procurement approach.

- Early involvement of the building services supply chain may / may not affect the Designer's role or the commerciality of the project and is context specific.
- Given the ability to benchmark effectively, proving the benefits of collaboration should not be difficult despite the bespoke nature of many projects. Uncorroborated general statements on the benefits are viewed suspiciously.
- There appears to be no consensus on the assertion that the entire supply chain should be utilised during collaboration, nor that EVERY project would benefit from this approach.
- Bespoke models of collaborative procurement are reliant on context specifics to deliver to Clients' requirements.
- The view that collaborative procurement is best suited to large complex projects is not universally held. Some believe that the ethos of the approach is relevant to projects of any size.

Conclusions of the Preliminary Study noted prominence within the literature of the discussion of "trust amongst construction practitioners", and an "inertia of willingness to be involved in collaborative procurement" because of this. Comments from one of the Focus-groups wholly supported this assertion, commenting that there is a "lack of trust" in the industry coupled with no real "whole-heartedness" to support collaboration.

2.2 Further areas, subsequent to the Preliminary Study

2.2.1 Trust, *generally*, and amongst construction practitioners

Colquitt, Scott & LePine (2007) note that trust in itself is worthy of inquiry in many disciplines, as it is vitally important for effective working relationships. Meng (2011) states that a lack of trust is a major obstacle to collaboration,

Lencioni (2002) notes it as one of 5 dysfunctions of teams, and Erdem and Ozen (2003) state that the critical relationship between trust and organisational output has attracted increasing interest when assessing performance. Trust is a critical success factor and a core concept within co-operation and partnering in construction; that it is vital for enabling fully co-operative processes and systems, but that there is a lesser amount of research relating to trust in the context of construction projects (Kadefors, 2003). Where research has been undertaken, trust is recognised as being important for long term relationships, effective communication, efficient economic exchange, and attaining benefits (Jiang, Hennenberg and Naudé, 2012). Whilst there are significant examples of construction being adversarial, there is research indicating that trusting relationships also exist. Where trust is noted as a significant factor it also intimates positive business performance (Paluri & Mishal, 2019).

It was important to understand the *notion* of trust and how this works on an inter-organisational level as well as between individuals, and then how it manifests itself in the combative environment of construction and how practitioners approach the concept and its deployment. Huxham & Vangen (2000) state that it can be down to individuals from organisations to deliver successful collaborations, and that this can be degraded if the organisations are represented by others; this personal connection is likely to have, as its basis, a degree of trust.

2.2.1.1 What is trust?

“Remember that trust is a privilege and not a right – it is hard to win and easy to destroy” (Sabatier, 2014, p.5)

Definitions and classifications of trust *per se* are plentiful and verbose as is evidenced by Paluri and Mishal (2019) in their systematic review of literature in regards trust in supply chain management. Whilst it is important to reflect

on this, it is also essential to focus on the specific type or classification of trust relevant to this research. Hence, this review of existing evidence on trust is unapologetically selective in its attempt to posit a single definition for the purposes of the research; however a systematically focused approach has been undertaken including a wider review not referenced here-in. Those sources perceived as being most relevant have been summarised in Table 2.1.3 where definitions of Trust are detailed. A single definition of Trust relevant to this research is derived (in part) from these definitions.

Author	Description	year
Erdem (2003) (referring to Deutch (1960))	... is an individual's confidence in the intentions and capabilities of a relationship partner and the belief that a relationship partner would behave as one hoped	1960
Paluri & Mishal (2019), referencing Schurr and Ozanne (1985)	The belief that a party's word or promise is reliable and that a party will fulfil its obligations in an exchange relationship,	1985
Zsolnai (2004) referring to Sako (1992)	... is a state of mind, an expectation held by an economic agent about another, that the other behaves or responds in a predictable and mutually acceptable manner.	1992
Mayer et al (1995) as quoted by a number of articles	... the willingness of a trustor to be vulnerable to the actions of a trustee based on expectations that the trustee will perform a particular action	1995
Erdem & Ozen (2003) quoting Mishra (1996)	... one party's willingness to be vulnerable to another party based on the belief that the latter party is competent, open, concerned and reliable.	1996
Rousseau et al (1998) as quoted by a number of articles	... is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions of behaviour of another	1998
Paluri & Mishal (2019), referencing Zaheer et al (1998)	Inter-organisational trust is perceived by companies with respect to their immediate business partners in the chain - the confidence that the other party will not exploit the vulnerabilities of the other party.	1998

(Laan, Noorderhaven, Voordijk & Dewulf, 2010) referencing Nooteboom (2002)	An expectation that things or people will not fail us, or the neglect or lack of awareness of the possibility of failure, even if there are perceived opportunities for it.	2002
Kadefors (2003), who also quotes Rousseau directly	... is regarded as a psychological state, not a behaviour. It is not equivalent to cooperation, as cooperation does not necessarily need trust.	2003
Colquitt, Scott and LePine (2007) combining a number of authors	...a behavioural intention ... an internal action... action that inspires positive expectations on the part of other individuals (trustworthiness?)... ... some treat TRUST as a synonym for cooperation or risk taking	2007
Paluri & Mishal (2019), referencing Yavas and Celi (2010)	... was conceptualised as a belief, expectancy or feeling that is deeply rooted in personality and has its origins in an individual's early psychological development.	2010
Vaughan-Smith (2013)	... means confidence.	2013
Paluri & Mishal (2019), quoting Moorman et al, 1993	... the willingness to rely on an exchange partner on whom one has confidence, without worrying about the exposure of one's weakness of vulnerability, and considering the partner as credible , reliable and benevolent, thereby willing to rely on the partner.	2019
Google on line dictionary (2020)	firm belief in the reliability, truth, or ability of someone or something	2020

Table 2.1.3: Selected Trust definitions

Tyler (2003) discusses the division of rational (or calculative, or fiduciary) trust from that of social trust; in that rational trust is based on the issue of predictability of the behaviours or the competency of others, whilst social trust is more aligned with how motivations of others, their ethical stance and their fairness will lead them to believe that the trustee will do what is good for the trustor. Barbalet (2009) notes that *expectation* is the necessary precursor to trust, not cautious *calculation*; this polarises the division of the social from the rational further. Putting this into the context of a Construction project team,

where the reliance on specialists (Designers, Contractors) means that Clients may not be fully aware of likely actions (due to the expertise inherent), then there has to be another facet of the trust required. The *social trust* aspect is assumed in that Clients have to rely on this in the fair and ethical actions of those they employ and ultimately collaborate with and that they are fully competent. However, it could be argued that experienced Clients may not have to rely so much on social trust due to them being more likely to rely on rational, or fiduciary trust, as they have a higher degree of predictability of those they employ; this is particularly true when the same teams are deployed on successive construction projects. But the counter argument to this is that if Clients only trust those who they can predict the behaviour of (those they have previously worked with), they reduce their exposure to potential innovation improvement from the expertise of others. An absence of previous personal or resilient trust means that individuals have to rely on situation-based and calculative aspects as antecedents to initialise trust (Nilsson & Mattes, 2015). Trust, it is argued, may not be a rational judgement, however. More that it is developed iteratively and intuitively, largely in an unconscious way and with little tangibles to base it on; nevertheless it is an important social construct (Smyth, Gustafsson & Ganskau, 2009).

Clients often feel vulnerable in their relations with Contractors and the choice of a traditional contractual relationship is seen as less risky than entering into a collaborative arrangement (Kadefors, 2003). This signals to the Contractor that there is already a degree of distrust in the relationship. This hinders potentially beneficial cooperation by limiting cross-disciplinary teamwork, likely then having a negative effect on project performance.

Zsolnai (2004) describes 3 types of trust having an influence on an economic exchange (which would include a construction project), these being;

- Contractual trust – expectations directed by the written (in this case) contract that the trusting agents are entered in to ensure *promises* are kept and obligations carried out.

- Competence trust – expectation that the other party is competent and that they will fulfil their role within acceptable limits of competence. Aligns with Tyler's (2003) *rational* trust aspect.
- Goodwill trust – expectation of an open commitment to one another, in that the other's behaviours may fall out with the requirements of the contract *per se*.

The trustee being able to correspond to expectations is levelled within *competence* trust, and that this also reflects trust in the technical abilities, organisational capabilities and managerial competence of those being trusted (Laan, Noorderhaven, Voordijk & Dewulf, 2010). Consistent competence is then self-perpetuating in regards trust and its development, until that is evidence suggests otherwise. *Contractual* trust mediates those who might choose not to act in a trustworthy manner were it not for self-interest; limiting opportunities for opportunism and untrustworthy behaviour through contractual obligations, hierarchical pressure and dependency on relationships (Laan *et al*, 2010). The *Contract* is the trust controller, but there is a perspective that control and trust are inversely related. There is the opposite perspective however; that trust and control reinforce each other mutually, countering risks within and out with the trust relationship. This implies a close linkage between control and trust.

Jiang *et al* (2012) proposed that an element of the trust inherent is around dependence and control. Reflecting the above trust descriptions, they note that there is Contractual control (governance imposed by written guidelines) and Normative control (shared implicit principles and relationship framework). It is the Normative control that is more symptomatic of the parties trusting each other.

Gillespie & Mann (2004) note Cognitive trust, referring to the belief in the trustworthiness of others (what Tyler describes as rational), and Affective trust, which highlights the significant role that emotions have in the process of trust and trusting (closer to what Tyler describes as social). Erdem and Ozen

(2003) state that cognitive based trust seeks a rational motive to trust others, i.e. that others will perform effectively and consistently. They say affective trust comes from a more intense relationship with elements of benevolence and concern for the other party. They conclude that a trusting relationship as it develops may move from cognitive trust, more important at the beginning, to affective, depending on the experience.

Conley (2017) states there are 3 LEVELS of Trust within relationships, and whilst this is not specific to Construction teams, there are comparisons to be drawn to Zsolnai and a Construction setting.

Conley	Zsolnai	Construction setting
<i>Deterrence-based trust</i> - relies on rules and contracts to govern behaviours. Penalties if rules are broken.	<i>Contractual trust</i>	Contracts and rules of engagement dictate behaviours. Largely lesser trust anticipated.
<i>Knowledge based trust</i> - experience affords an understanding of behaviours and capability. The other is likely to have aligning interests	<i>Competence trust</i>	Multiple projects with similar team members appointed. Shared values and objectives
<i>Identity-based trust</i> - understanding of motivations of the parties, with equal openness, vulnerability and transparency	<i>Goodwill trust</i>	A degree of partnership uncommon in traditional transactional contracting between Clients and Contractors. Perhaps arises in full partnering arrangements

Table 2.1.4: Conley-Zsolnai Trust comparison

Conley does state that identity-based trust is not a level that is common, particularly in the business arena, and that it is usually reserved for those *most important* to us.

Kadefors (2003) stated something similar but not quite aligning with above. She noted that the 3 basic forms of trust were;

- Calculus-based trust : aligns with Zsolnai's *Contractual Trust* largely as there is economic incentive to trust and penalties if aspects are defaulted.

- Relational Trust : aligns with Zsolnai's *Relational Trust* due to it been formulated from repeated interactions and personal attachments that derive understanding of one and others.
- Institution-based Trust : This refers to institutions and legal systems and how these societal norms derive the propensity to trust and trustworthiness within an organisation or system. In this instance it has no direct correlation to Zsolnai's description.

Kadefors goes on to state that the lines between the types are sometimes blurred and also notes that the circumstances for trusting are not simply down to the individual.

"Trust is not a homogeneous phenomenon" (Zsolnai, 2004, p.57). It is ambiguous (Kadefors, 2003), multidimensional (Patrick, Rourke & Phillips, 2007), and a complex and multifaceted construct (Gillespie & Mann, 2004), and whilst trying to define trust for the purposes of this, that is wholly recognised. It is intangible, potentially something that is either there or not and unchangeable (albeit McDermott, Khalfan & Swan (2005) note its dynamism and potential to change subject to events), and due to this is somewhat avoided when considering strategy (Vaughan-Smith, 2013) and so is hard to manage (Patrick *et al*, 2007). The role that trust plays in the dynamics of teams or organisations is subject to the complexities of the realms of sociology (an area this research resides within) and psychology (an area this research has avoided) (Tyler, 2003). It is an important *resource*, embedding certainty within project settings and leading to higher probability of positive operational outcomes (Smyth *et al*, 2009). The act of Trusting requires certain characteristics to be apparent within a relationship to enable this. Colquitt *et al* (2007) (amongst others) note that in order for Trust to develop, or be inspired, there has to be appropriate degrees of *Trustworthiness* and *Trust Propensity*. These are founded on the combination of ability, competence, benevolence, character and integrity, all aspects of the nature of trust itself, along with predictability or consistency (Hope-Hailey, Searle & Dietz, 2012). Jiang *et al*

(2012) state the two key components in defining trust are benevolence (best intention) and credibility (acting on promises), but that there is also a degree of dependence required to enable the trust development. Trust development processes are complex and sometimes contradictory. The dynamic nature of this means that the out turn may not be predictable nor the same from project to project. Having trust-based collaboration within a construction setting is likely to be strongly influenced by emotion, intuition, sensitivity to behaviours and individual respectful actions (Kadefors, 2003). Patrick *et al* (2007) state that trust is seen to be at the heart of collaboration and the lack of it will decrease the outcomes of any efforts of co-operation. It is noted as being essential in a modern society (Lewis & Weigert, 2012).

Trust then, in the context of this research and the approach advocated, is potentially about members of networks believing that their network colleagues will go beyond the norm for the mutual benefits of them and the wider network, forming an emotional connection (Chinowsky, Diekmann & Galotti, 2008). Meaningful trust will make people act differently and therefore it follows that positive trust should engender positive actions in others. Social capital theory dictates that the more people engage in trust-centred relationships the more likely others are to participate in the same (Barbalet, 2009).

Both Latham and Egan highlighted the presence of trust as being a significant factor of success in construction projects, but there has been limited attention paid to the challenges and barriers to trust being formed within project teams, echoing the fragmentation issues levelled at construction historically (Khalfan, McDermott & Swan, 2007). Effective team working is fundamentally predicated on the presence of trust, without which teams will breakdown (Pinsent Masons, 2017) with failure likely being the outcome; trust is a critical enabler of cooperation (Tyler, 2003); a *required condition* for working as a team (Erdem, 2003). It enhances innovation, advances and improves collaboration, allows openness in communications, affords relationships commitment and can generate improvements in execution (Vaughan-Smith,

2013) (Gillespie & Mann, 2004). Transparency and the open discussion of issues within projects is a likely enhancer of trust, rather than ignoring or setting them aside (Laan, *et al*, 2010).

It is accepted that trust is a complex, multi-factored, issue but Khalfan, McDermott & Swan (2007) state that the three main important factors are honest communication, reliance and delivery of outcomes. In addition, it was noted that there was importance in appropriate timing of information transfer as well as the timing of delivery (doing something when an individual says they will) as well as a high degree of competence, and that construction was especially reliant on these factors. Zsolnai (2004) notes that competence and honesty equally determine trust structures required for economic interchange; doing the right things and doing what they say they will.

Similarly, there are number of key *building blocks* to trust, which are;

- Integrity
- Transparent intent
- Clear and obvious capabilities
- Track record of delivering on promises
- Ensuring the 'money is right' (being paid for the value added?)

(Pinsent Mason, 2017)

There is a clear connection and correlation between a number of pieces of the literature's assertions.

Reflecting a number of comments earlier in the literature review, Khalfan, McDermott & Swan (2007) summarise the key ways of developing trust, and these are:

- Experience – working with individuals repeatedly and successfully
- Problem Solving – Communicating issues and collectively delivering solutions
- Shared Goals – A conjoined understanding of aims of projects and the roles within

- Reciprocity – mutual support and reward when trusting behaviours are delivered
- Reasonable behaviour – Treating one another professionally, fairly and with respect and equity.

Which seem to align with some of the elements of effective team working from *various research* which are;

- Aligned vision (*shared goals*)
- Time to build the team (*experience and working repeatedly*)
- Clear roles and responsibilities (*Reasonable behaviours, understanding of roles*)
- Good communication (*Communicating issues, reciprocity*)

(Pinsent Masons, 2017)

And further alignment with what Erdem (2003) describes as the *appropriate social processes* required to activate trust;

- Intensive social relations (*experience and shared goals*)
- High confidence in others (*experience*)
- Help-seeking behaviour (*reasonable behaviour and reciprocity*)
- Free exchange of information (*communicating issues and reciprocity*)
- Giving priority to team objectives and needs (*shared goals*)
- High commitment and solidarity (*reasonable behaviour*)

In regards Intensive social relations, Trust concepts are critical componentry and currency for developing and maintaining social exchange (Colquitt *et al*, 2007).

Further to above, the Principles governing trusting relationships as noted by Vaughan-Smith (2013) are;

- Being clear and unambiguous (*communicating issues*)
- Demonstrating respect (*reasonable behaviour and reciprocity*)

- Keeping commitments (*reasonable behaviour*)
- Tackling issues (*communicating issues and reciprocity*)
- Being transparent and accountable (*reasonable behaviour, shared goals and reciprocity*)

2.2.1.2 Individual trusting

Trust, or rather the social motivation behind being trusting voluntarily, is considered personal and the motivations behind why individuals are willing to add value by being trusting are equally complex within a work setting (Tyler, 2003). The propensity of an individual to trust others is largely a dispositional personality trait and can rely on past experience formulating their general expectancy of others' reliance (Colquitt *et al*, 2007). The trust factors of *vulnerability* and *expectation* are influenced by an individual's disposition towards trust; if that individual is more disposed to being trusting they will perceive benefit from the social (or project based) interaction. This shows how intrinsically valuable trust can be (Laan *et al* 2010) in the context of this research.

Whilst trust may be induced through recommendation or reputation the most powerful influence on perceived trustworthiness is personal experience of the trustee (Patrick *et al*, 2007). Vaughan-Smith (2013) states that trust starts with the individual (the confidence they have in themselves) which displays credibility, and then ripples outwardly to others, individuals and organisations. He goes on to state that there are 4 core qualities of the individual;

- Integrity – doing the right things aligned with beliefs and values
- Intent – relating to motives and behaviours; straightforward and genuine.
- Capability – showing that talents, ability, attitude, knowledge and skill can be deployed effectively

- Results – track record of achievement and match expectations

The first two relate to the individual character, the second two regard competence. In Zsolnai's (2004) terminology these would be divided between honesty and competence. These 4 qualities, whilst noted as being for the individual by Vaughan-Smith, could be considered essential for organisations and teams working with others on construction projects and in wider fields. Gillespie & Mann (2004) note that team leaders, by displaying integrity and competence, communicate trustworthiness and engender development of trust within the team. The predictability that the leader should demonstrate through this approach and a transactional leadership style, also suggests they will respond reciprocally to the team members' displays of trust in a way that has mutual benefits. People show more trust in the motives of those who share a common or similar social background, and if they understand the motives behind why those who they are asked to trust are acting as they do (which is different to the predictability of actions); this is not linked to the degree of how accurately they can assess future behaviours of others either (Tyler, 2003). If relational trust does not develop through repeated interactions, then it may be likely that closer cooperation will not mature (Kadefors, 2003). But those that do trust their co-workers are more likely to be more open about potential weaknesses and failures, as they rely on the integrity of the other party to assist within the trusting relationship (Sabatier, 2014).

Voluntary cooperation, or collaboration, requires the motivation of the individual which Tyler (2003) states are driven by attitude in turn affected by the enjoyment of the individual's role or job and the commitment to the team. These influences on cooperative behaviours lead to motive-based trust from others and positively effect attitudes within the relationship as well as others' commitment. The consequences of both trust and commitment have similarities and overlap in regards team relationships (Paluri & Mishal, 2019). Colquitt *et al* (2007) state that those who have a high propensity towards

trusting are likely to appear more trustworthy to others, are better at building social exchange contexts (due to their adherence to reciprocity) and are more likely to commit to the relationship and protecting same. These individuals are likely to have an impact on the wider team and even broaden the decision-making network to improve overall performance. Those who appear trustworthy are perceived as being consistent, committed to the group's cause (rather than self-interest), transparent in their dealings, and display high degrees of integrity within a team environment (Sabatier, 2014). Jiang *et al* (2012) state that sustaining relationships requires careful management and the fostering of trust development, but in doing this, confidence is increased and effective exchange is sustained.

2.2.1.3 Trust within construction teams

As some individuals do not think about things going wrong, there are some that suggest that *trusting* is a default in some; assuming trustworthiness unless evidence appears to the contrary (Laan *et al*, 2010). It is unlikely that the construction industry has this default; rather the assumption of a lack of trustworthiness, or even mistrust, until evidence shows the contrary.

Transactions and economic activity are vicariously affected by trust, and this is no different in construction, a complex situation (Paluri & Mishal, 2019). Whilst organisational needs should encourage trust-based cooperation, the mobility and temporary nature of construction teams means that trust relationships are potentially more complex to derive and maintain, due to the requirements to enable trust to develop (Tyler, 2003). There is difficulty in developing trusting relationships, but there is an assumption that construction project's see performance improvement when these types of relationships exist; although there are examples where partnering projects do not show high performance (Laan *et al*, 2010).

It is recognised that trust has an element of *two-sidedness* (Laan *et al*, 2010); but the idea that trust is inherently a dyadic relationship (Paluri & Mishal, 2019) is potentially too simplistic for application within a construction team

scenario. In addition, the differing definitions and interpretations of trust mean a lack of clarity in the concept and practicalities of building trust up and down the supply chain (Paluri & Mishal, 2019). Whilst project success is likely to rely on the effective coordination of the parties that trust and collaboration bring, the mechanics of developing and maintaining these collaborative relationships between Client and contractors are complicated and challenging to manage; almost purposefully so, as Laan *et al* (2010) observe. They go on to note that, given the significance that the development of trust assumes in the construction industry, there is the case for cultural change within the industry to develop the skills and breakdown barriers to collaboration engendered trust, and that previous experience could be a factor in this. They also state that trust is likely to arise only when the partners are more focused on optimising the relationship, rather than self-interest. Gillespie & Mann (2004) ask if shared values are necessary for establishing trust or are they something that only enhances trust but is not essential? It is suggested here that, in terms of construction teams, the second proposition is most likely; and that shared values may not be necessary.

In smaller organisations, such as construction teams with a degree of autonomy and low levels of outside influence, solidarity and cooperation requires individual trust to ensure effectiveness, rather than corporate or organisational procedure and, due to its criticality, it means that cooperation and trust require to be considered as synonymous behaviours (Erdem, 2003). There is an element of voluntary exchange which necessarily is based on trust in the relationships between Client and consultant primarily (Ive & Chang, 2006), but by extension this must also be the case where contractors are acting in an advisory role. Trust is an enabler; creating team spirit and allowing the protection of this through solidarity and collaboration. Trust has an affect; the outputs of teams and organisations are directly and indirectly transformed (Erdem & Ozen, 2003). It is the case that high performing *Self-managed* teams have a significant degree of trust in their leadership, but that this is influenced by a consultative leadership style which involves the view

and expertise of team members along with common shared values (Gillespie & Mann, 2004).

An individual's motive-based trust within a team setting is linked to their perception of the character and motives of the other team members and where other methods of trust enabling (rational trust) are lacking, i.e. within a newly formed project team where personal history does not exist, motive-based trust is essential to swift trust forming and delivery from the outset. (Tyler, 2003). Whilst differences are inherent between the concepts of inter-personal and inter-organisational trust, there is a close relationship, and some make little distinction. Where inter-personal trust is not yet formed there may be a reliance on that between organisations, but care is advised in the instance where individuals might be subject to influence from the *organisation* and do not perform as expected in the trust forum. Reciprocally, inter-personal trust relationships can be constituent in the nurturing of inter-organisational trust development. The *Trust-Control* association also plays a part in this, influencing performance and shaping the development of the relationship. This in turn leads to opportunities for risk and opportunity sharing, enhancements of the relationship, better problem solving and outcomes that are mutually beneficial (Laan *et al*, 2010).

Within cross-functional teams (contextually a Construction project team) with new working relationships requiring formation, the *propensity* to trust takes on a more significant importance (Colquitt *et al*, 2007); it is likely to be the most important factor in how trust relationships form. If individuals are not inclined to trusting characteristics the team formation may be impacted, and even if others display trustworthiness, the leap to a team-wide trusting environment may not be achievable. It is generally accepted that the more trusting a relationship, the more communication is likely, and therefore management and project outcomes are more favourable. A consistent measure of how a relationship has impacted on performance is how satisfied the parties are (Laan *et al* 2010).

Trust has a significant influence over the management of projects and is at the very heart of better procurement, rooted in the assertion that it is fundamental to human interaction and the behaviours there-in, albeit parties do not need to trust to be able to cooperate (Brewer & Strahorn, 2012). It is stated that trust within a relationship has a higher import than incentive systems, as they in themselves do not engender trust development, more so they symbolise a lack of trust and commitment (Bresnen & Marshall, 1999). Best Practice collaboration has, at its centre, trust (Court, 2016) and if individuals tend to trust *people* primarily, rather than organisations' reputations (Khalfan, McDermott & Swan, 2007) then it is at a granular level that trust is developed and conversely lost, especially when it is considered that individuals are *only human*. An organisation's *reputational* trust may be an indicator in individual's tendency to trust, but then it may also be a factor in an initially uneducated lack of trust. A lack of trust is attributed as the factor having the highest significance when it comes to failure of collaborative construction projects (Akintoye, 2007). Khalique (2021) lists trust as one of six *essentials* in leadership capability for achieving collaborative success.

Collaboration needs trust, but not at any cost (particularly relevant in construction) and nor should it be unconditional. Kadefors (2003) insists there is an optimal level of trust in a given situation, dictated by the interdependence between the social exchange partners. However it is to be noted that trust and dependence are not the same thing (Jiang *et al* 2012). When trust is too highly regarded, misplaced or overarching of other aspects of the team, leading to roles and actions being subverted or diminished, this will have a negative effect on the team performance (Erdem, 2003). Many note that having shared values is a requirement for establishing high levels of trust and, if sharing exactly the same values, can lead to trust that is *unconditional* (Gillespie & Mann, 2004). Erdem & Ozen (2003) note however that where unconditional trust leads to a lack of constructive criticism, effectiveness can be affected negatively. Too much emphasis on solidarity

rather than a positive *challenge* ethos impacts on overall performance. In transactional contracting, whilst some values may be common, it is unlikely that there will ever be this level of symbiotic trust between Client and contractor teams, but this does not necessarily dictate negative outcomes. A high degree of trust, amongst other benefits, can reduce the cost of transactions and monitoring, and increases the likelihood of knowledge transaction or transfer (Hope-Hailey *et al*, 2012). Kadefors (2003) says that even when a collaborative approach is adopted, the complexities around developing and maintaining trust coupled with those inexperienced in collaborative relationships can increase the risk of reverting to traditional construction relationships. Given that Clients are concerned with the cost, quality and delivery aspects of their projects they need to be assured of the believability and integrity of the organisation who is undertaking this (Bates, 2010) and the trust aspects of this are not always apparent. Perceptions of lack of trust can generate downwardly spiralling trust relationships; the organisations perceive that their partner is less trustworthy than initially thought. This leads to a higher perception of risk. To combat this an increase in control is deployed to counter the degraded trust. Couple this with the perceived performance weakness and trust is degraded further (Laan *et al*, 2010) in a dynamic sense. Jiang *et al* (2012) reflect that the construction industry is characterised by low levels of trust due to the inherent fragmentation within the short-term relationships but where relational quality is experienced, this is driven by high levels of interpersonal trust between the parties. Activities such as opportunistic behaviour (the lack of benevolence) or advantage seeking have an impact on trust levels, inducing uncertainty (Paluri & Mishal, 2019), with trustors understanding they face the risk of this within their interactions on projects (Laan *et al*, 2010).

Erdem (2003) notes the aspect of both trust and distrust having positive outcomes; it is further noted that the element of distrust enables identification of unfavourable and undesirable behaviours. In a Construction team environment the distrust element keeps team members “honest” along with a

degree of *self-policing* activity. If excessive trust is active, without suspicion, behaviour of detriment to the development and construction process would be exacerbated and outcomes may be sub-optimal. It is the balancing of the right levels of solidarity and trust that teams delivering construction teams are seeking to maintain. Distrust is displayed through behaviours such as diversity seeking, alternative proposals defence, scepticism of others' proposals, questioning of decisions made, and higher levels of criticism; all key aspects of construction team behaviours which can prove conducive to problem solving activity. It is entirely possible to have different views within a team but still have strong team spirit and provide effective outcomes. If the emphasis on having a high degree of team trust is too great (trust beyond all else) it may dissuade team members from raising potential conflicts or issues, so as not to damage the team spirit; this then degrades team effectiveness and has a further negative effect on individual's performance. Solidarity, support, and a generally trusting team environment should be the backdrop for a team who are able to question, critique, inquire and challenge for the benefit of the project outcome.

Zsolnai (2004) touched on levels of trust and distrust within his comments on economic interactions, along with negative trust and a lack of trust and how this relates to honesty and competence. Table 2.1.5 describes how trust is generated from high levels of honesty and competence, whilst distrust comes from a lower level of competence rather than lower levels of honesty. Vaughan-Smith (2013) says that the opposite of trust is distrust (suspicion). In the context of the benefits of distrust in teams it is suggested that Vaughan-Smith is potentially being too simplistic, and that a lack of trust would be the opposite of trust when considering a (even only slightly) wider measure, as Zsolnai indicates.

Competence	High	Low
Honesty		
High	TRUST	DISTRUST
Low	Negative trust	Lack of trust

Table 2.1.5 : Trust Competence comparison, from Zsolnai (2004)

He goes on to state that agents should invest strategically in trusting structures and reduce exposure to distrust. He also says that negative trust is to be avoided, where as a lack of trust can be exploited in certain circumstance, but that these manner of structures are inefficient economically. Overly close monitoring of performance or other actions signalling that an agent is not trusted can lead to distrust within the relationship due to the subsequent reliance on a less personal trust form; calculus-based rather than relational (Kadefors, 2003).

Enhanced trust within teams allows team members higher confidence in taking risks in activities or proposals (Erdem, 2003). Stability of the relationship requires levels of credibility, a building of faith, a degree of reliance and high confidence (Paluri & Mishal, 2019) within the team structure. Some directly correlate trusting activities to behaviours that indicate risk taking, but there is a requirement to distinguish between risk-taking *per se* and the act of being willing to be vulnerable (Colquitt *et al*, 2007). Note that the results of their research indicated a *moderately strong relationship* between risk taking and trust. Jiang *et al* (2012) note that a high level of trust reduces the perception of risk, increasing confidence instead. Risk-reward arrangements can facilitate trust development and encourage more open and equitable arrangements within a contractual setting. This also then develops other, more optimal behaviours, such as knowledge transfer and transparency. The economic incentives in these arrangements clearly show that there is legitimacy in the cooperative behaviour and are likely to enable further improvement (Kadefors, 2003). Contracting firms can derive advantage through trust-based relationships and collaborative synergies with

their supply chain, but relationships such as this can fail through a deficit in that trust account that enabled the relationship in the first place (Paluri & Mishal, 2019).

2.2.1.4 Trust leadership

Whilst individuals can manage their own trusting behaviours within the context of governance and procedural teamworking, leaders and managers are required to develop an environment enabling trust and motivate the conduct needed to enrich trust (Tyler, 2003); to motivate others to perform beyond expectations and beyond their own self-interest for the betterment of the team (Gillespie & Mann, 2004). They are required to lead through exemplary problem-solving, expert organisational skills and high-quality communication (remembering that *trust-maintaining* communication is not a one-way concern (Hope-Hailey *et al*, 2012)); they should be consistent in their approach and operate in an environment of honesty (Sabatier, 2014). To ensure the maintenance and audit of the trust within a team environment, the leader should look to share control when feasible and operate in an open-minded and fair manner (Erdem & Ozen, 2003). They should understand that trust plays a powerful part of organisation and is unlikely to take place effectively without trust between individuals in the team; this may require displays and reciprocity of trust, thus demonstrating vulnerability (Gillespie & Mann, 2004). Showing trust in a relationship tends to generate reciprocity within that interaction (Kadefors, 2003) but one party is likely to be dissatisfied with the social exchange relationship if the other party is perceived to not be displaying the same reciprocal trust or trusting behaviours (Jiang *et al* 2012). It should also be noted that trust relationships may be distinctively different between individuals and their leaders, compared to co-workers or team members (Colquitt *et al*, 2007), but that performance improvements and the solving of problems increases as the team develops effective and cognitive trust dimensions, whilst instance of mistakes being made or a degradation of quality decreases (Erdem & Ozen, 2003).

Whilst it is stated that leaders play the primary role in founding and evolving the team's trust and that trust in leadership is important to function effectively (Gillespie & Mann, 2004), too much trust in the leadership may mean that there are less challenging behaviours towards the team norms, which leads to less dynamism (Erdem, 2003). There should be commonality of vision and shared values between the leadership and the team, but also be an element of reliance on the team members where they have enhanced or a higher level of technical knowledge (Gillespie & Mann, 2004); this being particularly relevant in construction teams with both Designers and Contractors arguably having a greater depth of knowledge than those potentially leading the team.

2.2.1.5 General trust principles applicable to this research

The relationship between trustworthiness, trust propensity and trust are noted as being an individual position but is significant in how these impact on teams. The three aspects are also moderated by one another so, whilst some team members may have a low propensity towards trusting, the trustworthiness of others may mean a degree of mitigation (Colquitt *et al*, 2007). Further, as a construction team relies on the abilities of the members as well as their integrity and their benevolence towards others, these antecedent characteristics should be of benefit to trust and how this effects outcomes, *if* they are present. These three qualities are considered necessary for trust to develop (Kadefors, 2003). Integrity is one aspect which Colquitt *et al* (2007) specifically state is of higher significance in predicting trust within a team in industries akin to construction. Where the relationships have a leader-centric status the importance of integrity is not understated; it is an ethical construct and fundamental to trust (Wood, McDermott & Swan, 2002). The nature of the trusting relationship provides an accurate prediction of the nature of the overall relationship between Client and contractor (Paluri & Mishal, 2019). Traits such as ability, fairness, reliability and commitment fulfilment are noted specifically; relevant to the Client-contractor relationship at the heart of the collaboration issue.

Paluri & Mishal (2019) provide tables of ‘Antecedents of Trust’ and “Consequences of Trust” with in their systematic review. Earlier in this review Hughes *et al*'s (2012) list of key aspects within collaborative construction projects was referred to. A correlative comparison is included in Appendix B reflecting the key link between requirements for trust and effective collaboration. The vast majority of the antecedents and consequences have a direct correlation to the factors as described by Hughes *et al*, indicating an inexorable link between trust and collaboration.

2.2.1.6 What is trust? A definition

Based on the evidence reviewed, the definition for trust in the context of this research is;

Trust is the psychological state of construction project team members whereby they have confidence in others' ability and intention to perform or provide as they have stated they will, in a credible and predictable fashion; and that related behaviours are mutually acceptable, exchange based and reciprocated.

2.2.2 Inertia of willingness to be involved in collaborative procurement

Returning once more to *the problem*, the literature directs that there is a lack of understanding of why collaborative procurement approaches have not been more widely utilised in the area of building services. This is in the context of both industry and academy. It is stated by Pryke (2012) that the very process of delivering buildings requires more interaction from those involved throughout the supply chain (the industry), in order to solve the project problems, and that these processes require a more sophisticated review (the Academy). Lester (2020) states that for the Academy to enhance the construction industry's success there must be a higher degree of collaboration on an equitable basis and that, done correctly, this could be transformative.

Whilst there is an internal commitment to deliver change in line with Governmental directive, the construction industry still seems to be displaying

an institutional inertia (Bresnen, 2013) (Pinsent Masons, 2017), a reluctance or resistance to develop this change (Vennström & Eriksson, 2010) (Meehan & Bryde, 2010) (Vilasni *et al*, 2014). A commitment can only be successful if those committing can find agents and agencies who are able to enact its delivery (Smith & Love, 2015) (Watermeyer R. 2012a); the gaining and maintenance of this commitment is essential for success, but it is acknowledged that within alliances it is difficult to develop commitment (Cheng *et al*, 2003).

The fear of change

The future success of global construction will likely rely on effective collaboration between all involved and should therefore be at the very core of the industry (World Economic Forum, 2016). Jiang *et al* (2012) note that competitive advantages can be achieved through long-term relational arrangements based on trusting orientation.

But, in uncertain or volatile times the act of collaboration in itself may be undermined or deprioritised as individuals and organisations seek to protect their positions, their livelihoods and even their continued presence within the construction industry. This position ultimately reduces effectiveness, trust and increases uncertainty (Court, 2016). There may be an argument for a redefinition of consultant roles with a higher focus on collaborative working for those traditional professionals who are yet to grasp the benefits of this approach, involving retraining and enhanced development (Pinsent Masons, 2017). Despite change being seen as a constant within construction, there are those who are reluctant to embrace change or are actively resistant, particularly where there may be perceptions that changes bring requirements for additional burdens or responsibilities (Cheng *et al*, 2003). Similarly, there is noted reluctance from some Client bodies and advisors to engage in a process where a degree of control or of ultimate decision making is lost to others (Pinsent Mason, 2016).

The ability to be flexible, to be able to adapt to situations, changing contractual and procurement environments, is necessarily based on a high degree of trust. In an industry where trust has a high commodity cost, the willingness to adapt within a collaborative arrangement at the cost of over-compromise is unlikely to be palatable to many organisations or individuals unless, that is, suitable flexible contractual arrangements do not disadvantage the parties (Court, 2016). Inertia is said to result from some quarters due to the comfort found in existing and familiar contractual arrangements, ones which do not support collaboration of supply chain engagement, and there is little commercial incentive to change (Pinsent Mason, 2016). Reflecting earlier comments, the construction industry is its own worst enemy; convinced of a need for change to adapt to survive and develop, but with a deep-rooted reluctance to change *well-trodden* procurement routes and working practice. It is an industry that requires something to *go wrong* before the requirement for change is identified. Change for the sake of improvement without an imperative is harder to justify in some quarters of the industry (Pinsent Mason, 2017).

Brinksmanship and mistrust

A further reason to not be entirely collaborative is centred around the status aspects of knowledge ownership. Having the knowledge and using this to gain or cement status within a team can sometimes lead to *anti-collaboration*. This could be an aspect of mistrust within the team environment, or the belief that the knowledge shared may not be used in the ethos given or even mis-used (Patrick *et al*, 2007). But Jiang *et al* (2012), referring to social exchange theory, say that mistrust inevitably leads to further mistrust and the degradation of commitment to the relationship; a commitment which, by its very nature, is resultant on trust (Paluri & Mishal, 2019). A distrust of active collaboration is noted as a factor of the combination of fear of the unknown and inertia, inhibiting progression (Pinsent Mason, 2016). It is mooted that it is

the *people* involved in a collaboration that create advantage, which carries more weight than inertia experienced (Huxham & Vangen, 2000).

2.2.3 The sharing of knowledge

Best practice approaches direct that improvements across the global industry, and the closing of industry inefficiency gaps, will be met through enhanced knowledge transfer and sharing; it is argued it is a fundamental requirement and that it should be undertaken on a cross-industry basis, along the value chain and be facilitated by industry driven initiatives (World Economic Forum, 2016). This will require enhanced, better, collaboration amongst all actors within the industry. Dougherty (1999) notes that knowledge transfer is to do with connection between individuals and their behaviours; about “connection” rather than “collection”.

Defining the concept

In defining Knowledge Transfer we need to be clear on the context for this enquiry, and this is two-fold; in an academic sense and in practical, construction, terms. But it also involves the interface between the two. Academically, the intention is to transfer the implicit, tacit, knowledge of the practitioners to the Academy in a suitable format that is both then explicit and potentially generalisable in other contexts. There is however a feedback element to the nature of this in that, by involving practitioners in the research methodology, a degree of academic knowledge is transferred to the industry agents however subtly or accidental. This then is a key aspect of the broad range of activities supporting mutually beneficial knowledge collaboration, with tangible elements of expertise and experience being exchanged suitably (Minshall, 2009). For the industry, the practical aspect of knowledge transfer; this is carried out in a number of ways; through verbal communication, training (formal and informal), briefing papers, presentations, meetings (and their subsequent record), and by the implicit passing of experience and expertise between operatives in a project or programme sense, along with the explicit

knowledge transferred through drawings, specifications, schedules and data transfers. Those with experience in prior settings similar to projects subsequently involved in are able to transfer this knowledge freely; this includes clients, consultants, contractors, and supply chain members. Knowledge transfer should not be considered easy, free, or simplistic; it requires effort from those participating in the exchange and relies on openness (trust, no less?) and supportiveness. As Minshall (2009) says, “*it is a contact sport!*”

Reliance on other aspects – its all connected

One reason cited for undertaking collaboration is that it enables and enhances information sharing (Pinsent Mason, 2016). For improvements to be made there has to be an integration of contractor and Client, with aligned cooperation, coordination and collaboration, and high levels of trust; exchange of information is reliant on this (Laan *et al*, 2010). Pinsent Masons (2017) state that there is further research required to better understand what drives better performing projects, their supply chains, and a focus on genuine value enhancement. Team members’ trust in leadership is increased when their input is considered equitably but diminished if their input is not considered appropriately (Gillespie & Mann, 2004); this indicates that where different views on the plausibility of the input from different members of teams is noted, a hierarchy of contribution may be perceived. This may have an impact on the propensity to share knowledge.

At team or individual level the transfer of knowledge is largely predicated on a reciprocated level of trust; trust that the knowledge will be used effectively, competently and reliably. It is based on mutuality and fair exchange, and that the information receiver can be trusted not to use the information provided against them in some way. There are noted positive connections between team trust and performance and that this may be more acute where team members rely on knowledge shared by other team members (Morrissette & Kisamore, 2020). The organisation or team need to be active in creating the

environment, through socialisation techniques or the like, for the evolution of the trust required to facilitate suitable knowledge transfer (Patrick *et al*, 2007). In addition Jiang *et al* (2012) note that when the two parties relevant to a construction contract have reciprocal trust the relationship grows and affords enhanced transfer of knowledge. They also state that trust is a critical component of the transfer of meaningful information due to the vulnerability aspect of information offering. Trust is both an antecedent and a consequence of the sharing of information (Paluri & Mishal, 2019)

This research, and its approach, contributes to sharing of knowledge and aims to contribute to the development of both academic and practical knowledge and aspires to improvements in the practice (Chynoweth, 2013a) of collaboration and of procurement of building services.

2.2.4 Updated evidence aspects

Given the prolonged review of existing evidence, starting prior to the Preliminary Study formulation and continuing through the process of writing up the thesis, it is considered appropriate to make comments on latest literature and commentary on the subject areas.

Construction 2025

The aspirations of Construction 2025 where to make specific reductions within key areas of the construction industry; initial and whole life costs, construction programmes, greenhouse gas omissions, the trade gap of imports/exports of products and materials, through collaboration with the industry. The Construction index (2022) notes that there have been some improvements on the first three aspects, though this is not quantified in any way. How this has been achieved is also not entirely clear; whether it is through collaboration directly is not noted. Arguably the targets set are unlikely to be achieved fully in any case aside from that of the reduction in emissions, largely due to legislation in this area (Construction index, 2020). However, there are key

national and global economic issues that are likely to have had an impact on the ability to meet the targets set, especially those regarding the trade gap.

Conversely, Maher (2022), a construction industry recruitment specialist, stated (in May 2022) the following in regards target-meeting;

- The Office of National Statistics advises that year-on-year construction output growth had surpassed the targets of Construction 2025, but that this was not the entire picture. Large infrastructure projects were skewing this value and in some sectors, residential for example, there was a significant decrease compared to pre-covid values. There is increasing concern over energy and material price increases which are likely to also have a profound impact on this target.
- In regards the lowering of Construction costs by 33%; this is also being significantly impacted by the post-covid material cost increases, to the tune of an increase of more than 25%
- In trying to secure growth opportunities, in regards swelling the industry's ranks by at least 60,000 jobs; this has been met successfully in 2022.

Maher also comments on positivity within the construction industry and regarding the Construction 2025 targets. This then somewhat contradicts the earlier commentary, suggesting a mixed view of being able to deliver the targets. This is reflected by speculation of "uncertainty" within the industry as significant economic headwinds are encountered. What is not apparent from the reports reviewed on the progress of Construction 2025 is the impact of collaboration within the industry and how this is affecting outcomes.

Collaboration as a key industry driver

Leadership organisations within Construction continue to espouse the need for further collaboration and to establish methodologies and vehicles to drive the industry to "*Work together more effectively to meet the infrastructure delivery challenges*" (Construction Leadership Forum, 2022, p.3). A very recent publication, October 2022, the "Scottish Construction Accord"

(Construction Leadership Forum, 2022) shares a vision of how the Scottish public sector will collaborate dynamically to create effective working and to enhance the positive contribution made by the industry to the economy, to society and in an environmental sense. It talks of restructuring construction procurement procedures, and being transparent about construction pipeline forecasts, all aspects discussed in earlier literature. It also discusses improving outcomes through collaborative working arrangements between public sector clients, construction deliverers and their supply chains, and minimising the interface challenges between the same actors in the delivery chain. The aspiration to support the transition to net zero is also noted along with a drive to maximise whole life cycle approaches and the benefits of the circular economy to provide value enhancements. These specific aspects will have reliance on engagement with Building Service supply chain members and will be contingent on collaborative interaction.

The participants in the accord recognise, specifically, that trust and behaviours have a significant impact on how construction relationships work, and that all parties need to work hard on the contractual environment to sustain the trust within relationship settings. Where disputes arise, resolution should be sought through collaboration rather than defaulting to a conflict model.

In HKA Global Limited's 5th annual report (2022), titled "Battling the headwinds", they reflect on the global issues facing the industry and have a focus on dispute causation. It is reiterated that contracting comes with significant risk and that, in time of increased uncertainty, there is a greater need for collaboration to assist in the identification and equitable mitigation of inherent risk through the supply chain to enable successful delivery. They note that earlier engagement with contracting organisations would be one way to pre-empt, and therefore be able to deal with, potential conflict-inducing issues. Reflective of earlier evidence, they state that in these turbulent times the mindset of the industry needs to change to provide certainty of long-term work pipelines, and that a focus should be placed on value of outcomes of

delivery. They also note a requirement for more equitable balance of risk allocation within projects through collaborative procurement alongside recognition that this may require an external intervention, political leadership even, to resolve the industry's fundamental flaws. This is wholly reflective of various aspects of earlier evidence reviewed and whilst it supports the overall thematic review, it is somewhat frustrating that these observations are still being made with no resolutions, albeit they note that there is now (only now?) a recognition of the need to change with publications like the UK government's Construction Playbook, and pointing to global instances where commonly adversarial models of contracting are shifting to more collaborative approaches. It is observed that this means a potential move away from traditional, fixed price lump sum, contracts to enable the deliverers of projects to be less susceptible to cost escalations and market inflation; it places asset procurers, Clients, in a less protected position but might mean the only way of procuring where Contractors are unwilling or unable to shoulder the burden of risk. Inevitably this should mean increased instances of negotiated and collaborative procurement models with Contractors being involved throughout development and delivery. However, the report identifies that in some global jurisdictions there is less understanding of Collaborative procurement models and therefore reluctance to adopt these approaches. This reflects the evidence reviewed previously where reluctance to change due to lack of awareness or knowledge is identified.

Leading change – The Construction Playbook

As noted above, the UK Government recognise that senior leadership is crucial to transform the poorly performing construction industry and enhance delivery of better assets in the future. The Construction Playbook (Cabinet Office, 2022) is a compact between Government and Industry, is established on collaboration and working together and, ultimately is a guideline developed to deliver value; value in a sense of economic, sustainability and of social outputs. The key elements of the publication relating to this study are;

- Clients setting clear and measurable outcomes, and the how the value of the outcomes will be assessed; advising the key priorities to enable deliverer's understanding.
- Early engagement with supply chain – to develop solutions to Client requirements and to employ collaborative approaches.
- Ensuring that project teams are formed appropriately based on the correct expertise
- Fair procurement approaches which seek to afford contracting organisations equitable and sustainable margin attainment, ensuring long term industry health.
- Understanding and the notification of comprehensive work pipelines with suitable “lookahead” publication so that the industry can respond to public sector needs appropriately.
- Appropriate and collaborative risk management, allocation and mitigation approach so that those best positioned to deal with risks are able to do so suitably.
- That risk allocation within a contract not be done inequitably; the principles of contract profitability and a “fair return” should be immutable for a long term sustainable market.
- The use of Frameworks which are created in accordance with high standards set (“the Gold Standard”), to deliver efficiencies and savings and avoid duplications and the like.
- Use of effective construction contracts with degrees of standardisation and to include collaboration clauses, risk management techniques and methodologies to improve value.
- That the principles of the playbook are deployed throughout the entire supply chain, so that the entire industry is aligned in this regard.
- That the Playbook is **mandatory** for central Government and its related agencies. Where parties are not acting in the spirit of the Playbook,

those party to it are encouraged to make contact with the cabinet office; active policy policing.

- Annual updates and review of the Playbook policies and their implementation

What the Playbook appears to do then is capture a great deal of the aspect of this research and provide active leadership in trying to answer the well-documented issues around construction contract conflict and other areas. Whilst it does not speak directly to the area of Building Services procurement, the fundamental parts highlighted here are wholly connected to this aspect, where the necessity for greater collaboration is arguably more acute. Another aspect not listed above is in regards the classification and harmonisation of data environments; this area is a key aspect of coordination of Building Services with themselves and other building elements.

Even in his Foreword, Alex Chisholm, highlights the importance of the construction sector to the UK's economy and how essential it is to seek improvements in key areas such as delivery, the building of schools (and other infrastructure assets), Governmental leadership, and the bringing together of cross industry expertise. This supports the outline premise of this research; that there are potential improvements in how procurement is undertaken.

A further publication (Department of Levelling up, Housing and communities, 2022), focussing on how collaboration can improve safety also highlights four key proposals that are generally applicable to seeking improvements in procurement processes and, again, reflect fundamental areas of this research. These are;

- Selection of delivery by means of value rather than lowest cost
- Early supply chain involvement
- Collaborative relationships
- Integrated transfer of information and knowledge that links design, construction and operation.

The Gold Standard

As noted above, the use of *high standard* frameworks is advocated within the Construction Playbook, given the noted inconsistency in available frameworks' outcomes. This instigated a review of Frameworks to be undertaken by the Cabinet Office, led by Dr David Mosey, to see how better developed frameworks could be the driving force in implementing many of the recommendations of the Construction Playbook in areas such as integrated planning and better project outcomes (amongst others). The review notes that the variety and efficacy of the amount of frameworks available leads to their potential being misunderstood and therefore success outcomes are not always achieved (Mosey, 2021). These poor outcomes are plagued by inconsistent leadership, ineffective professional advice, and low levels of client commitment.

One of the noted key policy reforms from the Playbook recommendations was in regards 'Effective Contracting', with aspirations to guarantee that projects and the procurement and contract vehicles used enable the improvement of value, ensure collaboration, allow data (knowledge) exchange, and improve the management of risk.

Supply chain members note how the uncertainty around the extant frameworks and the pipeline of opportunities means that the aspiration to improve value from the industry is hard to attain. It is also noted that client leadership needs to improve to invest fully in better procurement management to ensure value improvements through transformative arrangements. Procurement models, frameworks included, need to provide detailed direction on Client value objectives so that the supply chain can act upon these effectively, meeting outcome expectations.

The "Gold Standard", it is stated requires the following, relevant, aspects to be fully considered to enable effective delivery;

- Outcome based strategic brief, with details on how this brief is to be measured against

- Committed collaborative multi-party relationships, centred around clear objectives, measures for success, and value improvement ideals
- Intelligent early supply chain integration and open collaboration with same
- Transparency in commercial discussions; fair returns and profits in return for value offerings
- Management systems that manage risk, avoid disputes and support collaboration

These reflect the themes already highlighted from earlier evidence review and reflect the areas where this research seeks to understand how improvements can be sought.

2.3 Discussion on the overall themes and gaps and how the research responds to this.

The review undertaken parallels and contributes to the Research Objectives outline in Chapter 1. The overall themes for the research are therefore;

- How trust impacts or affects collaborative behaviours in the context of construction procurement
- How levels of trust affect key project knowledge being transferred between project agents
- The impact of undertaking early engagement with the building services supply chain and how, in turn, this affects delivery of Client defined value.
- What affect the manner of Client defining value objectives has on project delivery
- How closely linked teams deliver in an environment of collaboration where trust levels are disparate or unequal

As is discussed elsewhere in this thesis, the “gap” highlighted is largely between the research element, the knowledge generating Academy, of the Built Environment and the Practical application of this knowledge through the Practitioners. That the most recent publications on the themes identified tend to repeat the same issues that are highlighted from the earlier literature reviewed; this indicates that the gap noted is very much research worthy. There appears to have been very little progress in the period of the evidence review despite the recommendations for improvement identified.

The review notes that there is less written about the collaborative procurement of building services along with the practicalities of dealing with the complexities of delivering the procurement requirements of Clients. There are few case study observations in this context. Whilst there appears to be a fair amount of existing evidence on the effect trust has on construction delivery, there appears to be less evidence of practical observations of this in an active environment. The opportunities for active researchers to be able to have access to an environment of practical delivery are few. So the response in this practitioner-researcher model to that highlighted gap should be relevant in practice AND relevant in adding knowledge to the Academy with an appropriate amount of academic rigour. The deployment and involvement of the researcher within the teams being observed is a relatively unique view on the practicalities of the themes generated and, as commented on by Chynoweth (2013a), may be challenged by those with a bias towards more academic research notions. He goes on to note that there is a rich tradition, harking back to Aristotle’s concepts of episteme and techne, of knowledge derived in action. This practical knowledge paradigm is recognised in research addressing human interaction and activity. The well-established method of Action Research is one concept where this practical application is utilised and whilst it might not be perceived as having the rigour of traditional scientific approaches, the generation of this style of Mode 2 Knowledge (Gibbons *et al*, 1994) is acknowledged as being academically rigorous. Whilst the academic rigour could be measured through a purely scientific (Mode 1)

lens, given the nature of the enquiry it might better be evaluated on how useful or applicable it is for both the Academy and Practice.

This uniqueness is enhanced by the manner of the Client involved in the case studies acceptance of the researcher's proposal for alternative procurement strategy for the purpose of observation. This is acknowledged as being a rare occurrence in commercial environments; the idea of "experimentation" being problematic within practical environments. The serendipity of this in the context of the research timeline is not wasted on the researcher and it is appreciated that a similar environment, including the specifics of the case studies selected, may not be available should further research be recommended.

2.4 The link between the Themes, the Enquiry reasoning and the Research methodology.

There is a need to ensure the component parts of the research strategy are logically linked. Figure 2.4.1 indicates the alignment of the methodology outline, the reasoning, actions taken and outcomes, and the themes in relation highlighted from the review of existing evidence. The themes are indicated as being in two phases; that for the Preliminary Study and the following Cross-case study.

Refer also to figure 3.10.2 in chapter 3 for further linkages between themes, key theoretical elements, the Aim and objectives.

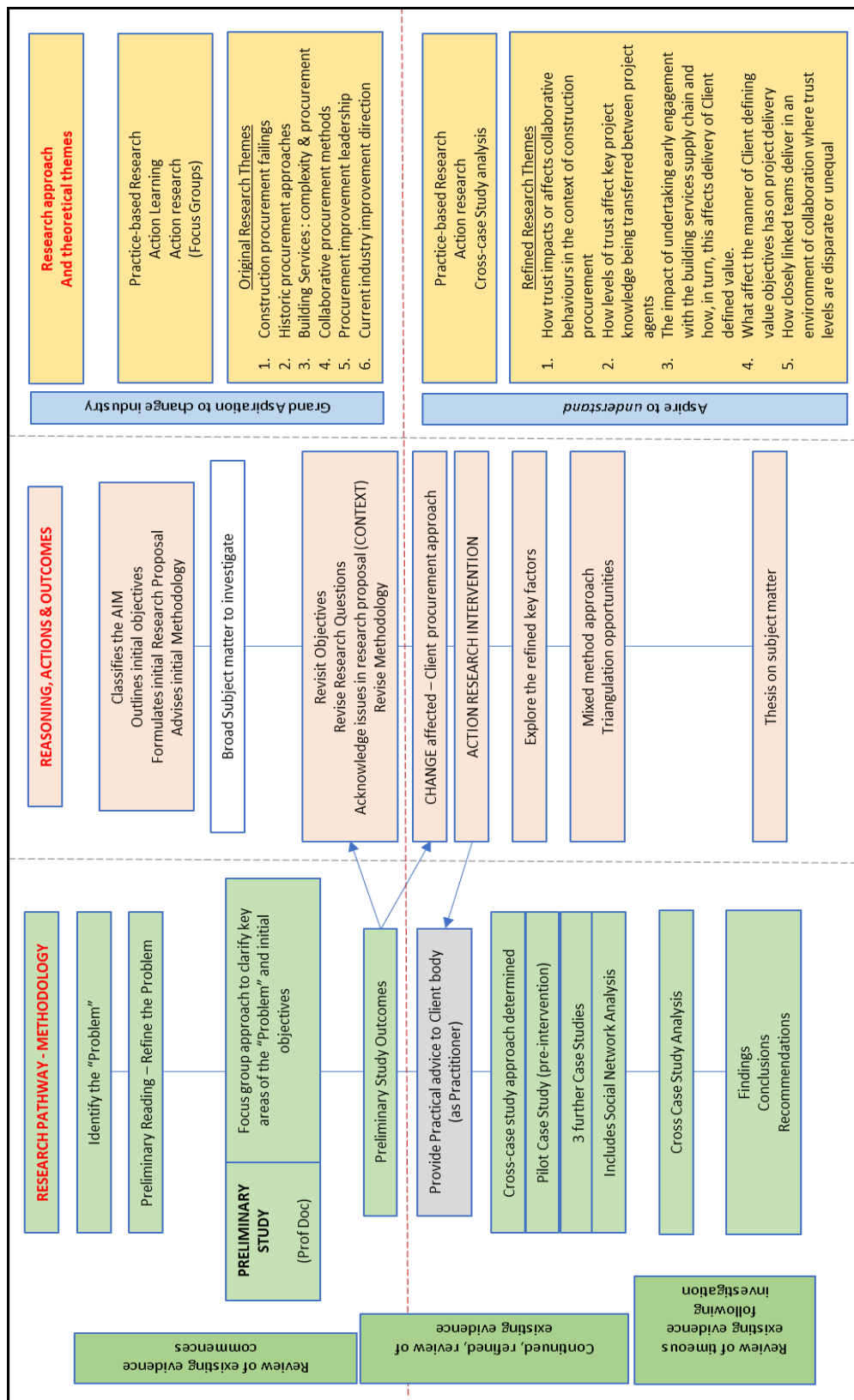


Figure 2.4.1 Link between Themes, the Enquiry reasoning and Research methodology

3 RESEARCH METHODOLOGY APPROACH

3.1 Research methodology introduction

Whilst it may be argued that it is for more *philosophical* research candidates, rather than those undertaking a Professional Doctorate, to worry about the ontological and epistemological assumptions as it may appear irrelevant (Gray, 2009), others (Grix, 2004) believe it is essential for all doctoral candidates to understand the foundations of the research. It is equally as essential to understand where the researcher is starting from, be clear on preliminary assumptions, and how these relate to the practical problem.

This understanding of the interweaving of academic process and practical knowledge assists in avoiding legitimacy and academic alienation issues (San Miguel & Nelson, 2007) and also assists when research requires the development of hybrid research tactics based on common concepts (Oyegoke, 2011).

Reasons for the researcher to be in full understanding of their position are;

1. To understand how the significant elements of the research inter-relate
2. To be able to discuss or debate theoretical issues and how social phenomena should be approached without confusion
3. To be able to defend one's own research position, whilst understanding others' views (Grix, 2004)

It is noted that reason 1 above is particularly pertinent to this research and how the Preliminary Study, the outcomes of same and the *action* implemented, had then a profound design on the further stages of the research. Refer to later discussion.

3.1.1 Ontology

Ontology can be described as the bedrock of the foundations of research. It is the metaphysical study of existence and reality, of *being* (Gray, 2009), and the describing of the research's ontological position seems to clearly depend on the nature of the researchers view of *reality* and what they seek to discover.

Before embarking on the research journey, the researcher should commit to their Ontological position (Grix, 2004), although it would appear that their own personal bias may already have selected this.

In order to describe the Ontological position, each (relevant) ontological paradigm is reviewed in the context of this research. Table 3.1.1 shows how each has been considered as a factor of the ontological position.

Ontological Paradigm	Description	Relationship to this research
Positivism	A single reality, which general laws dictate - Scientific, observation	Not the position of this research - more <i>social scientific</i>
Anti-positivism	The counter to above in that it is the belief that one must experience behaviours directly, rather than observe only	The nature of the Professional Doctorate, with the research part of a practical issue resolution lends itself to this
Realism	Objective, independent of human thought	Not the position of this research; human interaction involved
Interpretivism	Subjective, socially constructed, likely to encounter change	Very much a starting point for this research - the social aspects of the Construction teams and the potential for change
Objectivism	That social phenomena is independent of social actors	Not the position of this research; social actors key to the research
Constructivism	That Social Phenomena continually happens due to the interaction of social actors	It is very much the view that this is the case in the research and practical environment
Subjectivism	That social phenomena is created from the perceptions and actions of social actors	The research revolves around the behaviour of the social actors involved the practical problem
Pragmatism	The choice of the best approach to carry out research, externally	Not the position of this research; internal approach likely

Radical Structuralism (Sociological)	Structural conflicts within society generate constant changes	The sociological paradigm that has a resemblance to the construction conflict model
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Table 3.1.1 : Considered Ontological positions

The research is very much *socially constructed* given that it is a study on the phenomena enacted by the independent social interaction of construction actors, through their perceptions and their behaviours, and is very much subjective. This subjectivity is potentially compounded by the role played in studying the actors within a construction behaviour paradigm when it is considered how human cognitive behaviour comprises the aspects of intuition and reasoning, and further how this impacts on rationality (Chang, 2015). The concept that thought processes may be fast (intuitive) or slow (reasoned) and how this impacts on decision making contributes to the conflict between what was undertaken (Cooper, 2021) and what is considered the *correct* response. Actions undertaken intuitively may not be directly correlated to reasoned responses to study questioning, so the subjectivity must be acknowledged.

An *objectivist* approach to this manner of study would seek to attain and codify the tacit knowledge of those studied, converting it to some manner of explicit format (Chynoweth, 2013a) and decontextualizing same. It is not the case for this research that the knowledge produced will be removed from its context and be *value free*, more so it will be about framing the knowledge in a more conventional, academic arrangement reflecting and recognising the social construct it resides within.

This is particularly pertinent in all stages of this research as the *construction actors* are considered as being central to the data collection processes. Whilst some consider that *social science* methodologies are unable to produce practice-relevant research, Chynoweth (2013) notes that the majority of this style of research in the field tend to fall in to “the domain of the social sciences”.

In addition the research responds to a practical problem that is identified by (Chynoweth, 2013a) and central to the researcher's work practice, and is experienced directly rather than merely observed. The exploration of the issues within a practical setting, with corresponding, or contrary, concerns or interests lends itself to a manner of research that is experienced "*through*" the practice (Chynoweth, 2013) and the social construct that necessarily entails.

Here we see a potential dichotomy; Both Constructivism and Subjectivism have been highlighted as being potential ontological paradigms under which this research is conducted, yet Gray states that they are derived from differing views of reality. It is important to derive a degree of clarity however, as a researcher's ontological position can lead to differing views of the same phenomena (Grix, 2004).

We draw here on the works of Egon Guba and his collaborators, who are fundamental to the notion of social science research within a constructivist paradigm; it has long been proposed that classic scientific models of enquiry may not have the flexibility to manage a broader range of research, particularly where there is linkage between research and practice, where the nature of the problem leads to complexity within the outline research activities, and when experimentation per se might not provide a suitable methodology for the enquiry (Lincoln & Guba, 2013). If constructivist researchers seek to construct knowledge rather than simply observing information, which this enquiry actively seeks to explore, then the theory proposed by Guba and others based on his works would appear to have value. That this enquiry is centred on social actors and their interactions is very much considered constructivist; coupled with the focus of the research being about the project organisation, the actions and perceptions of those involved, a social phenomenon, and it is stated that a combination of both Constructivism and Subjectivism is valid in the context of this enquiry.

3.1.2 Epistemology

There are areas where Ontology and Epistemology cross over, and it is stated that they are interconnected and that underlying assumptions fall into both philosophical areas (Grix, 2004). The distinction made here is that Epistemology is in relation to the nature and scope of *knowledge* (rather than *belief* stance), and how this knowledge is derived, created, and ultimately passed on to others (Philosophy Basics, 2018). If ontology is about understanding WHAT, epistemology attempts to comprehend WHAT IT MEANS TO KNOW (Gray, 2009) and focuses on the approach to gathering knowledge (Grix, 2004). In Aristotelian terms, *know-why* is episteme; the root of the term epistemology; the “*what and how can we know about it*”. In this way it is not simply a matter of the practical *know-how*, and Practitioners are aided in their practical activities in understanding the basis of their knowledge. This understanding may assist significantly in dealing in with conflicts of purpose, in value-alignment, of goal-meeting, and of potential interests (Schön, 1983).

The terms used in defining the ontological position are also used in epistemological positioning. Both Gray (2009) and Crotty (1998) provide examples of how terms such as Objectivism, Positivism, and Subjectivism straddle the areas of ontology, epistemology, and theoretical perspectives.

Like defining the Ontological position, defining the Epistemological placement has a potential impact on designing the research approach, the method of data collection, and how the interpretation of the data will be positioned (Gray, 2009). The approach to research design is suggested to be best in a linear progressive order, with ontology asking, “what is out there to know” and epistemology asking, “what and how can we know about it” (Grix, 2004). This methodological approach then affords the researcher the appropriate opportunity to make the correct choices in designing a methodology.

3.1.3 Theoretical Perspective / Approach

If we adopt Gray's structure for the elements of the research process (2009) and, for the sake of argument, suspend the distinction between ontology and epistemology (which Grix (2004) states is the wrong approach), we can place this research into a philosophical position thusly;

ONTOLOGY / EPISTEMOLOGY – A combination of Constructivism and Subjectivism, in that it is posited that social phenomena is created from the perceptions and actions of social actors and that this continually happens due to interactions of same. In doing this the researcher should understand that perceptions and action may have inherent, unconscious, or conscious bias involved and look to, as a minimum, contextualise this aspect. It is also to be understood that there will be degrees of bias in most *behavioural* study, as it is difficult to separate the beliefs and biases of those being studied and the choices assumed in particular behavioural situations (Chang, 2015). Any bias should be recognised and, where possible, dealt with accordingly.

THEORETICAL PERSPECTIVE – From the position above, being subjective and socially constructed, we also accept that there is a likelihood of change, and this lends itself to an Interpretivist perspective, where subjects have cultural, historic, potentially subjective classification and have elements of social science approaches. Grix (2009) states that interpretivism looks to *understand* the issues under consideration more, rather than *explain* them as in Positivism, but he further states that there are degrees to this distinction and that there may be a degree of explanation in interpretivist research. Gray (2009) says that interpretive studies look to explore actors' experiences of events and garner their perspectives of how these transpired.

The researcher admits that the nature of this research is somewhat opportunistic, in that the cases to be researched are already prescribed. However, and importantly, the process of a linear review of the research position has afforded better clarity of the research and the paradigms within which this will reside. It has also been used as an academic cross-check

against which assumptions have been measured and adjusted where applicable. In this way, the researcher believes that the pitfalls of “method-led” research are avoided. The research therefore remains as “Question-led”, and it is the research questions that derive the choice of methodology (Grix, 2004).

RESEARCH APPROACH – The use of research questions rather than the testing of hypotheses lends itself to being an **inductive** approach; the collection of data, analysis of potential patterns, the construction of generalisations or relationships. Both Grix (2004) and Gray (2009) state that this manner of research is usually associated with the interpretivist research tradition and lends itself to qualitative strategies such as in-depth studies of smaller samples, the generation of rich data from which ideas are induced (Saunders and Thornhill, 2012).

METHODOLOGICAL CHOICE – It is incumbent here to detail how the methodological choice is, firstly, divided between the Preliminary Study and the Cross-case Study, but then, secondarily describe how the practical implications had an effect on the choices made.

Overall it is considered primarily that the research in whole is to largely be of a **qualitative** nature, albeit acknowledging that there is mixed methodology in part.

Qualitative methodologies tend to describe what is being observed. They tend to understand perspectives and interpret the context involved, with the researcher being directly involved as data gatherer and therefore being able to give coherence to the meaning within the research (Chynoweth, 2013), with some elements of the collection of that data being unstructured. The researcher also is involved, subjectively, within the subject matter, further elevating the subjective nature of the study. The sample used in this methodology is relatively small, not necessarily representative of the wider population and has respondents within the study selected specifically for their

context-rich experience. The analysis lends itself to an interpretivist approach and the data is largely in the form of words rather than statistics or data centred output (albeit there are aspects of this). The research has elements of both a survey and correlational design. This research, in the context of these research design headings, looks to;

Survey research

- address the question posed regarding the phenomena being studied and the subject-matter related population.
- address views, attitudes, preferences and concerns of the study group involved (which comes with a high degree of *bias*)

Correlational research

- ascertain the relationship between two (or more) quantifiable variables
- measure the strengths of relationships identified

(Higham, 2020)

The research has as its basis a validated review of current (and ongoing) evidence and literature, which is considered as a combination of both *archival* and *survey* strategies, and this extends between the Preliminary Study and the Cross-case Study.

The Preliminary Study was primarily concerned with validating the common themes derived from the literature through professional Focus-group study with a view to recommend improvement. However, the researcher was able to apply findings from the initial study to their area of practice. In this way there has been an element of *Action Learning* following and leading from the Preliminary Study, in that the researcher has intervened and successfully recommended an alternative procurement model. More so, it is the effect of

this intervention that the further elements of the research, the Cross-case Study, then investigate.

The Cross-case Study extends the literature review, focusing on the key emergent themes from the Preliminary Study and undertakes a number of case studies which are cross referenced and compared. The case studies are derived from live projects on which there was an *action intervention* (leading from the *Action Learning*), and to which there is direct access to.

In addition, the research is considered as having an element of **heuristic** inquiry, due to the subject being personally professional, derived from direct human experience (Gray, 2009), and the approach being considered for the wider research being immersive for the researcher. By taking an *insider's* position within the research, the researcher should be able to understand contextual purpose and meaning, contributing to both the academic knowledge base and, through the understanding of the practitioner action, industrial knowledge landscape (Chynoweth, 2013a).

TIMEFRAME – This research is considered a ‘snapshot’ of a phenomena and so has a **cross sectional** time horizon. Whilst the research is carried out during a specific timeframe, aspects of the narrative within the research mean there is a potential for a longitudinal comparison.

The case study projects are divided in to two distinct timeframes with the Pilot Case Study project being undertaken prior to the *action intervention*, and the following projects studied running subsequently and based on this intervention.

Figure 3.1.1 indicates this element of the research’s position in the research landscape.

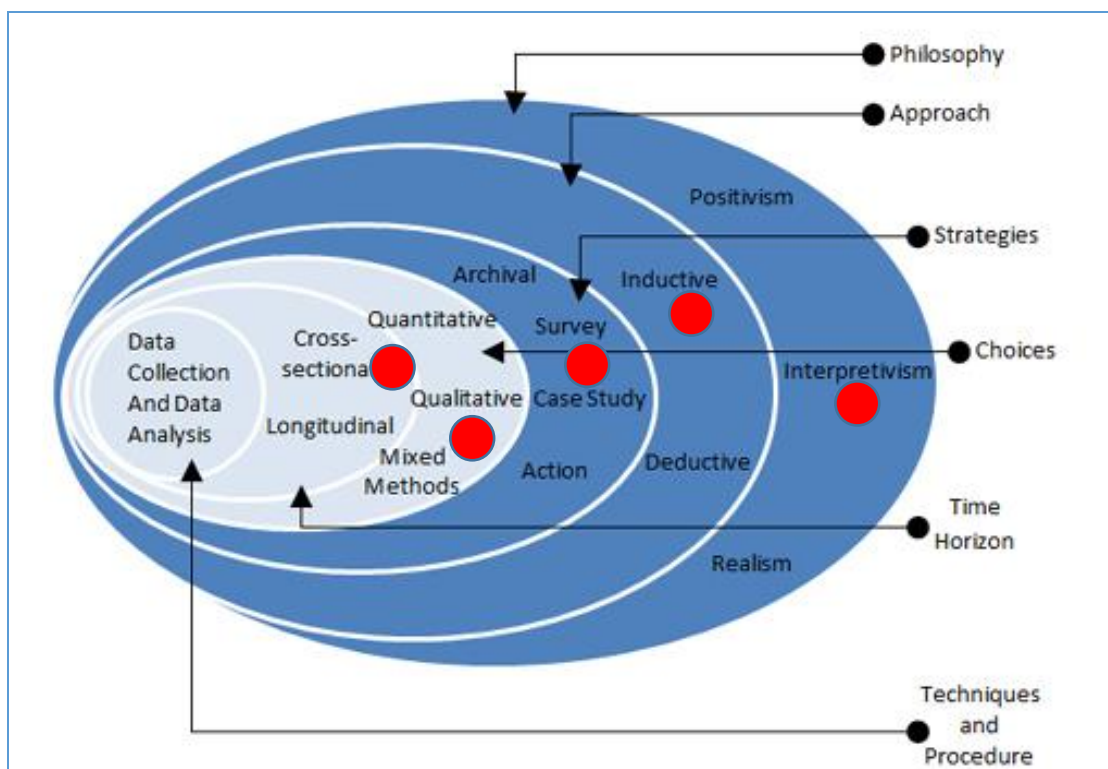


Figure 3.1.1 : Position in the Research Landscape (derived from Wordpress, 2016)

3.2 Research Methods

The methods adopted in this research are outlined here;

3.2.1 Review of evidence and literature

A review of existing evidence and literature is considered key to sophisticated and thorough research, and the foremost research tool to understanding what has been researched in the topic before (Gray, 2009).

With a broad subject such as construction procurement (albeit narrowed when focusing on the procurement of building services) it is important to define the parameters of the literature review. By defining what is to be contained within the review, and what is to be excluded, the reviewer avoids the potential of allowing the review to grow exponentially and become unfocused. Stringency allows the subject matter the attention required to appraise what the academy (and industry) have discussed in the research area.

The themes then initially formed the basis of the Preliminary Study discussions/ research. Following the output from this Preliminary Study, the literature was revisited, augmented with further review and extended on the basis of highlighted themes; continuing throughout the period of the full research.

3.2.2 Focus-groups

Focus-groups allow a sample of respondents to provide their views on specific topics, guided by the facilitator to provide the spark for the dialogue (Grix, 2004). One advantage of Focus-groups is that a variety of views may emerge, providing potentially new perspectives on the body of knowledge themes.

Focus-groups can also assist in engaging the organisation that the research is undertaken within, particularly if there is an element of cynicism (Gray, 2009).

3.2.3 Action Learning / Action Research

Action Learning / Action Research advocates lively and challenging collaborative team working of an inter-disciplinary nature (Botham & Vick, 1998). It is the bringing together of operatives with potentially differing views of a situation, phenomenon, or problem, and the method compels them to find resolutions in partnership, by being both challenging and supportive, and by searching more deeply into the focused problem area (Mann & Clarke, 2007). Gray (2009, p.574) describes action research as involving “*close collaboration between researchers and practitioners*”, and that it “*aims to achieve measurable, practical benefits for the company, organisation or community*”. The essence of this enquiry was, originally, to seek to make a difference in procurement practice, this was then tempered somewhat but continued to seek to generate knowledge that could provide practical benefits. In addition, a practical intervention led from the Preliminary Study which aimed to provide a measurable benefit to a specific organisation.

Not unlike the transdisciplinary approach suggested in Gibbons *et al's* (1994) Mode 2 knowledge production for problem solving, having different mind-sets

around the table can often provide clarity where previously there may have been confusion even though initially the approach may seem challenging (Roy & Eales, 2010). The use of inter-professional working practices can develop a greater understanding of complicated phenomena (Baxter & Brumfitt, 2008) and richer knowledge may be generated by undertaking research in the environment of application (Chynoweth, 2013a). Lincoln & Guba (2013) note that the principle of carrying out social science research under a constructivist paradigm, particularly where there is inherent link between practice and academia, is valid but may require alternative approaches to that of experimentation or other, more *traditionally scientific*, approaches.

By blending the dualities of knowledge and experience (Thompson & Pascal, 2012), the argument that experiential knowledge is inferior or purely anecdotal is disputed. In fields such as the built environment, knowledge that is commonplace to industry practitioners but is not (traditionally) scientifically proven may not be acknowledged as a suitable research resource (Chynoweth, 2013a). But, in this context, it is likely to be seen as the superior or most important form of knowledge, as Schön described (Hébert, 2015), with Flyvbjerg (2001) arguing that personal experience is more important than context independent, explicit facts, and Nimkulrat, Niedderer & Evans (2015) expressly consider it the highest level of knowledge within professional practice. It is an approach that may assuage the practitioner opinion that academic research has limited applicability and is of minimal use for solving practical problems (Barrett & Barrett, 2003), placing the professional contribution centrally within the research approach (Chynoweth, 2013). It may be particularly relevant to this area of study, as the built environment has a well-documented lineage in the use of varied methodologies in knowledge transfer (Griffiths, 2004).

Action Learning is a methodology of research which mirrors an element of the focus of this research, in that it is a way of engaging relevant stakeholders' perspectives collaboratively with the means of pooling their comments and suggestions to find a way to advance and provide systemic changes (Pedler &

Trehan, 2008) and generation of new ideas (Barrett & Barrett, 2003). It is the very essence of a collaborative approach which the research argues is a way to enhance building service procurement practice. It utilises Schön's alternative epistemology of practice where a developed professional's intuitive expertise is valued even when it is hard to explain or define (Hébert, 2015), provides the best performance (Flyvbjerg, 2001), and supports the view that collaborative research methods are becoming increasingly recognised as being able to deal with complex issues (Roy & Eales, 2010). It is the extension of reflection of an individual nature to that of a socially situated, organised, and collective approach. It accepts the long-standing understanding of the worth of learning from experience with others, whilst operating within an environment where questioning and critique is commonplace. It is mooted that it is a method of solving complex problems and can increase the progress and quality of development of an individual's or an organisation's learning (Marquardt & Waddill, 2004). It reflects Lincoln & Guba's (2013) view on utilising methodologies which reflect the nature of the knowledge being generated or constructed.

The process for the proposed research starts effectively as a heuristic inquiry, whereby an answer is sought for the highlighted problem (Gray, 2009) but can be constrained by a question of ethics and what is practical (Saunders & Tosey, 2012). Through a process of action learning or research, being a collaborative approach between practitioners and the researcher, it is attempted to find a solution to promote positive change (Gray, 2009) and use the real-world context to develop research itself (Dainty, 2008). The understanding gap that Schön talks of between academy and industry can be diminished through collaborative communication and interaction of an interpretive nature (Aram & Salipante, 2003) as it relies on an understanding of another's point of view (Seymour & Rooke, 1995). There are multiple examples of where this process has abetted in the development and interchange of knowledge by the appropriate use of inter-organisational networks (Abbott, Sexton, Jonas & Lu, 2007).

And so, along with other research methods, Action Research (Learning) is utilised within the research following a process suggested by Vagle (2010) for conducting phenomenological research. Phenomenology being an understanding of how actors experience and assign meaning to events, ideas or the cases being studied (Gray, 2009) in this research context. The idea of carrying out research *through* practice aligns with this and this research is considered, as Chynoweth (2013, p.12) describes, a “systematic enquiry conducted through the medium of practical action”. But alongside this it may also be considered as “practice-based” research as well as having an “action-reflection” tendency. It deals with the exploration of issues, interests and concerns but is able to take a detached, more academic, perspective in studying the phenomena. Whilst this might seem confused, epistemologically speaking, with the lines between each of the taxonomical positions being fuzzy, it is considered a valid position to state, given the complex and multi-evidential nature of the study. The distinction is made in the chronology of the research activity; research *for* practice before application *to* practice, and research *through* practice taking place at the same time as the practice or thereafter (Chynoweth, 2014). The approaches briefly noted complement each other and are considered the most appropriate definitions for this research, alongside the more familiar approach of research *into* practice (Chynoweth, 2013). In addition the research is distinctly considered *practice-informed*, where the practitioner understanding and knowledge informs the methodology and the purpose of the study (Chynoweth, 2013).

Table 3.2.1 outlines and provides context on this research approach, in regards phenomenological research

Component / Aspect	Research Action	Context
Identify a phenomenon in its multiple, partial and varied contexts	Identify the problem. Review existing evidence and literature	Broad review of existing literature, forming themes, contextualising to the problem
Devise a process for collecting data appropriate for the phenomenon under investigation	Author Research Strategy. Validate with Academic Supervisor.	Early stage research strategy agreed. Adjust as problem and events surrounding this impose restrictions or provide opportunities
<i>Make a bridling path</i>	Have own understandings questioned by reflexive process and the development through Action Learning approach	Outputs from Pilot Focus group provide further focus. Affect a change in practice. Adjust research approach, within overall strategy.
Read and write your way through data in a systematic manner	Draw all strands of data and information together to develop narrative	Combine outputs from evidence review, Pilot Focus group study, and from cross case study in an iterative and responsive process
Craft a text that captures tentative glimpses of the phenomenon	Developed research, informed by Professional Doctorate approach	Deliver Thesis for academic scrutiny

Table 3.2.1 – Outline of phenomenological research based on Vagle (2010)

In phenomenological research when described as a study of people or of a *society* (Chynoweth, 2013a), where the researcher is part of the observation frame, interpreting practice, the proximity to the subject may expose negative feelings within the researcher to the subject (Boyd, 2008). The support of the relationships in an Action Learning Set or group may temper this. Vagle also argues that this approach to research can be untidy (messy, as Schön would have it) in that it deals in relationships and the uncertainties of practice, but that it has the ability to provide powerful outcomes. Chynoweth (2014) says

that research *through* practice, with a reliance on the process of practitioner action, can address issues where a technical solution is difficult. Inductive research focus can emerge from early messy research providing an enabling purpose for the continuing research (Mann & Clarke, 2007).

Potential criticism of Action Research over the temporal nature of this style of enquiry, i.e. it might only be relevant to the time and circumstance the data is collected, are partially assuaged by the validity of the outcomes and the comparison to other relevant and connected enquiries. In addition, triangulation with other, more *traditionally science-based*, research evidence can support relevance. Further, expressing the generalisability of the research findings, beyond the bounds of the specifics of the Action Research enquiry, can indicate a broader relevance.

It is argued by both Schön and Eraut that the larger the base of experiential, practice based, knowledge that a practitioner has, the more likely they are to be an effective operative taking appropriate and timely action. This is then enhanced by an engagement with the relevant theoretical and research base of their profession, with the learning that occurs at this interface with their deep tacit knowledge (Jones, 2010). Chynoweth (2014) notes where there are situations of uniqueness and conflict as well as uncertainty and instability, that the aspiration to enhance the relationship between academy and industry propagates the idea of practitioner becoming researcher; as in this inquiry.

3.2.4 Case Study Analysis

The degree of context emergent from the Preliminary Study rather lends itself to an investigation that covers “*a phenomenon and the context within which the phenomenon is occurring*” (Yin, 1993). The emphasis on context is key (Grix, 2004) to the subject matter and the boundary between the two virtually indistinguishable. There are instances when answers may not be simply true or false, but rely on factors to define the output; the inherent logic or context (Lincoln & Guba, 2013). It is within this theoretical muddle that the outcome of

the Preliminary Study sought a research method to resolve complexity. The base theoretical and ontological position had not fundamentally changed; the overall enquiry was still attempting to construct knowledge within an action setting, and had actioned knowledge already constructed from the Preliminary Study in the advice given in practice. Therefore, given the complexity of the context and that the phenomena being observed would be impacted by this context as well as those involved in the enquiry's primary data provision, a case study approach was investigated.

A case study is;

An empirical inquiry that;

- *Investigates a contemporary phenomenon within its real-life context, especially when*
- *The boundaries between phenomenon and context are not clearly defined (Yin, 2003, p.13)*

This describes the situation that the research finds itself in, with the opportunity to utilise four projects with significant degrees of Building Services as the subjects of analysis; four projects which the researcher has unfettered access to. On this basis a multiple case study analysis was chosen as the research approach. This comparative approach allows the subject matter to be studied across a number of similar instances and contexts and, particularly with the adoption of a Pilot Case study of a school project procured prior to the researcher's intervention, which lends itself to the development of knowledge (Grix, 2004) in this area. Having *more than one* case studied is likely to fortify the research findings on this basis (Yin, 2003).

Table 3.2.2, reproduced from Yin (2003) attempts to balance the research situation against potential strategies.

Strategy	Form of Research Questions	Require Control of Behavioural Events?	Focus on Contemporary events?
Experiment	how? why?	Yes	Yes
Survey	who? what? where? how many? how much?	No	Yes
Archival analysis	who? what? where? how many? how much?	No	Yes/No
History	how? why?	No	No
Case Study	how? why?	No	Yes

Table 3.2.2 : Potential strategies and their relative situations

The research questions posed are all “HOW” questions, and all have aspects of “WHY” in the manner of these questions being answered. This then excludes the SURVEY and ARCHIVAL ANALYSIS strategies, albeit that the literature review aspect of the research naturally includes a degree of analysis of the *archive*.

The second aspect asks if the research requires control of behavioural events, and whilst the researcher will be involved in a practical sense in the projects being studied, there is limited ability or requirement to control the events under study. This then excludes the EXPERIMENT strategy, although it is acknowledged that by interjecting a procurement strategy based on the ongoing research there is a degree of quasi-experimentation (see below in regards clear discounting of this in its *purest* form).

Finally, as the research will focus on contemporary events the HISTORY strategy is excluded.

Therefore the choice of CASE STUDY strategy is justified as an appropriate approach.

Other, related, approaches could be adopted, rather than case study analysis, but have been discounted for the following reasons;

Ethnography: Does not follow the traditional rules of scientific inquiry, not lending itself to testing of propositions stemming from the literature review only. Also may limit the use of key data sets in collection and interpretation.

Grounded Theory: Does not lend itself to testing of propositions stemming from the literature review.

Quasi Experiment: May eliminate the important aspects of context in this instance, and data usually considered quantitative for this nature of research (Yin, 1993)

By considering other methods of analysis prior to finalising the appropriate approach the enquiry performs a degree of *self-check* by discounting methodologies which do not *best fit* the research path. Whilst it is acknowledged that other methodologies *could* be deployed, the cross-case study approach allows the research the opportunity to draw upon a broad church of accessible data, including direct contact with those involved in the projects studied.

In addition, it should be noted that the nature of the cases study subjects selected meant a potential limitation was placed on the research not using a broader set of “Rich Data”. This is a valid position given the narrow field of enquiry and the subject matter, the degree of information available for triangulation, and the nature of the questions to be posed within the interview element arguably afford a degree of richness. The use of different data types that narrate the phenomena provides a more acute understanding of the complexity involved. It is, however, essential to ensure that the interpretation and presentation of the outcomes from the data are skilfully provided, avoiding a *thickness* of description and, instead, having a suitable presentation style to tell the “story”. This can involve lengthy participant quotations, reference to field notes or journal entries, but is designed to *involve* the reader in the phenomena experience (Given, 2008).

In addition, Case Study analysis can utilise both quantitative and qualitative data in analysis, which provides a richer response to the study being undertaken and affords the researcher the opportunity of including other data collection and analysis techniques to enhance triangulation. It is therefore a valid approach in a mixed research methodology sense, but also in that the richness noted above is sought to enable further augmentation of the purely qualitative. The quantitative aspects of the research are designed here to cross-refer, cross-check and validate the qualitative. Given the complexity of the context aspects, it might be that there are contradictions between the two data sets; this lends itself to further analysis and conclusion in a descriptive, qualitative, outcome, which the quantitative facilitates.

The researcher accepts that there are disadvantages to undertaking research through case study analysis. These are;

- Elements of the Academy criticise the approach as being unreliable, lacking objectivity, and suffering from illegitimacy,
- Dangers of difficulties in generalising from the specifics of the cases studies to the wider field,
- They can be very time consuming and generate inordinate amounts of documentation (some of which may not be relevant)
- Difficult for inexperienced academics to undertake due to the skill set required (Gray, 2009)

The researcher acknowledges these disadvantages and responds in the following ways;

- Case Study Research is broadly accepted within the field the research resides and appears to be the best-fit approach for the subject matter.
- Generalising to the wider field is not necessarily the aim of this research; as it has been noted, there is a high degree of context within the study. However, it is anticipated that some generalisability may become apparent.

- The researcher is bounded by time and resource and will constrain the research to the defined specifics of the case study design, albeit the time required is noted as being significant.
- Whilst inexperienced, the researcher will be following guidance from the authoritative literature and academic supervision

Chang's (2015) criticism that case study research has been *overly relied upon* when studying construction problems empirically is answered, in this instance, by referring to his further comments on the subject, where he argues that the best choice of method relies on the questions being studied, with a good mix of tools displaying sophistication and rigour. Case studies afford the opportunity of mixing methods and being rigorous.

There is an element of the opportunism inherent in this research (that four projects' programmes align with the research timeline) where the empirical (professional) field, identified prior to the conclusion of a fuller research design, being studied has the ability to feed into the research design. This is particularly relevant with the incorporation of a Pilot Case Study of the first School undertaken on a traditional basis.

Yin (1993) discusses this aspect and the two diagrams comparing "The Central Function of Research Design" and "Field Access Opportunism" are reproduced here (Figures 3.2.1 and 3.2.2), in support of the researcher's assertion.

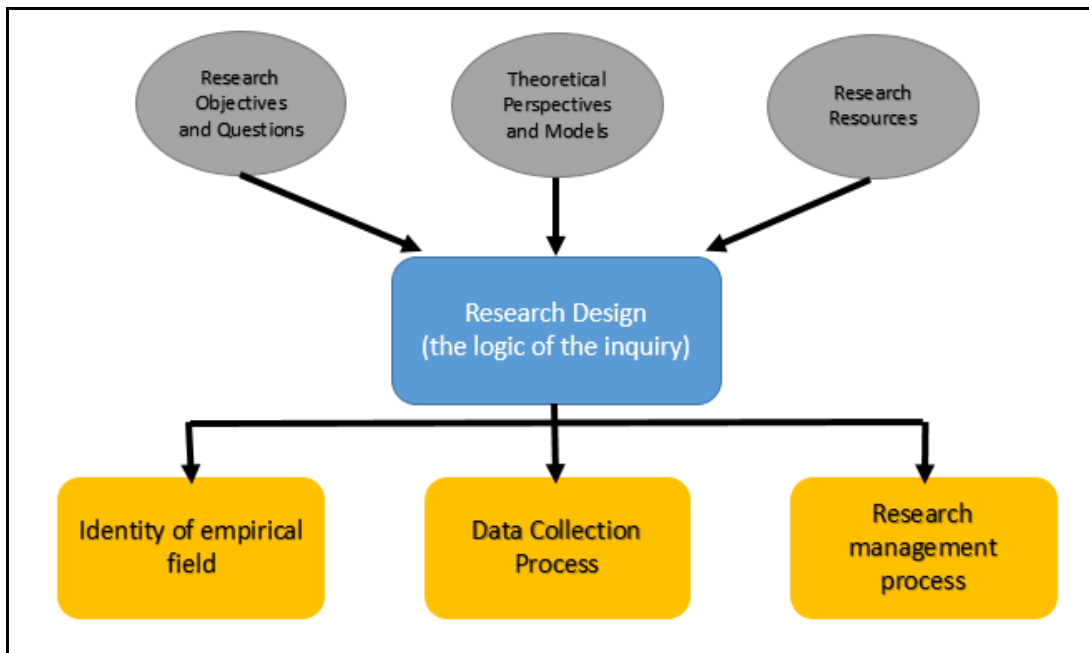


Fig.3.2.1: The Central Function of Research Design

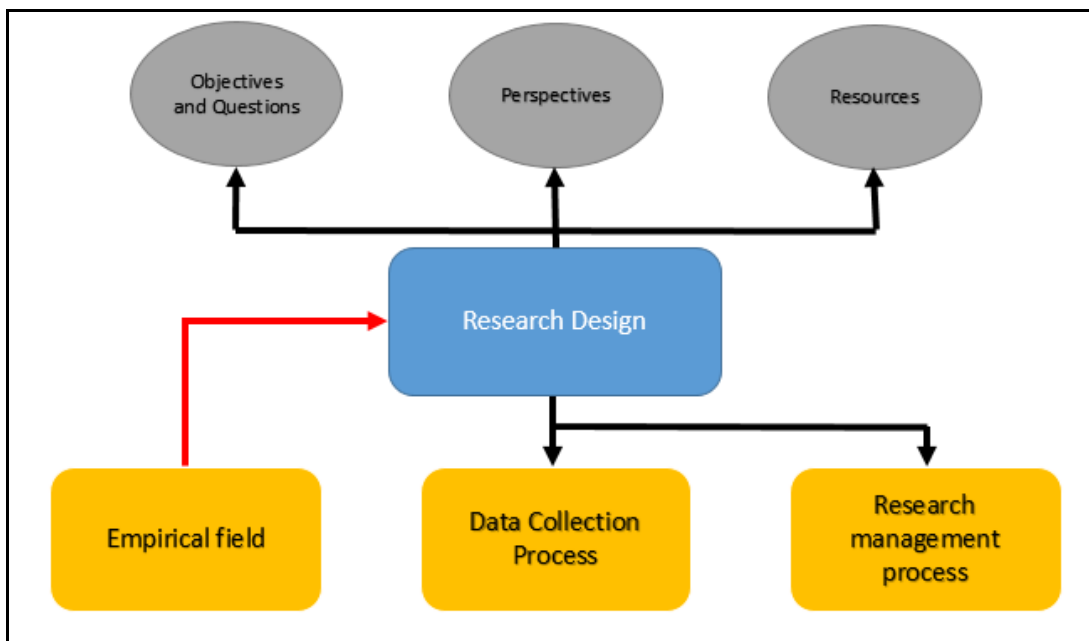


Fig. 3.2.2 : Field Access Opportunism

Whilst a more conventional, scientific, approach is advocated and outlined by the first diagram, a combination of the two approaches indicated reflects how

the industrial context has an important influence on the nature of the research design, and further on the research objectives and questions.

This combination of methods and the blending of industrial aspects into the research reflects a seeking of resolutions to problems through more creative ways, rather than maintaining an academic *status quo* and using established methodologies in a more structured manner to satisfy only academic rigour (Chynoweth, 2013a). Having stated that, the methods themselves are academically established approaches in themselves.

3.3 Case Study Design

Yin states that the most important lesson learned from undertaking case studies is to take time to develop the study questions and fully understand the issues being considered; ensuring this is done before anything else (Yin, 1993). He states, “*most types of case studies require an extensive degree of preparation and homework*” (Yin, 1993). Part of this is reflected in the development of the case study design and by the deployment of the approach of undertaking the pilot case study initially and then revisiting the design.

Whilst some case study research is considered deductive (confirmatory studies testing theory), the nature of this research (explanatory), starting with propositions formulated from the research questions and literature review, carrying out a pilot case study, adjusting the case study design, and then carrying out further case studies, is considered a more inductive approach (Gray, 2009), looking at phenomena from a different viewpoint (Gabriel, 2013).

Yin has been referred to widely in the researcher’s approach to designing the Case Study Protocol, and even though Yin advocates specific instances where a non-linear case study approach (Yin, 1993), there is no incentive to err from the linear approach broadly outlined by him in this instance.

Five components of the case study research design are (Yin, 2003);

1. The study's research questions
2. Propositions for examination in the study
3. The Unit(s) of analysis
4. The logic linking the data to the propositions
5. The criteria for interpretation of the findings

3.3.1 The study's research questions

These have been outlined in a previous section but the entire process of designing the case study and its protocol should be mindful of them in order to answer them effectively.

3.3.2 Propositions for examination in the study

The propositions should direct attention to elements that are to be examined within the study and forming these propositions from the research questions sets the researcher in the right direction and reflects the theoretical (or practical) issue (Yin, 2003). It is important to be clear on the nature of these propositions, in that whilst they are theories, they are not hypotheses *per se*. They are more concerned with the design of the case study protocol and an analytic strategy to collect the relevant data in answering the research questions. A complimentary strategy is that of *rival explanation*. Yin (2003) states that this approach is especially useful when evaluating case studies, and that these rival explanations should be identified prior to data collection, where possible. The identification of rivals should afford greater confidence in the study findings.

The propositions, their rival explanations, and how they link to the research questions are shown in table 3.3.1.

Research Question	Proposition	Rival explanation (1)	Rival explanation (2)
How do levels of Trust between project actors impact on project delivery?	That high levels of trust between project actors enhances the outcomes of a project	Project Outcomes are not reliant on high levels of trust between project actors	There is no correlation between the levels of project actor trust and project delivery
How do the levels of trust affect the transfer of key project knowledge?	Trust between project actors is necessary for effective knowledge transfer	Knowledge Transfer can be effective without trust between project actors	Project knowledge transfer relies on many factors, which may or may not include trust
How do different actors perceptions of the levels of trust between them and the other team members affect inter-project relationships?	That a disparity between actors' perceptions of the level of trust between them can cause conflict and barriers within the project network.	That network relationships are not affected by the perceptions of levels of trust, even if they differ between actors	Inter-project relationships rely on many factors, which may or may not include trust
How does the level of definition of clients' value objectives impact on the performance of delivery teams; how does it impact on their ability to collaborate effectively?	That poorly defined client value objectives have a detrimental effect on the performance of the project delivery team; and that it also affects their ability to collaborate	The level of definition from the client of their value objectives has no effect on the project delivery teams performance, nor their ability to collaborate	That overly prescriptive client's value objective definition has a detrimental effect on the performance of the project delivery team; and that it also affects their ability to collaborate
How does collaborative procurement of buildings services affect projects "client defined value" outcomes?	That the collaborative early engagement with the Building Services supply chain has a positive effect on delivering to the client's value outcomes	Collaborative early engagement has no impact on delivering to the Client's defined value outcomes	That the collaborative early engagement with the Building Services supply chain has a negative effect on delivering to the client's value outcomes
How might the <i>designed intervention</i> (the advised procurement approach) have an impact on the case study projects under consideration?	The alternative procurement approach adopted for the 3 further school projects had a positive impact on the initial stages.	The alternative procurement approach adopted for the 3 further school projects had no impact on the initial stages.	The alternative procurement approach adopted for the 3 further school projects had a negative impact on the initial stages.

Table 3.3.1 : Case Study Propositions

It is acknowledged here what Colquitt *et al* (2007) note as a potential issue in asking respondents to rate the extents of trust within a network where some are co-workers and some are leaders, as they state that the respondents may have differing views of the two types of network members. They themselves note that the question remains un-answered, and so, for the purposes of this study the responses are taken at face value. The potential bias towards the internal leadership of different respondents within the network is commented on, briefly, in the case studies.

3.3.3 The Unit(s) of Analysis

In identifying what the *case* actually is, the key is to define the boundaries that the research questions should set, and this is further narrowed when the decision is made as to what the *primary* research question is. If a number of the research questions point to a similar unit, the identification of the main unit should be self-evident (Yin, 2003).

Figure 3.3.1 shows the unit(s) and the context in which they reside. It describes how, within the context of procuring highly serviced buildings, our main unit of analysis is considered to be “the project organisation”, but that there are sub-units of analysis inherent, embedded. These are the project team(s), trust, collaboration, knowledge transfer and building services outcomes, but that these are all fundamental to an overarching embedded unit which is Project Delivery to Client Value Objectives.

The nature of the units identified very much regard the structure of the social interactions of the members of the “organisation” that is the subject of the enquiry; it is the social science aspect of the research that is fundamental to selecting the units for analysis and how these reflect the *designed hybrid* ontological position of constructivism and subjectivism. The key being what is being studied is the social phenomena (the project organisation) and how this further impacts interactions, the actors within the phenomena, and the outcomes (in turn generating further alterations or adjustments of the project

organisation and the other units identified) and how this facilitates knowledge construction, in an action research paradigm.

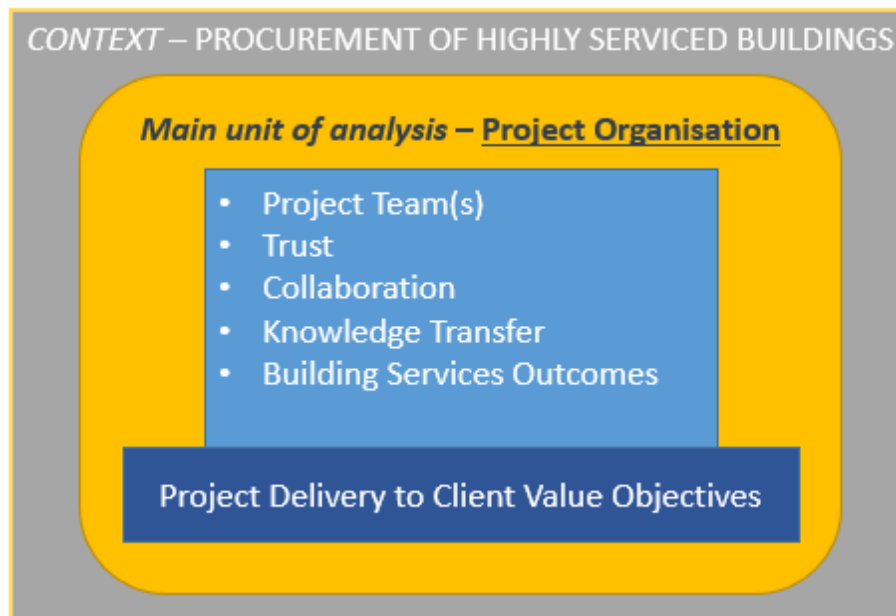


Figure 3.3.1 : Unit(s) of analysis

3.3.4 The logic linking the data to the propositions

It should be clear within the research how the data collected responds and replies to the prepositions stated. The formulation of a case study database allows a succinct chain of evidence, supported by linkages, to run through the research. This also highlights any prospective weaknesses in the comparative analysis or interpretation of the findings. This is further described elsewhere within this inquiry.

3.3.5 The criteria for interpreting the findings

The research design should consider how the data is to be analysed in the context of the research prior to undertaking the case studies. The linking of the data discovered to the propositions and how the findings are interpreted are closely linked and set the scene for the data analysis and the techniques to be utilised. Due to the qualitative nature of the research the analytical

technique utilised primarily from the data derived from interview, observation, and documentary evidence is through Pattern-matching. The patterns to match or compare against will mirror the propositions closely, and the variables within the embedded units of analysis related. By defining rival explanations, the research can also benefit from the pattern matching of independent variables, should this be required (Yin, 2003). Due to the explanatory nature of the research outlined, the pattern matching also extends to explanation building where this is has been feasible, a further analytical technique advocated by Yin (2003).

The Social Network Analysis aspect within the case studies plainly lends itself to a degree of quantitative analysis, due to the measure of the strengths of the areas being analysed. However, the out turn of the numeric data, whilst presented, is suitably narrated into a format for use in the triangulation process of the overall analysis.

Due to (and specifically for) multiple case studies being undertaken, there is then the exercise of cross-case study synthesis and analysis. This technique involves a further degree of pattern or similarity matching, or dissimilarity comparison, between the individual case studies, and strengthens the findings (Yin, 2003). The narration thereafter discusses both the understanding and explanatory aspects of the study outcomes, forming a fundamental basis of the overall research's findings.

There is ultimately a high degree of reflexivity, a distinguishing characteristic of qualitative research (Chynoweth, 2013a) in how the findings relate to the separate aspects of the case studies, the existing literature and the patterns derived from the social network analysis. Given the nature of the central position of the researcher within the study, the reflection should be strengthened by the projects under study and the knowledge of their practical outcomes.

3.3.6 Judging the quality of the design

Yin states that the quality of a case study design can be assessed by the outcomes of certain logical tests. He summarises these four tests as;

- Construct Validity
- Internal Validity
- External Validity
- Reliability (Yin, 2003)

The key to the *validity question* is to what degree the research measures up against what it sets out to measure in the first place. The position should be checked during the research design, adjusting as necessary to ensure proximity to subject matter and to eradicate elements of the research which might be considered as peripheral or unrelated to the focus of the study (Higham, 2020).

On this basis, *content validity* is also introduced to Yin's four tests.

Following Yin's direction on the tactics to be implemented to answer each of the logical tests, table 3.3.2 indicates this research's response to these tests, including additional content validity.

Logical Tests	Criticism or failing	Tactics implemented
Construct Validity	Subjectivity in the operational measures used	<ol style="list-style-type: none"> 1. Multiple sources of evidence 2. Establish a chain of evidence 3. Have key respondents independently review the case study report and incorporate feedback
Internal Validity <i>Explanatory study</i>	Inferences made incorrectly, and lack of understanding of spurious effects	<ol style="list-style-type: none"> 1. Undertake Pattern Matching 2. Undertake Explanation Building 3. Address potential Rival Explanations
External Validity	Are the results generalisable to the wider field	<ol style="list-style-type: none"> 1. Contextualise any generalisations made 2. Use replication logic in multiple case study and analysis
Reliability.	Are the case studies repeatable and would the findings be the same?	<ol style="list-style-type: none"> 1. Understand biases and eradicate these through operational approach 2. Author robust case-study protocol and adhere to this 3. Develop a case study database and maintain a chain of evidence
Content	Does the research <i>measure</i> what it is supposed to?	<ol style="list-style-type: none"> 1. Continual self-referral to research questions during research design 2. Elimination of erroneous or unnecessary question material 3. Undertake reflection of outcomes and their response to Aim, Objectives and research questions.

Table 3.3.2 : Logical test and this researches approach

The researcher considers that in this way, the approach taken answers criticisms of the process and the manner of the study. The research carried out met the tests of validity; it referred constantly to the tests to ensure the research approach remained legitimate and rigorous. Summary outcomes in answering the logical tests included;

Construct Validity : various elements of triangulated evidence, including a degree of quantitative research to augment the qualitative aspects. A

recorded chain of evidence, linked appropriately, and cross referred. Initial feedback sought from a number of respondents on outline outcomes from the case studies and the cross-case study analysis.

Internal Validity : Pattern matching fundamental to the Cross-case study analysis. The successful building of explanations in the analysis and conclusions. Rival explanations authored in relation to the initial hypotheses proposed, including a number of these which appeared to be valid alternatives.

External Validity : Generalisations sought and expounded from the data in conclusions. Undertook repeat and replicated approach to the logic of the case studies within the Cross-case study analysis, including facsimile approach on alternative case study information; this ensures comparability and facilitates generalisations where differing case study data is available.

Reliability : Case Study protocol fully adhered to, including where this would be potentially adjusted following pilot case study. Inherent and extant biases reviewed, acknowledged and addressed by adoption of an operational aspect which is able to filter potential predisposition. Chain of evidence and database approach adopted.

Content : Only the required questions were posed within the case study outline to ensure no superfluous elements. The questions posed are linked to all aspects of the research model (refer to Figure 3.10.2) and the over-arching research questions create the framework for reference throughout the fieldwork and analysis, with reflection over the outcomes and conclusion paramount in telling the story of the constructed knowledge.

3.4 Summary of the Case Study design

Yin (2003) provides a succinct diagram of the Case Study Method. This has been adapted to reflect this research and is shown diagrammatically in figure 3.4.1. An adaptation has been made in regarding “selecting” case studies to reflect this research’s previously outlined pre-disposition to the case study

subjects, The reality of practice meant that the timeline of the “first”, “second” and “third” case study projects, whilst originally due to have staggered start dates and potentially with differing construction teams involved, all happened at the same time and largely involved the same team (some differences were still inherent).

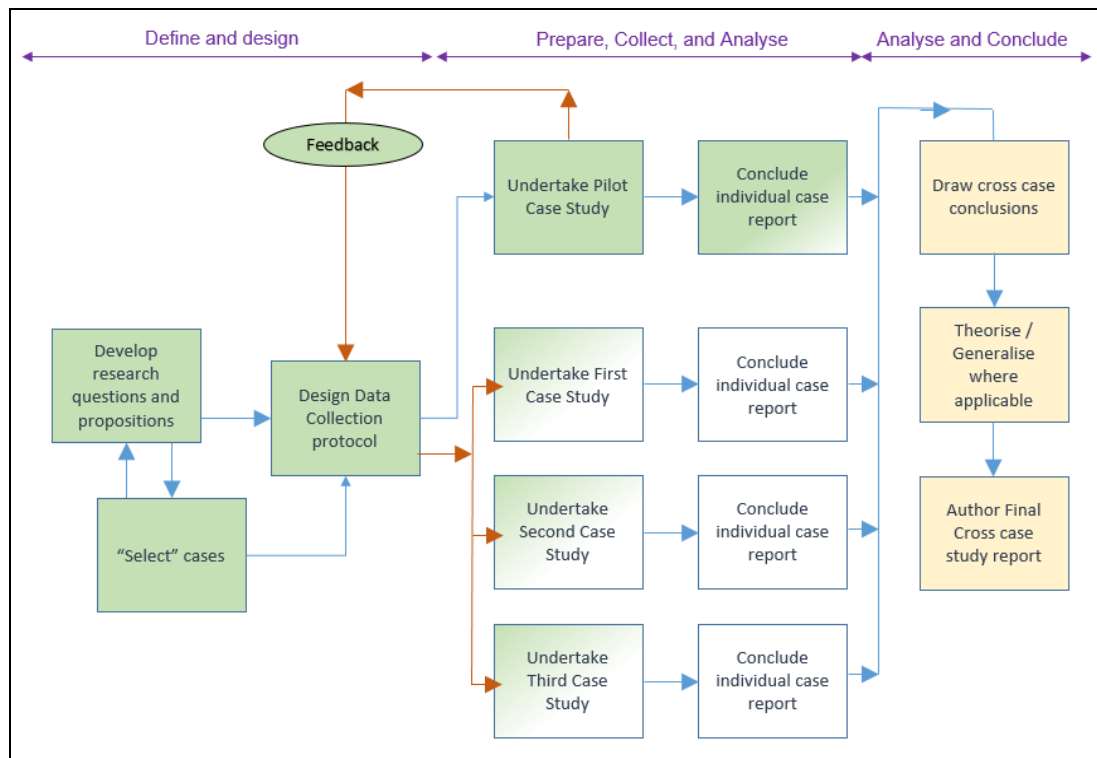


Figure 3.4.1 : Case Study Methodology

3.4.1 Additional Case – Serendipity again?

The researcher, whilst attending the Education Buildings Scotland Conference 2019, held discussions with another local authority delivery team for another, entirely separate, Primary School project where they had adopted a collaborative model of procurement not dissimilar to that used for the 3 further case study projects. The RENTON PRIMARY CAMPUS being undertaken by West Dunbartonshire Council had reached commercial close just prior to the conference and was under review before progressing to start construction. It had been procured through the Scottish Procurement Alliance framework, was procured via mini competition approach, as a 2 stage Design and Build

(with full Contractor Design team) contract, and utilised a NEC3 form of Contract.

The researcher was then able to interview the main actors from both Client and Contractor and have a number of questions answered. These queries were formulated from both the Preliminary Study and the ongoing research and case study basis.

This additional *Side Case Study* is further discussed in Appendix D.4, reflects on how their collaborative procurement approach affected the delivery and draws comparisons between their procurement vehicle and that of the main case studies. Further serendipity is experienced here, in that the Main Contractor involved in this Side Case Study is also the same Contractor involved in the other case studies (Pilot study excepted). Having a different Client and different delivery team involved further enriches comparisons drawn.

3.5 Social Network Analysis

The case study approach incorporates elements of Social Network Analysis as part of the research.

Social Network Analysis (SNA) is the measurement and understanding of the strength of relationships and flows of information or degrees of collaboration between the actors within the network (Orgnet, 2017). This manner of analysis is used to research the degrees of trust, knowledge transfer, and other aspects of a relational nature.

Pryke (2012) states that SNA is a theoretical concept and process of investigating social structures through the use of *network* and *graph* theory. SNA combines the theories noted but is rooted within the sociological field and particularly the study of relationship patterns. Social scientists have used the concept of "social networks" since early in the 20th century to indicate complex sets of relationships between members of social systems. Practical applications include behaviour patterning, data dissemination, customer and

marketing analysis, business intelligence, and team performance. Why then is it considered relevant to this Construction centred research?

The process within projects requires interaction and collaboration and relies on teamwork and relationships. It is reliant on tiered supply chains and how these interact and support one another; all of this in an industry which is contextually adversarial by nature. Construction projects are best portrayed as a matrix of relationships, comprising multiple transactions between individuals and firms (Pryke, 2012). Figure 3.5.1, from Pryke (2012), shows a graphic representation of the described matrix, the interconnectivity of transactions, and the complex relations inherent.

It is suggested that the SNA approach to this specific research is wholly appropriate, if not the MOST suitable method, given the highlighted issues inherent in construction within this study; failure of construction teams, poor communication, lack of trust between “actors”, lack of analysis of root cause of failures, poor understanding of modern practices (e.g. supply chain management), and industry resilience to implementation of studies’ findings or to change effectively.

Proponents of Social Network Analysis state it is ideally suited to the analysis of the construction industry due to;

- The observation of interdependent roles and changes to them
- Having an appropriate level of detail relating to the industry complexity
- Providing a basis of uniform comparison of networks and actors
- Accurately representing the nature of construction teams
- Being able to set aside traditional hierarchical structures
- Understanding the nature of *non-dyadic* relationships (Pryke, 2012)

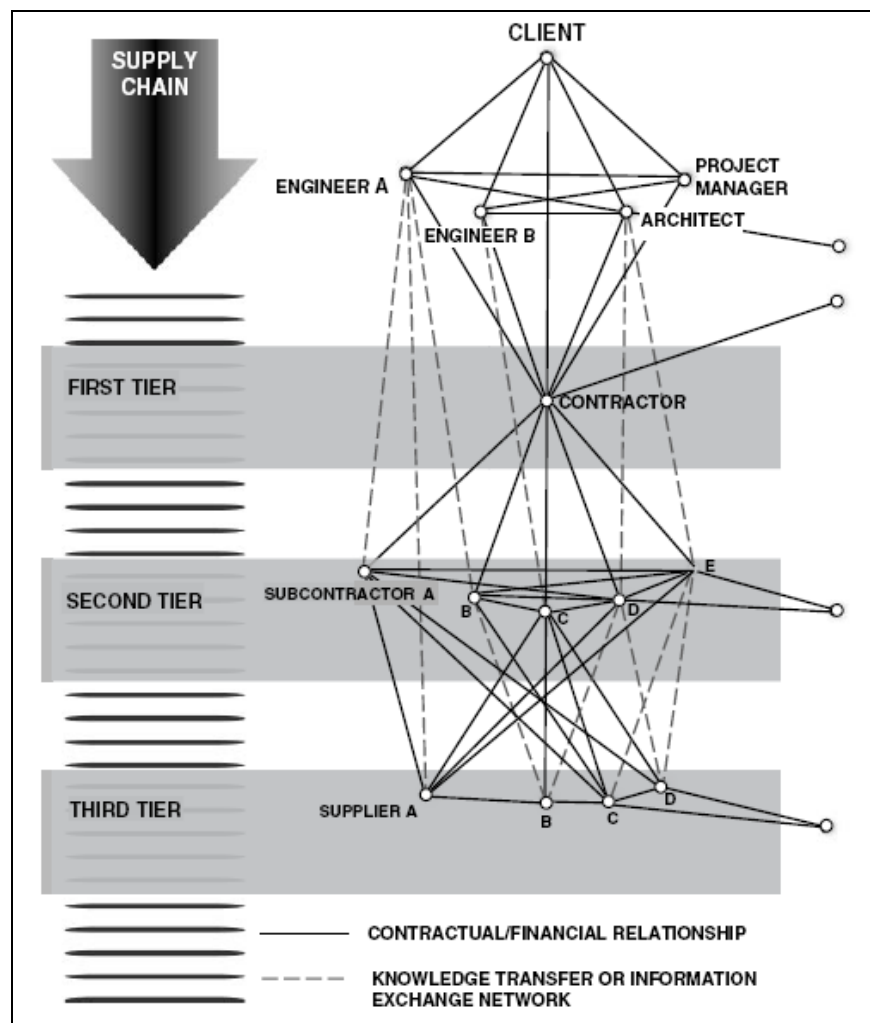


Figure 3.5.1. Supply chain network (Pryke 2012)

The measures undertaken in SNA generally involve the connectivity and interconnectivity of the network actors, the *density* (the relation between the maximum possible network links to the actual number of network links), the *centrality* (the measure of prominence or power within the network), and the degrees of *between-ness* (how actors are connected, directly, indirectly, or through other actors). Whilst this provides somewhat quantitative data, this is coupled with additional qualitative examination of the actors within the network to provide additional context. In relation to this and to identifying the key points of construction networks it is noted that networks rely on trust and function through psychological contracts. The effectiveness of a network is a

function of connectivity and the appropriateness of the prominence of individual actors within the network. Networks are self-defining and evolve over-time; they are transitory, multi-layered and organic.

Placing SNA in the context of this research's theoretical approach, it is described in the following ways;

- Explanatory and Descriptive
- Correlative
- Interpretivist, Constructivist, and Subjectivist
- Radical Structuralism (Sociological)
- Inductive
- Qualitative, but with elements of Quantitative (so arguably Mixed method)
- Cross sectional
- Heuristic

The specifics of the SNA enquiry design are outlined further in Chapter 5.

3.6 Justification of methods chosen

The previous commentary has given justification of the choices made in the methods undertaken. Within the framework of the research at the outset, a degree of flexibility was built-in; due to the uncertainty of the practical aspects of utilising the practitioner's sphere of activities to carry out research on and within. Serendipity has been acknowledged elsewhere, but part of the justification for the research methods adopted comes from having the awareness and flexibility to be able to adapt the approach. However, it is also acknowledged that had events taken a different turn, the research may also have had to have adapted in an appropriate way. The further justification below reflects on this aspect, how the approaches taken appear to have been justified, but also how they may have been undertaken differently given the live nature of the study. It might be argued that a more broader data set may

have been available through deploying a random sampling technique in selecting the projects for study. This is acknowledged but the justification for selecting the projects utilised in the case studies is centred on the level of detail available and the access that the researcher has to the documentary content for analysis. Given the Professional Doctorate route and the specific problem being researched the case studies selected are considered appropriate to providing reliable data in the research methodology outlined. That the outputs of the enquiry are also considered generalisable (refer to Chapter 6.5.7) is further justification for the selections made. It is considered that deploying a sampling technique in this instance would not have afforded such detailed data and consequent analysis.

3.6.1 Action research – Preliminary Study

The ability to access a wide audience of practitioners within the research field to discuss the aspects under consideration is a factor of the researcher's position in the area under consideration. This lent itself to the Focus-group approach without hesitation. However, had there been fewer Focus-group volunteers and a Survey approach then necessitated, that could have been considered. It would have likely not have been the case, with the survey approach, that the richness of response would have been equal to that from the Focus-groups. The level of mediated discussion was effusive and at points both argumentative and emotion driven. It is doubtful that a differing approach would have given an equal response in regards how the outcomes generated opportunity. This then, alongside crystallising areas of research focus, drove the central point of context within the follow-on areas of the research, which in itself caused the research to change direction somewhat. This context-driven direction change arguably enhanced the research proposition and may itself be the justification for the correct choice of preliminary study method being taken. The researcher's concern that dealing with context may derail thorough research then being assuaged with further adroit selection of methods.

3.6.2 Cross-case Study Analysis

The context-ridden area of research initially appeared troublesome to the researcher. Given the nature of practitioner-centric research however it *should* have been apparent that the area of research was never likely to be context free. The flexibility alluded to earlier, and the guidance of the academic supervisor, enabled a reframing of the method to be undertaken; requiring further review of the chosen methodology and how this could be deployed to best respond to the questions under scrutiny. Once the concept of context acceptance was fully grasped, and the case studies presented themselves, it was relatively clear that the use of case study was a methodology with a high degree of applicability. Also, given that these were cases with the researcher practitioner involvement, the central premise of the Professional Doctorate appeared to be very much represented.

What if those specific case studies not been available? And what if the Client body not been open to the suggested change in procurement approach? The researcher is in the fortunate position to have a number of projects that he could have relied on to source suitable cases and author the case study approach accordingly to deal with the differing timescales, availability of those involved and access to record information. This would have been a suitable alternative, but the cases and the Client body attitude that presented itself appear to have allowed an access to case study evidence, over identically comparable timeframes, with degrees of differentiation due to procurement recommendation, that may not have been as unambiguous as with other projects under study.

The cross-case study analysis approach allows for pattern matching, theme recognition and differentiation in analysing the projects individually and as a grouping. Whilst this may limit generalisations, the observations across the case studies allow a requisite degree of understanding of the themes within the context of the study, which also lends itself to explanation to a degree.

On the subject of generalisation from the case studies; If Construction projects are considered as a **group**, and if we were to narrow that group further to

education projects, it is argued that these would have common similarities as thematic content. If it is then proposed that these projects reside in, what Nassim Nicholas Taleb (2007) describes as, *Mediocristan* and reflect on his proposition that in this context only a few measures need to be taken to be “comfortable with the data” and to understand the wider population (projects), then generalisation is *potentially* possible. However, given the complexity and bespoke nature of projects as has been described in the existing literature and supported by preliminary study outcomes, it is still not the primary intention to claim that observations from this cross-case study analysis are applicable generally, unless that is the observations are considered applicable in all project instances. Refer further to Chapter 6.5.7.

3.6.3 Social Network Analysis

The introduction of SNA into the case study seeks to add a further layer to the analysis of, what has been clearly defined from the review of existing literature, the human interaction aspect of collaborative procurement. Some of the existing writing on the subject of procurement and on collaboration tend to avoid the context of the human aspect; this research wholly grasps that very aspect and acknowledges how that adds further contextual issues. On that basis the use of SNA is justified as there is likely no better opportunity to use the approach than in the environment of construction projects teams; the very ethos of how a social network works, how the relationships manifest opportunity or issues, and how the transfer of knowledge impacts on the project outcomes, the roles within the network, and the network itself. The researcher argues that had SNA not been researched and deployed, an alternative approach closely mirroring the concept (but likely sub-optimal) would have been authored and used.

3.7 Reflection on Action Research / Preliminary study

In carrying out the Focus-groups, a number of reflections were undertaken both during and following their completion. It is re-iterated that as these

Focus-groups were ongoing, the research was very much following a path of *Action research*; it was the realisation that the outcomes of the study meant that the initial research concept had some issues in regards context, that led to a repositioning of the research framework. This in itself represents robust reflection within the premise of flexibility, and it did not come without concern or consternation from the researcher.

3.7.1 Action research – Implementing a change

The initial adoption of a manner of Action Research with the implementation of a change to procurement methodology was the direct outcome of this. This displays that the action element is apparent both within this research framework itself and within the practitioner's area of practice. It was the nexus of the first and second phases of the research and is the hinge about which the two distinct phases hang. The change in direction (within the research framework) may not have been as relatively straightforward had the idea that context *could* be included in the research or if a change to procurement had not been a possibility. The implementation of the change in the procurement route means that the cross-case study analysis has a mirrored two phases, which lends itself to richer comparative review.

3.7.2 Reflective practice

The Focus-groups allowed an element of reflection within the practitioner's service delivery even as they were ongoing. The gaps between the Focus-group sessions allowed the researcher to reflect on what the participants were stating and apply this to his working practice in regards the view of how the themes being discussed were viewed by others. The concepts of value, of best value procurement, and of specific issues with the procurement of building services were particularly relevant at that stage. The ability to deploy early outcomes in discussions and representations to Clients and project teams was a helpful by-product of the reflection on that phase of the research

and is arguably *Research in action* or *Action on research*, however the phraseology sits best.

3.7.3 Ethical Dilemma

The proposal to deploy an alternative procurement strategy following the Focus-group outcomes and further reflection represented a dilemma of practitioner ethics. Was the recommendation purely for the purposes of the research OR was this the considered recommendation of the Practitioner Quantity Surveyor devoid of any influence from the research model?

It would be impossible to argue that the research model had absolutely no impact on the recommendation made, as it was a direct response to the initial phases of the research that the recommendation was formulated. And likewise, there is probably an element of bias in erring towards a recommendation in practice that would also facilitate the practitioner's research. However, the recommendation was not undertaken unilaterally, with the details of the method fully explained to the Client team, and how it also aligned with their specific requirements. Final decision on the use of the recommended procurement strategy ultimately rested with the Client.

3.8 Reflection on Cross-case Study Approach

The most significant aspect of the choice to adopt a Cross-case Study approach was in regards the inherent context identified in the "problem" about which the research is centred. It was considered that disconnecting the issues from the context they were related to would prove problematic and may limit the research significantly. Case Study research was identified, on that basis, to be the most appropriate for this study.

The ability to use projects with personal involvement, of a similar nature, and with the timing of same being ideal then directed the cross-case nature of the proposal. It is acknowledged that this relatively easy selection of cases to be studied may seem somewhat limited, and that it is rather the projects leading the research than the other way round. There may be an element of this, and

this has been considered. Had there not been the projects available to undertake this, the researcher would have had similar projects to undertake the same, or similar approach. The cross-case study approach does go hand in hand with the availability of the cases, but had they not been available, the approach would have still been undertaken due to it being considered the most appropriate to deal with the contextual issues. A further event supports this position; the side case study. This was not anticipated to form part of the research, but during the research it became available through the researcher's practice. The researcher identifies that there are further projects which could have been utilised in the cross-case study due to the nature and extents of the practical aspects of the researcher's workload.

The availability of the projects utilised means the case study information should be inherently richer and eminently more open to scrutiny, due to the accessibility by the researcher. The position of the researcher, within the project's teams, also affords greater access to the actors involved as they are known to each other; they are more likely to respond to request for interview etc. As a counterpoint to this aspect, it was considered at an early stage of this process if the proximity of the researcher to the actors studied might have influence over the actors' responses. This bias has to be addressed, given that the researcher was a Client representative and that responses given may be fed back to the Client, even unconsciously. The ethical considerations of this have been dealt with through the appropriate channels, and the respondents assured their input is anonymised. Any documentary evidence utilised in the case studies is also either anonymised or, approval has been sought to utilise openly from those who own the document.

3.9 Reflection on Social Network Analysis approach

A concern for the researcher with utilising Social Network Analysis was largely around the potential bias from the actors being studied and their responses in connection. It has to be accepted that individuals being researched will have certain preconceptions and biases, given human nature and how their

experience has developed attitudes. This is particularly relevant in this research where entrenched views of others, of procurement methods, and of construction process generally are potentially formulated from years of personal experience. Add to this the potential that actors may temper their responses in line with their corporate position; i.e. they may not be entirely open or truthful if they believe it may harm their employer's position, if they believe that the output of the research might show them in a less than positive light. So the rhetoric of practice in comparison to the actual practice needs to be recognised and understood.

How is this dealt with in this research?

In the Preliminary Study the divergence of opinion, including potential biases, was seen as a positive as the wider industry opinion was being sought by and large. The output of this made comment on where views were significantly different, including the delineation between those involved. This, in part, acknowledged the bias and also was a significant aspect of the context-based decision process, thereafter, adjusting the direction of the research method.

In the case studies, and more accurately within the response to the Social Network Analysis, divergences in views were considered as being potentially more acute as the individual responses were not tempered by the arena of a Focus-group, being one-to-one interviews. It was not the intention to censor or disregard any responses identified as potentially including bias or self-censorship, but again these would need recognising and acknowledging in analysis. The numeric aspect of the SNA outcome meant that, utilising some relatively straightforward statistical analysis, those responses that significantly differed from the most occurring range could be highlighted and investigated. The output of the SNA makes comment on where this occurs. Where it is obvious from the data that an individual or individuals have significantly differing opinions, this is clearly identified in the analysis output.

The narrative element of the SNA inputs and analysis of the common language would not be so simple to apply statistics to but analysis of the language deployed is able to be classified and compared. And again, the

output of the SNA makes comment on where this occurs. But to re-iterate, this isn't done to emphasise divergency, it is there to emphasise contextual aspects; acknowledging that bias is inherent. Generalisations may be able to be made from the majority of the data, but those aspects that do not quite align must also be dealt with.

Is this a potential failing of the SNA approach taken and the tool developed to attract response? It is not considered a failing, more so it appears to the researcher to be the most pragmatic approach to deal with the context and bias that goes hand in hand with researching a practical issue in the setting it resides and with the input of those enacting the practical actions. There is acknowledgment throughout this paper that the landscape this research resides within is complex; a simplistic output was never anticipated.

3.10 Methodology summary

Given the development of the research from its very early proposal, through the initial elements including Preliminary Study, its re-positioning following this, and then its ultimate methodology positions, the researcher believes the diligence and optioneering of methodologies undertaken have led to a position of *research comfort*. The methods selected align with the methodology discussed and similarly reside comfortably within the theoretical approach outlined. In addition to this, the potential issues that arise from this nature of research (context, availability of data, practical considerations and bias) have been considered. The approaches have been tempered or adjusted, methodology altered where necessary, to ensure that these issues, if not eradicated, are acknowledged clearly and assuaged appropriately. It is key to acknowledge in summary what each aspect has provided;

- Review of existing evidence – Frame and detail the problem identified in the academic context; support the identification of the gap required to be investigated (filled); forming the foundations of propositions to be explored.

- Focus group study – provide initial evidence of the problem outlined and the gap identified; initial findings to shape the further enquiry and drive the Action Research activity. Further develop propositions; fine tune.
- Action Research – the early elements of the research enacted a practical change in approach, defined the next stage of the research (by way of understanding contextual issues), and augmented the definition of the propositions to be tested in the following research elements.
- Cross-case Study Analysis – allowed for a richness of enquiry through the utilisation of a number of methods (including Social network Analysis) and is able to claim provision of additional knowledge for both Academy and practice due to the largely qualitative nature of the undertaking in answering (and asking) the complex IF, BUT, and MAYBE questions that context dictates. Propositions tested thoroughly through detailed enquiry, including reflecting on potential alternatives to the propositions derived.

It is important here to describe how the separate elements of the research data collection and analysis link together to form a cogent singular research enquiry, and whilst this is partially included in Figure 2.4.1 as an element of the overall design, Figure 3.10.1 indicates the steps taken in how the stages informed the next. It should be noted here that the evolution of the research is partially a function of the Professional Doctorate route taken; The Preliminary Study being initially designed as a stand-alone, modular, element of the research. The following elements of the research were influenced wholly by the outcome of the Preliminary Study along with the continued review of existing evidence. This research design is not unlike a more traditional doctoral study, however it does induce an additional iteration to the development of the knowledge. For the purpose of this explanation of the

research pathway, the action research intervention aspect is omitted albeit this was an important step in the development of the knowledge construction.

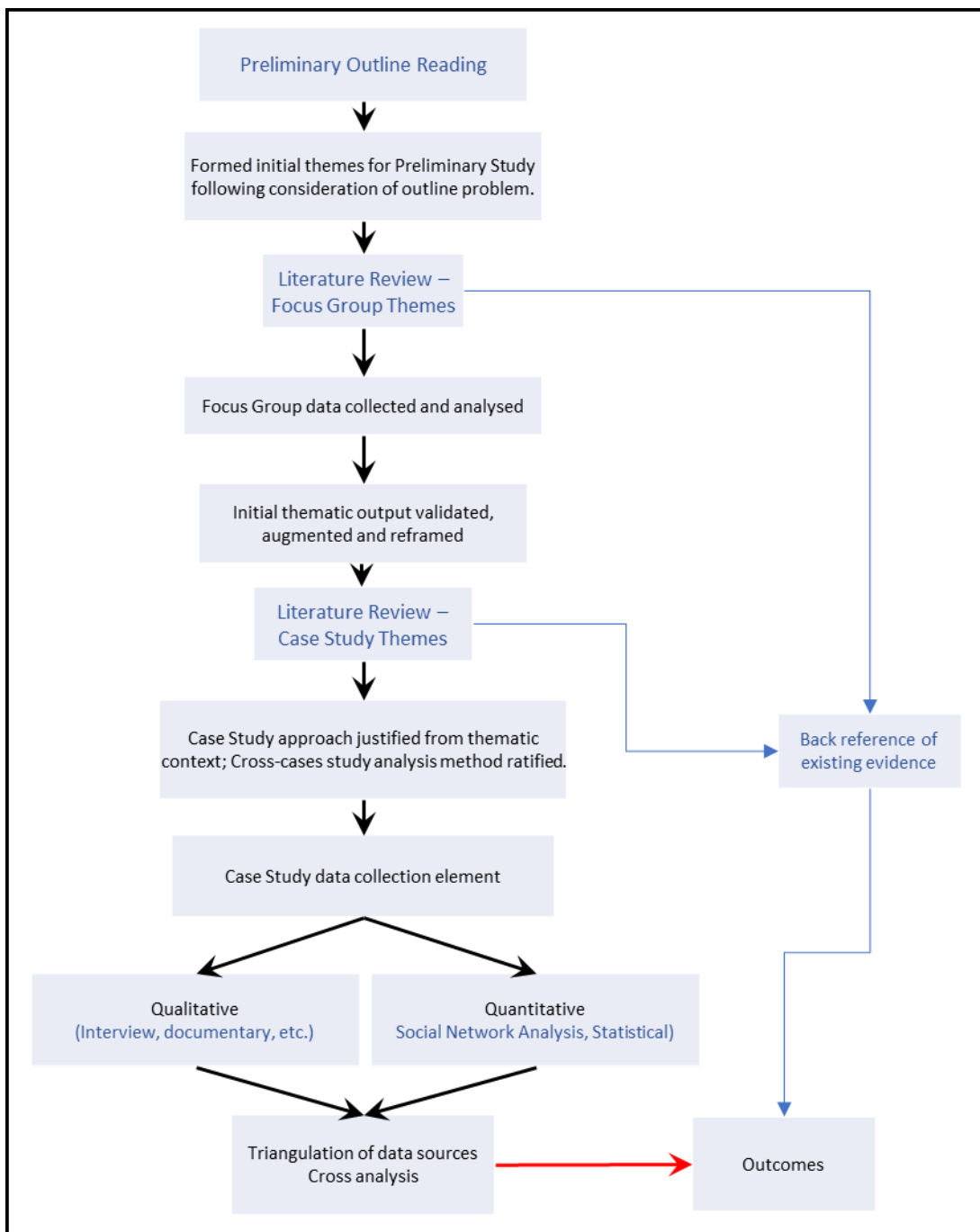


Figure 3.10.1 Research Phase pathway

Further, key to understanding if the methodology is appropriately constructed is how there is clear linkage between Aim, objectives, themes, the research

questions outlined and the research *tools* or question topics to be deployed. Figure 3.10.2 describes these clear relationships, from Aim to questioning themes. It shows that there was a logical progression and a development of a research approach designed to construct knowledge in an appropriate manner within a recognised ontology / epistemology.

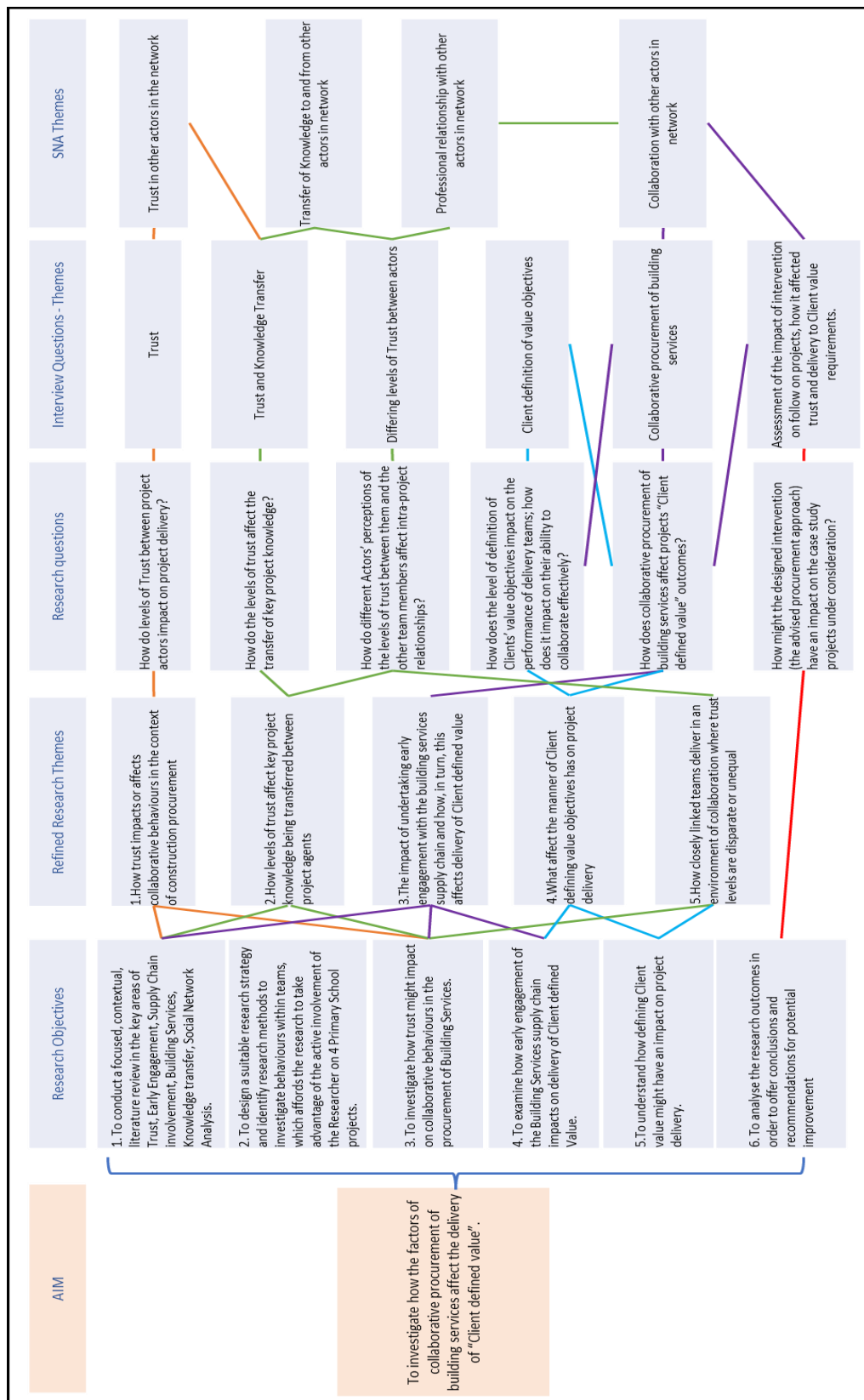


Figure 3.10.2 Research Strategy linkage

3.11 Ethical considerations

Any process of research has to consider the ethical implication of the enquiry, those participating and the potential outcomes for publication. This research has given due consideration to this aspect, has sought and gained full ethical approval from the appropriate Ethics Approval Panel within the University of Salford.

The specifics of the ethical considerations involved;

- Assessing potential participants and how they would be approached in a suitable manner for the separate elements of the research. The proximity of the researcher to the individuals and team members meant a direct approach was best deployed.
- Assessing potential risks to the researcher and participants; in this sense “risk” being more to do with reputation through lack of anonymity. No physical risk was assessed for participants and no vulnerable groups were considered. No financial inducements were proposed or undertaken.
- Provision of information to participants to allow them to make an informed decision about their involvement in the research. This was resolved through an invitation letter and information sheet provided when requesting involvement.
- Gaining informed consent from those participating through a returned document.
- Anonymity of responses. This was detailed within information sheet, with participants being assigned a *unique participant reference number*, coding responses to align with participant number, password protecting documentation, and storing reference number information in separate secure system to that of responses.
- Gaining the consent of the organisations involved in the research, through those participating, including Client, Designer, Contractor and the researcher’s own company.

- Outlining the research instruments to be deployed for gaining primary data. In this case of the Focus group approach, the Social Network Analysis related questionnaires and the interview format and questions.

Other practical steps were taken in the following ways;

- Focus group invitees were offered the opportunity to respond to the questions remotely and individually should they not wish to attend the group meeting or if distance or time precluded attendance
- Those undertaking the questionnaire were advised that if they were not comfortable in providing an answer to any questions they were able to leave it blank.
- Similarly, at the beginning of the interviews it was outlined to the interviewees that they need not answer any question they felt unable or unwilling to.
- The process of recording of interviews for transcription was outlined to those taking part; they were advised that all recordings would be deleted once transcriptions had been carried out. The transcriptions only being referred to by the *unique participant reference number*.

Full and final ethical approval was granted by the Chair of the Science & Technology Research Ethics Panel on the 12th March 2019, albeit an interim earlier approval was given for the Preliminary Study through the process of the Professional Doctorate.

4 PRELIMINARY STUDY – ACTION RESEARCH OUTPUT

4.1 Introduction

The Focus-Group Study (the Preliminary Study) was part of the Professional Doctorate Module 5, *Preliminary Practice Based Investigation*, the stage the research design was drawn up for this aspect, whilst the overall direction of research was understood (i.e. what was the *problem* to be looked in to), the potential for an approach alteration was not understood fully. The outcomes from this study were anticipated to direct and detail the continued research in a similar vein. As it transpired, it highlighted key issues within the subject matter and with the research around this. This ultimately informed and modified the methodology adopted for the rest of the research.

The Preliminary Study consisted of two methods; a review of existing evidence (the literature review) and the Focus-group study element, within an Action Research paradigm.

Literature review – considered key to sophisticated and thorough research, and the foremost research tool to understanding what has been researched in the topic before (Gray, 2009). In this part of the research it will set the agenda for the review of the themes derived and will be a significant aspect of the overall research.

With a broad subject such as construction procurement (albeit narrowed when only considering the procurement of building services) it is important to define the parameters of the literature review. By defining what is to be contained within the review, and what is to be excluded, the reviewer avoids the potential of allowing the review to grow exponentially and become unfocused. Stringency allows the subject matter the attention required to appraise what the academy (and industry) have discussed in the research area.

The initial Literature Review was then augmented by further investigation and full review is now included in section 2 herein.

Focus-groups – Focus-groups allow a sample of respondents to provide their views on specific topics, guided by the researcher as the facilitator to provide the spark for the dialogue (Grix, 2004). It also affords the opportunity for re-interview at a later time should the research require a longitudinal aspect, or to re-validate earlier assumptions should there be a shift in the research outcomes. One advantage of Focus-groups is that a variety of views may emerge, providing potentially new perspectives on the body of knowledge themes. Focus-groups can also assist in engaging the organisation that the research is undertaken within, particularly if there is an element of cynicism (Gray, 2009).

It is the aspect of the Focus-group Study that this section details.

4.2 Focus-group approach, data capture and analysis

4.2.1 Detail of Focus-group approach undertaken

Three Focus-groups were carried out (in accordance with approved ethical approval submission). These were;

- | | |
|----------------------|--|
| Focus-group 1 (FG 1) | Quantity Surveying practitioners from the researcher's own office (Edinburgh). Total number of participants was 7. |
| Focus-group 2 (FG 2) | Quantity Surveying practitioners from one of the researcher's employer's other offices (Glasgow). Total number of participants was 7. |
| Focus-group 3 (FG 3) | Quantity Surveying and Commercial practitioners from external organisations within the Central Belt of Scotland. Total number of participants was 8, and included Contractors, Building Services Sub-Contractors, Consultants, and Client representatives. |

A number of external participants approached were not able to attend Focus-group 3 on the scheduled date. The researcher provided the Focus-group documentation to them to be completed remotely and individually. This was carried out to further investigate if individual responses, lacking the context of discussion that Focus-group provides, differed from the consolidated response of the Focus-group participants as well as to gain their input. There were 6 remote participants which included a Contractor Quantity Surveyor, 2 Consultant Quantity Surveyor's, a Building Services Designer, an Academic Quantity Surveyor (with an industrial background), and a Client Quantity Surveyor representative.

4.2.2 Consolidated outcomes from the Focus-group research

The outcomes and responses from the Focus-groups are summarised here in the order and structure followed by the initial literature review and the documentation utilised.

4.2.3 Section 1 – 1. Industry and Client perceived failings of construction procurement, and how the industry has performed in this regard

		Validity	Level of agreement	Comments
1-A	That the construction industry needs to improve in how it meets clients' procurement requirements.	Yes or Yes with context	Agree or Agree Somewhat	<p>One of the remote participants Disagreed somewhat, but this appeared specific to their recent personal experience.</p> <p>Comments included; "Better informed professionals require focussing on project needs, not just what they are used to delivering." "The 'it worked last time' approach must be changed to maximise value for clients"</p>

		Validity	Level of agreement	Comments
1-B	That the construction industry is inefficient in many aspects of its delivery, including the manner of procuring built assets	Yes or Yes with context	Agree or Agree Somewhat	<p>FG3 included a number who considered the statement to be invalid based on lack of context, stating there are some very good examples and various reasons for failure.</p> <p>One of the remote participants Disagreed somewhat, but this appeared specific to their recent personal experience.</p>

		Validity	Level of agreement	Comments
1-C	Defining Client Value is, at best, subjective, due to the bespoke nature of construction projects (generally) and the complex relationships of clients and stakeholders	Majority Yes	Agree or Agree Somewhat	<p>One participant was the polar opposite, stating that "value can always be defined". This does not reflect the literature encountered.</p>

Table 4.2.3 Focus group outcome, Section 1-1

4.2.4 Section 1 – 2. Historic approaches to general construction procurement

		Validity	Level of agreement	Comments
2-A	Traditional, single stage, competitive tendering is not compatible with collaborative models of procurement – more so, that this approach induces conflict between the parties	Mostly Yes or requiring context	Mostly Agree Somewhat	Whilst the collective groups appeared to reach a general consensus, the remote participants provided varied responses and comments.

		Validity	Level of agreement	Comments
2-B	That when clients who wish to attain highest quality at lowest possible cost have to engage with an industry which seeks to maximise profitability, conflict is almost unavoidable and there is minimal opportunity for collaboration	Mostly Yes. Some No, but context required	Largely Agree Somewhat	Some varied responses with some commenting that there are mechanisms to incentivise parties to deliver.

		Validity	Level of agreement	Comments
2-C	Collaboration has been on the Construction Industry agenda for decades and has yet to be proven to be the solution to its procurement ills	Yes	Agree or Agree Somewhat	FG3 commented that there is a "lack of trust" in the industry coupled with no real "whole-heartedness" to support collaboration.

Table 4.2.4 Focus group outcome, Section 1-2

4.2.5 Section 1 – 3. Building services; their complexity and procurement approach

		Validity	Level of agreement	Comments
3-A	That, generally, the procurement of Building Services is more complicated than general construction procurement.	Yes or Yes with context	Agree or Agree Somewhat	One comment made reference to elements of the supply chain not providing transparency in pricing in procurement.

		Validity	Level of agreement	Comments
3-B	That volatility within the Building Services sector and a lack of consultant understanding leads to a degree of cost uncertainty, particularly at the early stage of a project.	Mixed response	Mixed response, but tending to agree somewhat	Whilst the collective groups tended to consider the statement valid and offered a degree of agreement, the individual respondents provided a split response with some disagreeing entirely. One comment stated; "Quality advice from supply chains, consultants and matching with client requirements is key here and should be set out at the start of a project"

		Validity	Level of agreement	Comments
3-C	That the complexity of building services lends itself to a model of procurement whereby the supply chain are involved early in the process, to advise on requirements, buildability and commercial issues.	Yes	Majority Agreement	This statement was seen unequivocally as being valid, by all respondents. FG2 encountered a level of disagreement between the participants which did not afford consensus.

		Validity	Level of agreement	Comments
3-D	Involvement of the building services supply chain at an early stage can lead to the degradation of the role of professional building services designers in a project team	Mixed response	Mixed response	No clear answer - context required. Comments examples: "depends on level of Professional services engaged" "Not if BSE has lead role" "Dependent on nature of project and individuals, new/refurb. Requirement driven" "enhances collaboration"

		Validity	Level of agreement	Comments
3-E	Involvement of the building services supply chain at an early stage can lead to the loss of commerciality in a project and may ultimately lead to a reduction in Value for Money	Mixed response	Mixed response	No clear answer - context required. Comments examples: "choosing the right specialist to provide the right advice should and does drive value into projects" "Dependent on nature of project and individuals"

Table 4.2.5 Focus group outcome, Section 1-3

4.2.6 Section 1 – 4. Collaborative Procurement methods

		Validity	Level of agreement	Comments
4-A	When times are tough (economically), collaboration is the last thing on clients' and contractors' minds; it's all about lowest capital cost.	Mixed response - errs towards Yes with context	Mixed response - errs towards agree with context	The groups provided consensus with 'Yes - with context' and 'Agree somewhat', but the individual responses tended to be the opposite. One comment (individual respondent) states " <i>Evidence has been strong during the economic downturn to improve collaboration to ensure better value is driven into projects that are viable to deliver and collaboration is key in the long term for the projects</i> ", which contradicts much of the literature and a large proportion of the Focus Group discussions

		Validity	Level of agreement	Comments
4-B	Proving collaborative integration delivers improvement is difficult given that the majority of projects have an element of uniqueness.	Mixed response - erring towards No	Mixed response - erring towards Disagree, with context	No clear answer - taking comments into account it appears the statement is not valid, and is not agreed with. Context required Comments examples: "Adequate benchmarking should prove / woolly outcomes not welcomed / difficult to pin on uniqueness" "Projects may be unique but the majority of projects have the same construction basis behind them."

		Validity	Level of agreement	Comments
4-C	In order to maximise value delivery through collaboration the entire supply chain should be integrated and utilised.	Mixed response - erring towards Yes, with context	Mixed response	No clear answer. Whilst there were lots of comments regarding only integrating supply chain members who could add value , one comment stated; "totally agree with this and should be the ethos of a project to ensure buy-in to the project from the earliest possible moment"

		Validity	Level of agreement	Comments
4-D	Integration of the supply chain requires significant resource investment and the development of new capabilities by those who wish to instigate this approach	Yes - some with context	Mixed response – marginal agreement with context	The groups tended to agree with this statement, where as individuals provided a majority disagreement. The context is plainly an issue here, with comments regarding timing, desire, consistent approach, culture, expectations, and the use of the word 'significant'

		Validity	Level of agreement	Comments
4-E	EVERY project will perform better with an integrated, collaborative team.	Mixed response	Mixed response - erring towards disagreement	There were discussions and comments regarding the size and complexity of projects being a contextual element; one comment from Focus Group 3; "It is the RIGHT way!" instigated some further, and frank, discussions within the group. This split the group, but the final overall response with them 'Agreeing somewhat'

Table 4.2.6 Focus group outcome, Section 1-4

4.2.7 Section 1 – 5. Procurement improvement leadership

		Validity	Level of agreement	Comments
5-A	An "agency" that does not reflect and utilise a lessons learned process is unlikely to improve	Yes	Agree	

		Validity	Level of agreement	Comments
5-B	Overly general statements on the benefits of collaboration and supply chain integration in all instances, without corroborating evidence, are viewed suspiciously	Yes	Agree Somewhat	

		Validity	Level of agreement	Comments
5-C	Integrated working at project level involving long-term supply arrangements will deliver better value to clients and more secure returns to industry	Yes, with context	Agree Somewhat	Some mixed responses. Contextual comments included; "This is proven on rolling project basis as the learning is integrated into the procurement and less mistakes are made"

		Validity	Level of agreement	Comments
5-D	It is not clear who is best placed to lead the drive for collaboration within the construction industry – Government, Clients, Consultants, or Contractors/Sub-contractors/suppliers.	Mixed response - erring towards Yes	Mixed response - errs towards agreement	FG 1 expressed opposing views between a number of individuals leading to a lengthy discussion regarding governmental leadership. Other comments included; "guidance rather than legislation exists - where is the legislation?" "I believe it is clear, and the answer is all" "Is there a role for a specialist procurement expert?"

		Validity	Level of agreement	Comments
5-E	Experienced Professional Quantity Surveyors have the appropriate skills, knowledge and expertise to provide the leadership in collaborative procurement	Mixed response - erring towards Yes	Mixed response - errs towards agreement	Whilst there were some responses that highlighted disagreement, the comments indicated that if this were the case it was important to have <i>relevant experience</i> .

Table 4.2.7 Focus group outcome, Section 1-5

4.2.8 Section 1 – 6. Current industry direction for improvement

		Validity	Level of agreement	Comments
6-A	That the Construction industry cannot wholly rely on utilising other industries' improvement models as construction differs significantly.	Mixed response - erring towards Yes, with context	Mixed response - errs towards agreeing somewhat	Comments centred round adapting the suitable elements from other industries.

		Validity	Level of agreement	Comments
6-B	Construction specific, bespoke, models of collaborative procurement will be best placed to deliver to clients' requirements	Mixed response - erring towards Yes, with context	Mixed response - errs towards agreeing somewhat	The contextual element was in regard the subjectivity of client and construction sectors

		Validity	Level of agreement	Comments
6-C	Collaborative procurement models are best suited for projects with a large requirement for complex building services	Mixed response - erring towards Yes, with context	Mixed response - errs towards agreeing somewhat	Group response erred towards validity and agreement, whilst individuals provided differing views, expressing invalidity and disagreement. Comments included; "The ethos should be the same regardless of project size." "cost driven down through early engagement, but would be client specific"

		Validity	Level of agreement	Comments
6-D	That the three new alternative procurement strategies developed from the Government Construction Strategy are a marked improvement and are likely to change the face of construction procurement	Mixed response - erring towards No, with context	Mixed response - erring to Disagree somewhat (Group response)	There was an equal balance of agreement/disagreement here. The groups tended to spend a great deal of time discussing this statement. Comments included; "Not effective on small projects - suited to large projects" "Largely existing approaches, aside from IPI" "where's the evidence? / not new / project bank accounts less than ideal for supply chain" "Only an improvement for government procurement. Cannot measure against a variable baseline of bespoke procurement approaches in private sector."

Table 4.2.8 Focus group outcome, Section 1-6

4.2.9 Section 2 – Group validation of “benefits of collaborative working”

	Validity		Rank order	
	FG overall	Remote overall	FG overall	Remote overall
Opportunities and risks are more transparent and manageable.	Yes	Yes	1	1
Solutions are more appropriate and more buildable.	Yes	Yes	2	2
Everyone is able to contribute; you get to use all the experience in your team not just some of it.	Yes, with Context	Yes, with Context	4	4
More innovation from all team members.	Yes, with Context	Yes, with Context	6	6
It's more enjoyable and more satisfying.	Yes, with Context	Yes, with Context	5	7
Shared problem solving leads to better problem resolution.	Yes	Yes	3	3
Time and cost are more predictable, so are outcomes and profit.	Context required	Undecided	7	5
Whole life implications are actually considered.	No	Undecided	8	8
It's cheaper.	No	No - with context	10	9
It's quicker.	No	No	9	10

Table 4.2.9 Focus group validation, “Benefits of collaborative working”

The summary above appears to represent a relative consensus between all respondents (albeit this is a summary of summarised responses). The majority of the benefits expressed are agreed with, but the last two were wholly rejected. In putting the benefits in rank order, the respondents, whilst there is minor dispute between four of the benefits, appeared to express similarity.

Some notable comments synthesised;

“Expressed benefits are not automatic outcomes”

“Design process with more people involved may lead to additional optioneering and taking longer”

“Can be MORE expensive, but may provide better VALUE”

4.2.10 Section 3 – 20 top ranked aspects of collaboration

All respondents ranking	Aspect	FG Average Ranking	Individual Average Ranking
1	An environment of open dialogue exists between all parties	1	4
2	A common aim is shared by all contributors to the project	2=	3
3	Early warning systems for any problems are integral to the project	5=	5
4	All team members contribute to the project	2=	2
5	An environment of mutual trust exist between all parties	11=	7
6	Collaboration creates a problem-solving environment	7=	1
7	Everyone understands the other team members roles and responsibilities	18	6
8	Team spirit exists between all personnel involved in the project	20	13
9	The contract supports collaboration	14	11
10	Collaborative projects encourage more effective information sharing	13	9
11	Risks are allocated fairly to the parties	7=	8
12	There are regular meetings between the various parties (client and supply chain)	2=	15
13	The project operates in a non-adversarial environment	15	16
14	Relationships between the parties are managed	7=	14
15	The pain share gain share mechanism is fair to both the client and the contractors	7=	18
16	Everyone respects the input of the other team members	16=	12
17	There is early involvement of key members of the supply chain	11=	10
18	Collaboration produces a win/win outcome	16=	19
19	Collaboration promotes long term relationships	19	20
20	The client and supply chain should achieve a reasonable profit margin	5=	17

Table 4.2.10 Focus group validation, Top ranked aspects of collaboration

It is worth stating initially in comparing the outcome of this research to the original that there were very few responses stating that these 20 aspects were “nice to have”, which aligns with the original. Also that the top 5 aspects are generally considered highly ranked by these respondents.

4.2.11 Outline Analysis

Utilising the same similarity classification scale as earlier in this paper, provides the following observations;

- The group’s average, whilst agreeing with four (including the top two) aspects, shows very little correlation with the original rank order. The individual respondents tended to be more aligned with the original, with over half of the aspects being similar to within 3 rankings.
- Significantly, in the context of this research, the respondents ranked 3 particular aspects higher than the original. These being;
 - All team members contribute to the project
 - Collaboration creates a problem-solving environment
 - There is early involvement of key members of the supply chain
- A granular interrogation of the responses indicates that there is little correlation between respondents. This suggests that the views on essential aspects of collaboration may be personal, subjective, and likely to be affected by context.

4.3 Emergent Themes

4.3.1 Summary of themes emerging

By way of degree of conclusion to the Preliminary Study, the themes emerging at that point are noted here. These themes relate to the headings within the initial literature review section and are those that formed the basis of the discussions within the Focus-groups. The themes are noted as statements (highlighted **Bold** below). Extension of these statements is only included here when considered necessary.

4.3.2 Industry and Client perceived failings of construction procurement

- 1-A **That the construction industry needs to improve in how it meets Clients' procurement requirements.**
- 1-B **That the construction industry is inefficient in many aspects of its delivery, including the manner of procuring built assets.**
- 1-C **Defining Client Value is, at best, subjective, due to the bespoke nature of construction projects (generally) and the complex relationships of Clients and stakeholders.**

Whilst the subject matter relates to improving Client value, it appears obvious that this term is hard to define.

4.3.3 Historic approaches to general construction procurement

- 2-A **Traditional, single stage, competitive tendering is not compatible with collaborative models of procurement – more so, that this approach induces conflict between the parties.**
- 2-B **That when Clients who wish to attain highest quality at lowest possible cost have to engage with an industry which seeks to maximise profitability, conflict is almost unavoidable and there is minimal opportunity for collaboration.**

Elements of the review promote the ideal that all parties can have positive interactions within the industry, even when the parties start with differing positions.

- 2-C **Collaboration has been on the Construction Industry agenda for decades and has yet to be proven to be the solution to its procurement ills.**

Whilst various reports on the construction industry and the need for collaboration have been published and accepted, there has not been the marked improvement which this approach has promised.

4.3.4 Building services; their complexity and procurement approach

- 3-A **That, generally, the procurement of Building Services is more complicated than general construction procurement.**

- 3-B **That volatility within the Building Services sector and a lack of consultant understanding leads to a degree of cost uncertainty, particularly at the early stage of a project.**

The industrial literature referred to the relative lack of the consultants who are involved in building services.

- 3-C **That the complexity of building services lends itself to a model of procurement whereby the supply chain are involved early in the process, to advise on requirements, buildability and commercial issues.**

Integration of the supply chain was common throughout the literature for all aspects of construction but appeared particularly pertinent when complexity was involved.

- 3-D **Involvement of the building services supply chain at an early stage can lead to the degradation of the role of professional building services designers in a project team.**

There was reference to the interaction between consultant designers and building services sub-contractors and what effect this would have.

- 3-E **Involvement of the building services supply chain at an early stage can lead to the loss of commerciality in a project and may ultimately lead to a reduction in Value for Money.**

Commentary was noted on the potential lack of commercial tension when there is early involvement of the building services sub-contractors who provide advice on buildability, innovation, and costs.

4.3.5 Collaborative Procurement methods

- 4-A **When times are tough (economically), collaboration is the last thing on Clients' and contractors' minds; it's all about lowest capital cost.**

A common theme, particularly in the most recent literature since the recent economic downturn, was noted. The return to traditional approaches was seen as a response when projects and teams came under pressure.

- 4-B **Proving collaborative integration delivers improvement is difficult given that the majority of projects have an element of uniqueness.**

The bespoke nature of projects was noted, regarding how the benefits of collaboration could be clearly shown and evidenced given that there are largely no identical projects.

- 4-C **In order to maximise value delivery through collaboration the entire supply chain should be integrated and utilised.**

- 4-D **Integration of the supply chain requires significant resource investment and the development of new capabilities by those who wish to instigate this approach.**

4-E **EVERY project will perform better with an integrated, collaborative team.**

Initially this statement was derived from an element of the industrial literature, but further review found support for this from academia. Having stated that, the contrary view, that not all projects will benefit from collaboration (largely based on size and complexity), was also evident.

4.3.6 Procurement improvement leadership

5-A **An “agency” that does not reflect and utilise a lessons learned process is unlikely to improve.**

The inability of the industry to learn from mistakes and other inputs was noted. The notion that the industry has not improved due to its inability to adapt to new approaches borne from reflection appears a number of times.

5-B **Overly general statements on the benefits of collaboration and supply chain integration in all instances, without corroborating evidence, are viewed suspiciously.**

Simply stating that collaboration and integration will provide improvement is unhelpful given the somewhat sceptical views of an element of the industry.

5-C **Integrated working at project level involving long-term supply arrangements will deliver better value to Clients and more secure returns to industry.**

5-D **It is not clear who is best placed to lead the drive for collaboration within the construction industry – Government, Clients, Consultants, or Contractors/Sub-contractors/suppliers.**

There are conflicting and opposing views on who is best placed to lead in the implementation of modern and improved approaches in the industry. It is noted that there are even conflicting views within governmental publications on who should provide leadership; this may be due to changes in governmental or legislative direction over the period of the publications.

5-E Experienced Professional Quantity Surveyors have the appropriate skills, knowledge and expertise to provide the leadership in collaborative procurement.

There are elements of the literature that state that certain members of project teams are best placed to drive leadership in this aspect of improvement. Whilst some state there are other professionals who could take this role, some specifically state that the Quantity Surveyor is primarily skilled for this.

4.3.7 Current industry direction for improvement

6-A That the Construction industry cannot wholly rely on utilising other industries' improvement models as construction differs significantly.

The commentary appeared to indicate some discomfort in adopting approaches from, for example, manufacturing to improve construction because of the inherent differences. The literature, however, did not indicate that ideas from other industries should not be utilised in some way.

6-B Construction specific, bespoke, models of collaborative procurement will be best placed to deliver to Clients' requirements.

6-C **Collaborative procurement models are best suited for projects with a large requirement for complex building services.**

6-D **That the three new alternative procurement strategies developed from the Government Construction Strategy are a marked improvement and are likely to change the face of construction procurement;**

- **Cost Led Procurement (CLP).**
- **Integrated Project Insurance (IPI).**
- **Two Stage Open Book**

As noted in the literature review section, these alternative strategies appeared to have precursory derivation in existing strategies. However, various items of literature appeared to support the statement made above. It was the researcher's intention to gauge the Focus-groups' views on the *newness* and *alternativeness* of these, as well as the level of understanding of them.

4.3.8 Group validation of the "Benefits of Collaborative Working"

Further to item 5-B above, the researcher wished to have the Focus-group provide their views on the 'Top 10 benefits of collaborative working' stated by Constructing Excellence (2015). Section 2 of the Focus-group approach was to derive their views on the level of validity of the stated benefits, as well as have them rank them from 1-10, to see how this compared to original study.

4.3.9 Ranking Aspects of Collaboration

Section 3 of the Focus-group was based on the prior research in to "Essential Aspects of Collaboration" (Hughes *et al*, 2012). Their research provided a long list of aspects which are pertinent to the themes and views throughout the literature review. As it was recommended that further research be undertaken

in this area, it was seen as a sound basis of a vehicle to derive the views of those taking part in the Focus-groups. The 20 aspects that were considered most essential (refer table 2.1.1) in the research were provided to the participants so that they could score these, individually, on the same basis as the prior research.

4.3.10 Conclusion of Themes

The themes derived and the responses provided by the Focus-groups then formulated a number of conclusions from the Preliminary Study element and are directly related to the initially authored research questions (reiterated in following section). From a point further down the research journey, these now (in part) look somewhat outdated and not all aligned with the research as it developed. As reflected on earlier in this paper, this is the nature of this extended research timeline, and how the research itself has been modified by outcomes as progress is made. This is considered a valid manner of research particularly in the context of research *on and in practice*.

4.4 Conclusion and Recommendation of Preliminary Study

The initial conclusions and recommendations from the Focus-group Study are shown in this section. These were formulated prior to the further phase of the research and, in part, were the basis of the recommendation to the Client involved in the case study projects and the nexus for the modification to the research approach. They are included here unaltered from the conclusion of the Preliminary Study (unless specifically annotated subsequent to the further research; highlighted as such)

4.4.1 Preliminary Study Conclusion

In concluding, the initially construed research questions (for the purpose of Preliminary study) are referred back to by way of comparison;

What are the commonly perceived issues with construction projects where early engagement and collaboration is not undertaken?

The themes derived from the initial literature are the researcher's summation of commonly perceived issues. The literature appears to indicate that the construction industry does have issues in delivering successfully, that this (in part) is due to a lack of collaboration between the relevant practitioners, that this has been an issue for some time despite previous commentary on the matter, and that improvements are required to be driven by strong and effective leadership.

Does the literature indicate that there are further issues in regards building services procurement?

Whilst it appears that the additional complexity of building services is noted, the extent of literature on building services procurement is considered somewhat limited. The commentary available indicates that where complexity is inherent, project outcomes are positively affected by early engagement with building services specialists (including the supply chain) and enhanced collaborative models.

What other themes are prominent in the literature in regard to the area of research?

The broader view of the literature discusses aspects of ‘trust’ amongst construction practitioners, as well as the potential ‘inertia of willingness’ to be involved in collaborative procurement. The wider involvement of the supply chain to enhance delivery is prevalent, although this view is not held by all in the industry.

To what extents do Quantity Surveying or Commercial practitioners agree with the common themes derived from the literature?

Those party to the research mostly agreed with the thematic statements presented. They comment that;

- whilst defining Client value is subjective, it appears that the industry is inefficient in delivering successfully
- Traditional procurement largely does not align with collaborative approaches, and when Client and contractor aspirations do not align conflict can be induced.
- Collaboration has been on Construction’s agenda for some years but has yet to prove its efficacy
- Building services add a further level of complexity in construction, and this largely lends itself to a more collaborative procurement approach.
- Volatility in building services or consultant knowledge may not affect the project at an early stage.
- Early involvement of the building services supply chain may / may not affect the Designer’s role or the commerciality of the project and is context specific.
- Collaborative approaches may come under pressure during difficult economic times, but this is not universal.

- Given the ability to benchmark effectively, proving the benefits of collaboration should not be difficult despite the bespoke nature of many projects. But uncorroborated general statements on the benefits are viewed suspiciously.
- There appears to be no consensus on the assertion that the entire supply chain should be utilised during collaboration, nor that EVERY project would benefit from this approach. Overall, those responding tended to believe that this was not the case.
- There is marginal agreement that additional resource and the development of new capabilities is required to engage in collaboration, but this is reliant on the context.
- Those that do not learn from experience are unlikely to improve.
- Long term integrated working will deliver benefits for the industry and enhance value.
- It is not totally clear who should lead the industry in the drive for better collaboration and integration. Whilst some state “ALL”, others expect the government to provide leadership.
- There was limited agreement that Quantity Surveyors have the appropriate skills to provide leadership in collaborative procurement (*this aspect was not investigated in the further research*).
- Construction should adapt the best and proven improvement models from other industries to make enhancements to delivery.
- Bespoke models of collaborative procurement are reliant on context specifics to deliver to Clients’ requirements.
- The view that collaborative procurement is best suited to large complex projects is not universally held. Some believe that the ethos of the approach is relevant to projects of any size.
- The three strategies developed within the Government’s Construction Strategy are unlikely to have a significant impact, in that they are adaptations of existing strategies, might not be effective on smaller

projects, and without easily accessible evidence to prove improvement are unlikely to be utilised.

- Not all of the benefits of collaboration stated by *Constructing Excellence* are agreed with, and statements such as these require context.
- The *essential* aspects of collaboration are broadly agreed on by a number of practitioners, however the relative order of broader aspects is likely to be subjective due to the contextual, and personal, experiences of those responding.

4.4.2 Preliminary Study Recommendations

It appears from the themes reviewed and commented on, that **context** is key in the procurement of building services. In the ongoing research, in order to be able to derive improvement, this context will need to be marginalised. A suitable methodology will be required to enable to isolate the contextual elements of procurement techniques to facilitate an approach which can be applied in many project circumstances (*plainly this view was modified following a further review, context being acknowledged and incorporated rather than removed*).

The literature review has limited itself to not undertaking an extensive search for the Government trial projects noted out-turn case studies. A wider search and review is recommended as part of the further research. Of those discovered in this research, whilst the case studies provided narrative on largely positive outcomes (of the Cost Led Procurement strategy projects found at least) there appeared very little substance to the assertions made. It is not that the case studies are to be distrusted, but for comparative purposes, the further research should interrogate the chain of evidence making the assertions unequivocal (*the focus of the further research was somewhat shifted away from this aspect as is described later in this section and elsewhere*).

Other potential directions for the Doctoral research included;

- The *scalability* of collaborative approaches; are larger projects more suited and will smaller projects gain benefits?
- Broadening the research to a wider pool of respondents than those included here-in.
- Seek to develop an opportunity with public sector Clients to utilise one of the recently published construction strategies on live projects, incorporating the learning from this (*it was this item that directly led to the proposals within the Case Study projects*).

4.5 Action Research – implementing a change in approach

There are two aspects to what is described as the *change in approach*; this being both in the research and of that in practical Client procurement advice.

The change had been described elsewhere more fully but the summary points are:

- Research approach modified to acknowledge the inherent context and how this could be captured; leading to Case Study Analysis as primary method, rather than initial concept of an Action Research approach (albeit an *ACTION* was enacted, see below)
- Further review of evidence to include additional key subject areas, particularly in regards trust and the SHARING OF KNOWLEDGE. INERTIA OF WILLINGNESS was also highlighted, but this field of review has proven to be limited.
- The active output from the Focus-group led directly to advice being provided to the researcher's Client in regards procurement of 3 further Primary Schools.
- The ability to utilise the 3 further schools as case studies led the research design to develop as a cross-case study approach. It is noted elsewhere that this could be potentially described as a *Quasi-experiment* but, given the Client's involvement in decision making and other factors, this description is set aside.
- The initially proposed procurement of the projects involved potentially different teams and staggered timelines. As it transpired there were similar teams involved and the projects overlapped (more than originally projected). The change in approach did not have a detriment to the case study comparison, nor did it materially effect the approach to Social Network Analysis. Arguably it made comparison more direct.
- The researcher reflects on the change in approach and how it aligned more closely with his view of the practitioner-researcher ethos and

particularly the interweaving of Practice and Academia. It is felt that the Cross-case Study approach specifically mirrors the aspects of the feedback loop between the initial research undertaken and how the Practitioner output then had a part in the modification of the further research.

5 CROSS-CASE STUDY ANALYSIS

5.1 Introduction

This chapter deals with the cross-case study analysis of the case studies undertaken, and articulates comparisons, similarities and differences between them. It addresses what the outcomes of the case study approach are and how these relate to the theories outlined.

The descriptions of the case studies undertaken, and reference to the *side case study*, along with the output from these is contained in Appendix D.

The fuller descriptions of each project are contained in each case study section, but summary of these is shown in Table 5.1.1.

Note: CEC is City of Edinburgh Council, WDC is West Dunbartonshire Council.

Case study	Name	Referred to as	Authority	Project Programme
0	St John's Primary School	SJPS	CEC	Dec 15 - Aug 18
1	Broomhills Primary School	BPS	CEC	Mar 17 - Jul 21
2	Victoria Primary School	VPS	CEC	Mar 17 - Dec 21
3	Canaan Lane Primary School	CLPS	CEC	Mar 17 - Mar 22
side	Renton Campus	Renton	WDC	May 18 - Dec 21

Table 5.1.1 – Summary of Case studies

5.1.1 Practical considerations on undertaking case studies.

The nature of undertaking these case studies required certain factors to be considered, particularly around the availability of information and of those being asked to participate. These practicalities were fully considered and formed part of the proposals outlined and agreed through the ethical approval requirements. It was essential for this approach to attain success to have the buy-in of those practitioners involved in the case study projects and advance work was undertaken with those required to be involved in order to seek their involvement and approval from them. This was wholly successful with no *actor* refusing to be involved; this lends the research fuller credibility.

Access to suitable documentary evidence had to be considered given the nature of potential commercial-in-confidence elements. However, the nature of working with a Local Authority means a great deal of the information has to be freely available under the Freedom of Information Act requirements. This meant that there were largely no issues in access to the documents as part of the case studies. The researcher's employer afforded singular access as long it did not breach Data Protection requirements.

The practicalities of carrying out the interviews was also considered, as this was considered significantly time consuming, including the transcription of the interviews for review and analysis. The interviews were all scheduled to be undertaken face to face and recorded via Dictaphone (or similar). All the Case Study 0 interviews were done in this way, with support (thankfully) from the researcher's employer's administrative staff in transcription (suitably anonymised prior to their undertaking this). Interviews for the follow on three case studies started out on the same basis but the COVID-19 pandemic meant an adjustment was required.

5.1.2 Impact of Practice on Research

There are some distinct instances where the research was affected by practical considerations specifically relating to the projects being studied as well as the wider construction terrain; these where:

- COVID-19 : as noted above, this had an impact on the method of acquiring interview data. At first considered problematic when lockdown ensued (March 2020), the dawn of the use of MS Teams and its associated tools (being able to record the interview and get auto-transcription (although that was not without its problems)) provided a solution which proved to be more efficient than the initial approach. It also saved time for both the researcher and those being interviewed.
- Delivery Programme : The 3 school projects (case studies 1,2 and 3) were originally programmed to be delivered on a fully *staggered* basis. As the pre-construction development activities advanced it became

apparent that the original programmes were not going to be viable or meet the Client's requirements. In addition, there were discussions on how undertaking parallel activities may actually benefit the development programme (design reviews and the like). As delays were encountered in the pre-contract phase (design delivery, market testing response, meeting commercial thresholds) the projects staggered programme became less so, with the Contract Execution dates and the start on site dates compressing significantly. Whilst this meant the Client requirements were being better met, it did mean that the original approach in the research programme had to be modified to suit. As it transpired, the programme of interviews elongated in any case (due to this and other factors). This was not anticipated fully when planning for the data capture.

- Contractor Selection : When the Client gave approval to procure the 3 schools on the basis of the advice given (whereas the suggestion was initially to undertake one of them on the basis of the bespoke advice) this meant that the potential for having the same contractor on the 3 projects was enhanced, which differed from the expectations of the original case study outline proposal. This was considered and confirmed that the case studies and cross case study analysis would still be valid, given the differences (and similarities) within the separate project teams.
- Cost targets : Whilst original Client Drivers were predominated by the Programme, to align with opening dates and school roll requirements, as costs were advised from supply chain input and exceeded the Client's budgetary caps, this became an over-riding issue. This somewhat derailed a degree of progress in the pre-contract phase and also agreeing a contract sum. It also had the effect of leaving a negative opinion of the initial process; one which it is acknowledged may have biased some actors' opinions in the SNA aspects of the data.

5.1.3 The procurement landscape for the case study projects

Procurement of construction projects is not undertaken in a bubble. As these projects commenced the Client, City of Edinburgh Council, had received the report in failures at a number of their schools from Professor John Cole (2017). One of the resultant actions from this was to note that Design & Build procurement was less preferred than a traditional approach, largely due to the ability of the Client to have better control of quality. The recommendation made in the client advice papers, rightly, considered this and hence the bespoke 2-stage traditional approach was recommended.

5.1.4 The Presentation of the case study data

Case Studies 0-3 are presented within Appendix D in identical ways; Case Study outline, Notable events, and the data collected, analysed and outcomes. An overall case study summary is provided at the end of each case study section.

The presentation of the data collected/analysed is described fully in Appendix D, but to summarise;

Section 1 – Interview Questions

1. Trust and project delivery
2. Trust and knowledge transfer
3. Differing inter-actor perception of trust
4. Client definition of objectives
5. Collaboration and Building Services

Direct quotations from the interviews are highlighted with italics within the narrative section of the case studies. Additional direct quotations, where not used to narrate the case study directly, are included in Appendix C.

Section 2 – Social Network Analysis

Network connectivity

Scored response to:

Trust
Collaboration
Transfer of Knowledge
Professional relationship

Within the presentation of the data are elements discussing relevant statistical tests, SNA standard mathematical tests, noted bias, and comparison drawn between the two time periods noted (3 months prior to contract execution and 3 months afterwards) and the individual actors.

Scored responses to SNA questions

The questions posed where;

- What degree of trust do you have in each actor?
- What degree of collaboration is there with each actor?
- What degree of Transfer of Knowledge is there with each actor - Separately, *To actor* and *From actor*?
- What is the manner of relationship between yourself and each actor?

Each was to be scored on an *ordinal* scale as described;

Guideline for scoring				
Score	Trust	Collaboration	Knowledge transfer	Relationship
0	No trust	None	None	Extremely poor
1	Little / minimal trust	Little or minimal	Little and not on time	Poor
2	Some, middling amount	Middling amount of	Middling and on time	Fair
3	Mostly trusting	High degree of	High degree and timely	Good
4	Absolute trust	Very High degree of	Delivered prior to requested	Excellent

Table 5.1.4 SNA ordinal scale

Relative Importance Index use explained

RII value shows the propensity for the individual to have a positive or negative view of the network connections under each heading; a score of 1 being the most positive (all 4's). Lower values show less positive response. Further description is included within Appendix D.

5.1.5 The Side case study – Renton Primary School Campus

The opportunity to review a similar size and value project procured in a different way, but in the context of the other case studies and the wider research is taken in a differently formatted manner as a *side* case study. Comparisons are drawn from this to the other case studies in the cross-case study analysis. It is noted here that this case study was not undertaken in the same manner and, due to this, statistical analysis has not been carried out as for Case studies 0-4.

5.2 Cross-case Study observation and analysis

5.2.1 Observation approach

The cross-case study observation and analysis is approached in two separate areas;

- Review of the narrative elements from the interview outputs and how comparisons are drawn between the case studies (Renton included).
- Utilising the numeric responses and drawing direct comparisons between each case study (Renton excluded), providing additional narrative.

The two elements are then subjected to synthesis and final cross-analysis of the case study outputs.

5.2.2 Narrative review

5.2.2.1 Narrative Summary

The provision of a summary of the comparison between the case studies is by way of table 5.2.2.1; this enable a relatively direct comparison of all aspects of the cross-case study outputs.

A summary of observations, with more detailed review hereafter, is:

Trust : The reliance on trust in order to operate effectively is similar within the 5 case studies. The view of the actors involved highlights, with almost unequivocal voice, that trust is fundamental to working collaboratively. Plainly there were noted differences in the levels of trust both within each case study setting and between the case studies; with the view of actors on successful outcomes mirroring these. The procurement and contractual arrangement, differing from Case Study 0 to Case studies 1 – 3, and again to the side case study, appears to not have been the determining factor on levels of trust. Case study 0 was traditionally procured (from a framework) yet the trust levels, particularly post contract execution, appear to have galvanised and been a fundamental part of the success. Case studies 1 – 3, set up on the basis of collaboration, had significant issues within the pre and post contract settings which were determinant on the lack of trust between a number of the actors. The Side Case study had the client set the agenda for trust by asking the initial question “who can we work with” and then spring-boarding from that throughout the project. It was the basis of trust within a core team, and their reliance on one another, that was considered part of the project success.

Degree of Collaboration : The pattern of the 5 case studies is similar to above, in that Case study 0 differ to Case studies 1 – 3, and again to the Side Case Study. This is perhaps self evident given the relationship between Trust and Collaboration. Despite these differences the act of collaboration on and within a project is seen by the majority of the actors involved in the case studies to be something that is likely to benefit a project; active and participatory collaboration leading to better outcomes. That Case Study 0

noted general positivity in this regard, speaks volumes for a contract based on what might be considered a *conflict model*; the specific central actors and their willingness to collaborate (despite the contract) leading to resolution of issues for the betterment of the project, rather than individual or corporate gain. The collaborative model defined for case studies 1 – 3 appeared to a lot of the network for these projects to be ineffective. However, those that were central to and active on the collaboration, particularly around the Building Services, had a more positive view. This then suggests that those who are willing to collaborate are more likely to gain the benefits from collaborating. This is reflected in the Side case study, where there was a very high degree of collaboration particularly within the core team and from the very beginning of the project. The benefits of acting collaboratively are highlighted as being fundamental to the project success; noted as being a project *without equal* by one of the client team.

Extents of Knowledge Transfer : Again, the pattern of the 5 case studies is aligned with above. Commonality between Case Studies 0 and 1 – 3 in regards how failings of knowledge transfer were perhaps influenced by actor relationships and the trust between these actors; this being singularly apparent on Case Study 0 where there was general positivity outside of that specific instance. On Case Studies 1 – 3 it was observed that despite there being a high degree of communication, this was not the precursor or the enabler of high degrees of knowledge transfer. This is somewhat unfortunate, given the procurement route was specifically tailored to enact enhanced transfer of experience and knowledge. This aspect was significantly impacted in key areas of the project by the lack of trust and collaboration. One positive, if it can be referred to as that, was that Case Studies 2 and 3 benefitted from learning lessons from Case Study 1; itself an example of knowledge transfer. The Side Case Study benefitted from open, honest and exhaustive, knowledge based communication, with reciprocity of enquiry being key to delivering requirements, inclusive of the wider stakeholder community.

Professional relationship within the networks : Again, the pattern of the 5 case studies is generally aligned with above, however Case Study 0 and the Side Case Study share the position that the positive relationships were a significant factor within the effectiveness of the team and the delivery of outcomes. Where Case Studies 1 – 3 suffer in this regard is in the area where some personalities were unable to resolve differences in view or approach; albeit that professionalism was not necessarily viewed as being diminished. It was however noted that the issue around trust of other actors sometimes meant that professional advice was sometimes questioned; this was not as prevalent in Case Study 0 and in the Side Case Study there was abject reliance on the professionalism and their advice provided, successfully. When considering how these professional relationships were engendered, the procurement model appears to have influence;

- Case Study 0 : Traditional : professional relationships developed positively and organically despite the contract model
- Case Studies 1 – 3 : Bespoke collaborative 2-stage traditional : The model was designed to enable the positive development of the relationships but issues within the projects and the actors' individual responses meant inequality in relationship status was apparent.
- Side Case Study : Collaborative : The relationships were fundamental to the project at the earliest of stages and predicated the team structure and approach to the project. Ultimately having a significant impact on positive outcomes.

This suggests that procurement model and contract form, whilst having an influence on the professional setting, may not be the predominant factor determining how construction professionals interact within a project; more so it relies on the motivations and attitudes of the individuals involved. This relationship status influences a number of the other factors discussed here.

Client Objectives defined : Similarities exist between the case studies 0 – 4, in that the setting of objectives or measures by the Client team was seen as being poor and that this had a significant impact on the manner of

collaboration, how the networks performed and the outcomes when compared to delivery aspirations (notwithstanding that the buildings delivered were received very well by the Authority). The verbal communication and lack of clear direction was said to also have a negative impact on the trust-setting, there being no solid basis for the impetus of trust and trustworthy behaviour. Compare this to the Side Case Study and it is observed that the robust nature of the Client requirements, being informed through an education-led, and then referred to at key junctures to advise decision making, and it is clear that the quality of Client briefing their objectives effectively has an impact on delivery; perhaps even fundamentally, albeit that the 4 case studies still delivered the over-arching objective – four new schools.

Building Services Procurement : The actors within Case Study 0 observe that the lack of early engagement with the Building Services supply chain was a potential factor in elements of the delivery for the project, and that the latter appointment caused issues at key points during the construction process. They note that earlier engagement would have been beneficial in any case. The model of collaboration for Case Studies 1 – 3 was geared around having the Building Services supply chain involved as early as was feasible (albeit there were comments that it would have been better to have them engaged even earlier than was the case). The issue in the actors responses is that those who were NOT involved in the Building Services collaborative discussions were somewhat dislocated from the output of this, and so were not necessarily aware of the positive aspects of this. Those involved in the discussions, generally, felt positive about the engagement and the outcomes and, as a consequence, also provide more positive response in other areas of the enquiry. This is mirrored by the Side Case Study where early engagement with supply chain members, including the Building Services subcontractor, proved beneficial for decision making at appropriate times and to align expectations with aspirations as early as possible. This then indicates that early engagement with the Building Services supply chain provides project

benefits and can engender more positive attitudes towards the network and wider collaboration.

	Case studies				Side
Case study	0	1	2	3	
Reference	SJPS	BPS	VPS	CLPS	Renton
Case study factor: Summary narratives					
Levels of Trust	Some highly effective trusting relationships impacted positively on the project outcomes	Initially positive trusting relationships diminished as pressures showed the fragility of these; impacted on outcomes			Commented on as being high in the project team and led to effective outcomes
Degree of Collaboration	The procurement route was not a precursor for collaboration. Central actors facilitated collaboration for the benefit of the project.	The selection of procurement approach was to enable collaboration to benefit the projects. This was seen as generally being ineffective, save two specific areas. Some actors considered that there had been some, limited benefits due to the collaboration, but majority considered it could have been enacted better.			A very high degree of collaboration from the very outset until the project conclusion
Extents of Knowledge Transfer	There was a generally positive view on the effectiveness of the transfer of knowledge, with two specific areas where it was problematic.	The view from the networks was that there was a varied degree of effective knowledge transfer and that this was impacted by the individuals involved and the levels of trust and collaboration between various network members. A high degree of communication did not lead to high degrees of Knowledge Transfer. The cross-agency collaboration was supposed to reap the benefits of extensive knowledge transfer; this did not transpire. Case Study 1 suffered the most due to failings, as the first of the three projects.			Expressed as being done in such a way as to ensure no one was in any doubt over any aspect. Was open and exhaustive with an environment of enquiry and response being key to the process.
Professional Relationship of the Network	Relationships were noted as generally being both professional and effective throughout the project.	There were some comments on personality clashes and arguments occurring between some members of the networks. This does not mean that the professional relationships were diminished. However, it was noted that the degradation of trust meant that some actors questioned elements of the professional advice being provided by other network actors. There were comments that the procurement route should have enhanced relationships but, due to issues within the projects, these were put under pressure and continued to be in the same state of tension when entering the delivery phase.			Strong and key to delivery. Reliance on each other to ensure delivery, with no one wanting to be the one to let others down.
Client Objectives defined	The client definition of their requirements was considered poor for the projects reviewed as case studies. The lack of written briefs was noted and that requirements were communicated verbally, by and large. This, it was stated, had a negative impact on how the actors were able to perform, interact, collaborate and deliver the projects. It also had an impact on the degrees of trust within the networks.				Noted as being robust, informed and a reference point for all decisions; an education led process as the basis of decision making.
Building Services Procurement	Earlier involvement would have improved the project. Late appointment of Sub-contractor caused issues.	Those involved in the early engagement provide positive comments on this aspect and note that without this being undertaken, delivery to development programme would have been impossible. Trust, Collaboration, Knowledge Transfer and professional relationships generally score higher within the network from those involved in this aspect.			Was affected by team input and key decisions being made early and collaboratively.

Table 5.2.2.1 : Cross-case study narrative output comparisons

5.2.2.2 Further detailed narrative

As well as the narrative summary of cross-case study outputs, the further descriptive and detailed responses to the interview question topics are addressed as they were asked.

1. Trust and project delivery

In general terms :

It is clear that across all the case studies that, generally, trust is seen as fundamentally important to project relationships and the ability to deliver. It was commented on by those interviewed as being *critical* to success, and *essential* for collaboration to work. It was also stated that, in general, the lack of trust can be a root cause of failures within teams or the inability to deliver projects. There was acknowledgement of the nature of individuals and their personalities or their propensity to trust others in a professional environment, across the construction industry.

There were also comments on the benefit of enabling trust at the beginning of projects, to set the scene for a trusting environment, and to engender effective, trust-centred, relationships. It was however also noted that trust cannot simply be imposed, it requires individuals to be trustworthy and be open to trusting.

The idea that suspicion (mistrust) also has a place in industry relationships was also raised, in that this can nominally raise standards.

In case study specific terms :

Differing views from individual respondents, but a generalisation would be;

Case Study 0 : Comments on the effectiveness of some highly trusting relationships within the network, and how these impacted the wider team, were made. But conversely, there were also comments on specific relationships that suffered from poor trust levels; these involved both Design Team members (particularly the Structural Engineer) and members of the Contractor's supply chain (namely the MEP subcontractor, who appears to

have been appointed later than would normally be anticipated). The strength and nature of personalities was noted as a driving force within the trust relationship, but that this also meant any breakdown was significant (due to its personal nature) and resolving issues proved difficult. Whilst the project was successfully handed over, the relationship around the MEP subcontractor appeared to have significant impacts, and part of this was on the basis of low trust.

Two other points noted where; the impact of having the early collaborative workshop and how that set the scene, and how, in order to get the project handed over on time, there was significant reliance on the trust relationships available within the network. This was a project that was TRADITIONALLY procured but there were comments in regards how the high degree of trust and collaboration was both unusual and effective.

Case Studies 1 – 3 : The interaction between Client and Contractor teams started out with a high degree of trust apparent, and some of this was due to previously existing relationships. Unfortunately, the trusting relationships diminished between a high degree of the network quite quickly, as project pressures arose, and was manifested by a clear delineation between Client and Contractor sides of the network. Meng (2011) notes that a decline in relationships reflects a degradation of performance within project settings; this was evident here. This was not solely between Client and Contractor team members, as there were also some trust issues between members of the Design team. The *fragility* of the trust relationships (in the most part) were obvious, and it appears that a significant number of the network had issues with trusting *per se* which, by its nature, may also illuminate the trustworthiness of some individuals. The poor trust relationships were at times seen to be obstructive, or at least seen to be impacting the effectiveness of, what should have been, a highly operative and collaborative procurement approach. A number of comments were made in regards the impact of those with leadership roles within the Client team not showing leadership in the trusting of the Contractor team. When significant issues arose in the project in

regards cost or programme, it appeared that an inherent mistrust focused on the issues being due to the Contractor rather than understanding the root causes.

Some commented on the strength of some of the relationships within the network, including between Client and contractor actors, so the poor trust atmosphere was not *total*. It was these relationships that were relied on to ensure the project continued towards its ultimate goal. This included around commercial aspects and the MEP Supply chain engagement, which also benefitted from existing relationships.

One element which was only recalled by a small number of the network was around the re-programming of the projects when it became apparent that the projects were undeliverable on the existing programme. This required the Client team to put trust in the Contractor leadership to come up with a programme solution that worked but required activity overlap and acceleration. A reciprocal trust was placed in the Design Team to comply with the programmed activities in order to meet the deadlines. This was partially successful and enabled closer alignment with the Client aspiration. That this was not widely recalled during interview might suggest that the trust-relationships have degraded to a point where some were unable (or unwilling) to discuss positive aspects of the network working together to meet requirements.

Even though Case Study 2 and 3 benefitted from some of the problems resolved on Case Study 1, overall there appears to be disappointment in the levels of trust in the network especially given the collaborative procurement approach.

Side Case Study : This project benefitted from an approach that focused on who the Client “*could work with*” collaboratively and at the earliest opportunity; essentially people oriented. This indicates that the foundations for trust were already being laid before engaging fully. The team approach was key to the delivery from the very earliest of stages where the Contractor’s operatives joined a small “tight” team with a “*multidirectional*” approach”. There were

already pre-existing relationships within the team. It was commented that trust was paramount and was further engendered by the engagement's Terms and Conditions, through the framework appointment. Even the selection of procurement route (2-stage D&B) and an NEC form of contract signalled a higher degree of collaboration. The team interviewed were effusive in their positivity towards the process they had encountered and the outcomes that were forthcoming. The project continued in the same manner and was successfully handed over. It should be re-iterated that this project had the same Main Contractor employed on it (albeit a separate team) as case studies 1 - 3.

Observations : With differing procurement approaches witnessed within the case studies it seems that trust can not be simply imposed through a projected engagement model. It needs the energies of the individuals to be directed towards trusting relationships and requires mutually acceptable conditions to exist. It appears that some individuals are not pre-disposed towards this innate degree of trust. Within case studies 0-3 there are individuals who show a consistent approach to trusting and being trustworthy, but there are also those who show contradictory styles. This indicates that trust relationships are complex, potentially unpredictable, and require a level of reciprocated behaviours exchange to be maintained.

2. Trust and knowledge transfer

In general terms :

In common with comments on trust and project delivery, those interviewed considered that trust plays a *significant* part in effective knowledge transfer; with the two aspects being noted as interlinked and that a lack of trust would have a high impact. The emphasis of trust may however be placed on those receiving the information, more so than those issuing it. It was found that trust, in this instance, may actually only be necessary in one direction and not need to be reciprocated. Arguably though, knowledge transfer as a project operation is not purely a one-way activity and so trust still plays an important

part in the process but may be reliant on the nature of the procurement or contract arrangements, with more emphasis placed on this under more collaborative models. It was noted that experience, and perceived experience, can play a part in how trust is manifested in a knowledge transfer environment. Sharing this experience in a wider network is an action in itself but also should assist in building trust in the one displaying experience. With a higher degree of trust across a network it should follow that the transfer of knowledge is more effective.

In case study specific terms :

Differing views from individual respondents, but a generalisation would be;

Case Study 0 : The transfer of knowledge, within the procurement model adopted, was generally considered as being effective, however there were some key areas of ineffectiveness noted, and these are reflective of the areas where less trust was apparent (Structural information and latter information exchange with MEP subcontractor once engaged). There were also some comments on the transfer being better between design team members rather than with the Contractor, but this might be due to the contract arrangements. One thing which potentially did have an impact was the loss of one of the actors leading collaboration (PM1) during the project. The trust had then to be rebuilt and this might have impacted on knowledge transfer generally.

Case Studies 1 – 3 : The view was that the effectiveness of knowledge transferral was impacted by the individuals involved and the levels of trust and collaboration between various network members. There was a high degree of communication noted, but a noted lack of trust in some areas between Client and Contractor, and this had an impact on what was being advised. From the interviews it is abundantly clear that there was a clear delineation between Client and Contractor teams, with comments from both sides intimating failures by the other party. This is the antithesis of how the procurement model was anticipated to work, with cross agency collaboration key to utilising experience and knowledge. Some felt at times that the Client was not necessarily trusting the information they were being provided, and even

potentially only listening to what they wanted to hear. One example was in regards the use of supply chain knowledge to offer alternatives to specifications and the like; the response from Client team was less than enthusiastic. It is this manner of event which led some to consider that the process had not been overly successful and had degraded trust.

Case study 1 (being the first of the 3 projects) suffered the most in this way, and the follow on projects did benefit from this activity being reviewed thereafter; particularly relevant around design detailing and the like.

Side Case Study : The openness and extensive collaboration noted within this case study indicates that the trust that existed was an important factor in the transfer of knowledge and experience, not just in construction sense, but also from the wider stakeholders and educationalists to understand the building use; their *multidirectional* approach.

Observations : It would appear that, once more, this aspect is very much affected by individual approaches to trusting and to how they are involved in knowledge transfer. The best practice approaches to knowledge transfer require openness and a high degree of collaboration and should be a two-way *conversation*. The perception by some that knowledge transfer may only require a one-way approach to trust might indicate a poorer level of knowledge being transferred across the networks; it may well be that was simply *information* being passed. That examples of good and bad knowledge transfer were intimated across the primary case studies indicates that the procurement route is unlikely to be a deciding factor on how trust affects the transfer of knowledge. That said, it is likely that a truly collaborative *negotiation and information collation phase* (2 stage procurement) prior to contract execution is likely to afford the opportunity for enhanced knowledge transfer, which could have the by-product of improving trust levels during the delivery phase, if enacted appropriately.

3. Differing inter-actor perception of trust

In general terms :

Differing trust levels between actors within project networks are generally understood as being a negative and as having a detrimental affect on project relationships as well as other aspects of the project. It was commented that the larger the disparity, the larger the issue is likely to be, but it is not clear if this is a direct correlation necessarily. There was also comments on how one actor's differing perceptions or differing levels of trust may also impact on other members of the network and their approach to trusting. With "people" being at the core of delivery, it is opined, a disparity of trust levels will be damaging to project aspirations and to how a project network would collaborate. The nature of prior experience of individual operatives (either good or bad) and how this may adjust levels of trust between network members was also noted; meaning that a project may be undermined from the very outset because of those "people" having pre-judged some relationships.

A general disconnect between parties within a construction project (Client/Contractor) was also noted and, whilst this was noted as having improved over time, the impact that this plainly has on trust levels is manifest on a daily basis and on the case study projects.

In case study specific terms :

Differing views from individual respondents, but a generalisation would be;

Case Study 0 : Whilst some instances of poor performance were levelled against a potential discrepancy in the levels of trust, there appeared to be an understanding that the overarching trust levels within the network were appropriately balanced to deliver the project with out too many issues (or at least issues that could be dealt with). Some relationships were impacted by the disparity in trust levels, it was noted, but there were also instances where resolution of this was actively undertaken to ensure continued progress.

Case Studies 1 – 3 : The three projects plainly suffered from imbalances in trust levels, and this may even have been manifested prior to the collaborative

engagement commencing due to historical relationships and experiences. There was a noted cynicism from some members of the network, and this was cross-organisational. The disparity, which did not improve (there appeared to be no mechanism nor appetite to resolve), is stated as having a significant impact on the projects, particularly around aspects of the design. Whilst it was hoped that the problems would be diminished following the first project (case study 1), it appears that the issues were widespread (noting that there are a high number of common actors within the networks), albeit some noted slight improvement on Case study 2, and another had a singularly positive view on Case study 3. A number of relationships did buck this trend however; the commercial operatives maintained, it would appear, a balanced relationship and the relationship within the MEP collaboration potentially saw improvement as trust levels balanced. This reflects the nature of the personalities involved, their expectations and their approach to working collaboratively.

It was also noted that maybe the disparity in trust levels was not an issue in itself, as it was considered that trust levels were so low across the networks generally, any disparity would have negligible impact.

Side Case Study : The initial selection process to enable the team from the outset, the nature of the professional relationships, the high and reciprocal trust connections and the open dialogue availability largely indicate that trust disparity levels were not evident or were resolved suitably.

Observations : For case studies 1 to 3, where the procurement approach was created specifically to engender collaboration and effective working relationships, there is common disappointment over the outcome of the varied and non-reciprocal levels of trust displayed (and, more problematically, not resolved) and how this impacted the projects. If we consider case study 0, which did not appear to suffer as evidently as the 3, and the side case study, which was set up in a similar procurement model, reflection on why there was such a high degree of trust disparity is required. The individual approaches to trusting and being trustworthy again come under scrutiny as does the leadership within the networks. That the apparent disparity was noted within

and by the leadership individuals and then nothing was done to resolve the wider disparities should be considered a failing as it has had an impact on the projects.

4. Client definition of objectives

In general terms :

Without fail it was considered that the Client defining their value objectives clearly and having them well communicated was *essential* to ensuring projects deliver to requirements. Provision of a clear brief was fundamental to driving excellence in projects and of being able to refer to it throughout the project's lifecycle to ensure targets were being met. It was noted that this was significantly important for public bodies so that correct measures of value could be incorporated and benchmarked against.

In case study specific terms :

The four primary case studies had common narrative, as below;

Case Study 0 : The vast majority of the network were unaware of a defined Client brief setting the value objectives. It was noted that this, at times, put pressure on delivery due to a lack of clarity and especially when priorities appeared to change. It also put the network under pressure when undertaking collaborative activities, primarily because different actors had a different understanding of the objectives. Despite this the project team delivered successfully, ultimately, with a reason given being the early collaborative workshops enabling better, project-long, enaction of the collaborative team ethos and an enthusiasm to resolve issues together, generally.

Case Studies 1 – 3 : There appeared to be widespread confusion over what the Client's value requirements were throughout the networks. There was no written brief provided initially or for reference throughout the project process. This caused issues throughout the engagement process and was potentially the root cause of some of the issues around design quality and commercial aspiration. It had an impact on how the teams were able to deliver and on how collaboration was enacted. A very small number of actors in the networks

were aware of a “customer charter” which aspired to outline the key Client objectives (notably one of the project’s Contractor PMs in charge of delivery was not aware of this), but this did not fully reflect the broader understanding (or *misunderstanding*) of what the Client requirements were considered to be; no mention of programme nor value for money. There was a perception that the Client’s objectives changed at times during the development stages and that this caused significant issues in collaboration, process and ultimately in delivery. It is commented on that the management of this aspect was fundamentally flawed.

Side Case Study : This was noted as being “*robust, informed and a reference point for all decisions; Education led.*” No other comment is made on this, other than this may be considered a factor in success.

Observations : Assertions are made by those involved in case studies 0-3 that the lack of clearly defined Client objectives is likely to have been a significant factor in how the project teams operated, collaborated and ultimately delivered. Where there was confusion in this aspect there appeared to be elements of discord as different actors had differing views of objectives. This is not a solid footing for any project.

It should however be considered that with publicly procured school buildings there is likely to be a wide stakeholder input, and this may have significant sway over value objectives; this does not detract from the obvious requirement for robust Client briefs at the outset of projects to direct efforts from the teams deployed.

5. Collaboration and Building Services

In general terms :

There was a sense from the interviewed that the idea of collaborative procurement of building services, including early engagement with knowledgeable and experienced supply chain members, was likely to have a positive impact on projects, given the high reliance on, and value of, this aspect of projects. There were also comments that MEP design positively

requires input from the supply chain to be wholly effective, given the complex nature of systems (the “Black Arts”), the critical nature of interfaces, and the responsibility for Contractor Design; this was supported by statements that MEP procurement currently does not work in the best interests of Clients and that a procurement approach which improves project understanding, knowledge transfer and clarity over MEP systems *should* be a significant improvement.

It was espoused that, potentially, construction projects with a high degree of services and of coordination should have an MEP Designer taking a leadership role in the Design Team, rather than an architectural led design.

There were comments regarding how measurement can be undertaken between outcomes of collaboration over MEP systems and Client defined value requirements; but this largely reflects a limitation in objective definition.

In case study specific terms :

Differing;

Case Study 0 : The procurement method meant that pre-contract engagement with the MEP supply chain was not available. The MEP subcontractor was appointed somewhat later than maybe they should have been and, whilst some comment on the interaction with them had some positives, the general view was that collaboration with them was ineffective in the most part. It was fortunate for the project that those involved in the MEP services were able to rely on pre-existing relationships and their willingness to collaborate fully when they could.

Case Studies 1 – 3 : The early engagement with MEP supply chain appears to have had *some* positive impact. Those involved in the collaboration (some of the network were unaware that this had occurred) comment that this proved invaluable in being able to procure this to programme given the position of the design against programme, and that there were tangible outcomes from the interaction that enabled effective delivery, having resolved some significant issues. The interaction between two separate MEP supply chain members did provide an atmosphere of openness and engagement which was considered

successful by those involved. It also led to the package of MEP works being able to be priced and included in the Contract sums despite not having a complete design and led to a degree of innovation being incorporated in to two of the projects (modular service tracts); an *added value* point not immediately identified by the majority of the networks. Some, however, saw the collaboration as being more about gap-filling in the design and trying to reduce costs through value engineering. Others commented that the interaction “missed a trick” and would have been even more effective if it had been undertaken earlier in the process, Stage 2 potentially.

Side Case Study : The project benefitted from early and collaborative team input to make timely key decisions.

Observations : Early collaboration with the MEP supply chain is of benefit in most projects with a high reliance on Building Services; this seems apparent to virtually all in the network. For whatever reason this is undertaken it is likely to improve prospects of delivery for projects due to the complex nature of systems and the required relationships between Designer and those who enact installation; it should also be of benefit to those who ultimately operate the built asset, given the enhanced interaction throughout the process. That a significant part of the networks interviewed were not aware of the collaborative workshops undertaken on case studies 1-3 is perhaps a failing in communication. The outcomes of the workshops had an impact on the wider project landscape and the opaqueness of the collaboration merely adds to the mystique around the *Black Arts*; or is it that others not directly involved in the MEP choose to avoid involvement?

6. Collaborative Procurement Approach Effect

In general terms :

The procurement method deployed for case studies 1-3 *SHOULD* have enhanced project development and delivery; that appears to be the general view. The reality was that it failed to live up to expectations and there are views on why this was the case, and ultimately there have been very few of

the perceived benefits of a 2-stage approach realised. Whilst there were some positive comments made regarding the approach and interaction over the MEP, the situation is best summarised by the comment made, “*This approach could have worked much better – WE (all of us) could have done a lot better.*”

In case study specific terms :

On trust : This aspect should have been enhanced by the approach taken but was derailed very early in the engagement leading to some fractious relationships primarily between Client and Contractor actors; the very thing the procurement method sought to remove. Whilst some relationships seemed to trade very well on the basis of trust (Commercial and MEP) others were described as being poor, problematic or “*awful*”.

On delivery to Client requirements : There were some positives drawn from what was undertaken, but not by many of the network members. The majority view was similar to the overall view of the process; should have been better and failed to provide benefits. Some however did comment that what might not be recognised, due to the generally negative view of what occurred, is the benefits the Client has attained through the process; the quality of the outcomes are higher, the projects would not have been able to enter in to contract nor start on site without the interactions that went on around the reprogramming by the Contractor and the engagement with MEP subcontractors.

Side Case Study : The collaborative approach adopted (which mirrors the one deployed for case studies 1-3) is heralded by the Client involved as being effective and of being of significant benefit to the project being delivered.

Observations : That the procurement approach *SHOULD* have worked but never, speaks volumes. This then lends itself to comparison against some of the key themes from the review of existing evidence and from the Preliminary study Focus-group outcome. This is discussed further in chapter 6, but necessity for expectation management, strong project leadership (in advocating trust and generally), openness and transparency in discussions, and the benefits of early collaboration with MEP supply chain are all factors

within case studies 1-3. These and, potentially of more significance, the **personalities** involved; their strength, experience, propensity to trust and be trustworthy, willingness to collaborate and be *professionally vulnerable* for the benefit of the project above themselves or their organisation, are all key observations especially when compared to Case study 0, where the strength of personalities, personal-professional relationships, collaboration (not mandated but volunteered), and the team ethos noted effectively enabled successful delivery.

General Comments provided by respondents have been incorporated in the observations in sections above.

5.2.3 Statistical review

The comparative statistical outcomes from the SNA data are narrated in this section. The summary table, Table 5.2.3.1, collates data for Case Studies 0 – 4 (The Side Case Study did not have this undertaken) in order to indicate patterns across all factors. The supporting narrative is provided in relation to this with further tables advising additional statistical detail.

	Case studies			
Case study	0	1	2	3
Reference	SJPS	BPS	VPS	CLPS
Case study factor				
% of value of Building services				
At contract execution	27%	28%	26%	25%
At Final Account	26%	25%	24%	23%
Social Network Analysis Outcomes				
Network Density				
Pre-contract	0.484	0.754	0.778	0.760
Post-contract	0.714	0.643	0.737	0.661
Movement between timeframes	0.230	-0.111	-0.041	-0.099
Centrality				
Pre-contract	0.505	0.822	0.825	0.781
Post-contract	0.742	0.765	0.810	0.760
Movement between timeframes	0.237	-0.058	-0.015	-0.021
Degree of Trust between Actors				
Pre-contract (MEAN score)	3.162	3.180	3.155	3.068
Post-contract (MEAN score)	3.107	3.043	3.019	2.958
Movement between timeframes	-0.055	-0.137	-0.136	-0.110
Degree of collaboration between Actors				
Pre-contract (MEAN score)	2.925	2.716	2.727	2.702
Post-contract (MEAN score)	2.746	2.644	2.570	2.544
Movement between timeframes	-0.179	-0.072	-0.157	-0.158
Degree of Knowledge Transfer - TO Actors				
Pre-contract (MEAN score)	3.039	2.727	2.685	2.660
Post-contract (MEAN score)	2.746	2.671	2.663	2.614
Movement between timeframes	-0.293	-0.056	-0.022	-0.046
Degree of Knowledge Transfer - FROM Actors				
Pre-contract (MEAN score)	2.582	2.529	2.495	2.488
Post-contract (MEAN score)	2.672	2.592	2.474	2.424
Movement between timeframes	0.090	0.063	-0.021	-0.064
Manner of Professional relationship between Actors				
Pre-contract (MEAN score)	3.178	3.110	3.094	3.062
Post-contract (MEAN score)	3.135	3.089	3.117	3.038
Movement between timeframes	-0.043	-0.021	0.023	-0.024
Relative Importance Index				
Pre-contract	0.800	0.770	0.755	0.750
Post-contract	0.780	0.760	0.753	0.730
Movement in RII between timeframes	-0.020	-0.010	-0.002	-0.020
View of network between the timeframes	Less positive	Less positive	Less positive	Less positive

Table 5.2.3.1 Summary of Case Study 0-4 Statistical outcomes

Value of Building Services

It is observed that the comparative percentage value of the Building Services elements when compared to the overall project value reduced; by 1% for Case Study 0 and for 2% on each of Case Studies 0 – 3. This indicates that whilst the projects incurred additional costs overall, there was less impact on the Building Services elements. That this reduction is higher on Case Studies 0 – 3 suggests that the outputs of the Building Services collaboration and early engagement may have had positive impacts for the duration of the project delivery phase. Plainly there may be other factors, but the connection can be made when considering other elements that increased significantly in cost; elements which encountered less collaboration through the design, the procurement, and the delivery. In addition, some of the additional costs incurred were noted as being due to poor collaboration in part. For Case Study 0 it is the case that the percentage may have been higher if earlier engagement had been undertaken. The cost significant increases on this Case Study were higher in other elements, but those relating to Building Services were largely due to poorly communicated requirements because of the misalignment of parties at an earlier stage which, it is suggested, may have been avoided through earlier discussions.

Network Density

Case study	Name	Pre-con	Post-con	movement
0	SJPS	0.484	0.714	0.230
1	BPS	0.754	0.643	-0.111
2	VPS	0.778	0.737	-0.041
3	CLPS	0.76	0.661	-0.099

Table 5.2.3.2 Network Density

The increase in Case Study 0's density is as anticipated given the traditional procurement approach and the post contract inclusion of the Contractor into the network. The reductions within Case Studies 1-3 are of interest when it is considered that the delivery team members became more connected post-contract. This movement is potentially due to the view of CoL1 on his distance from the network and also the lessening of connectivity of the MEP

Subcontractors as they engaged “traditionally” under contract. That the movement is less on Case Study 2 may represent a *more connected* team than the others.

Network Centrality

Case study	Name	Pre-con	Post-con	movement
0	SJPS	0.505	0.742	0.237
1	BPS	0.822	0.765	-0.057
2	VPS	0.825	0.81	-0.015
3	CLPS	0.781	0.76	-0.021

Table 5.2.3.3 Network Centrality

The overall increase in Case Study 0’s centrality is as anticipated given the traditional procurement approach and the post contract inclusion of the Contractor into the network. The reduction in centrality for Case Studies 1-3 is again potentially due to the items noted within “Network Density” but given the nature of the procurement approach it might have been anticipated not to have reduced. The higher negative movement for Case Study 1 reflects some of the comments on this *first project* being the most problematic in regards collaboration. It is also worth noting that when reviewing Contractor and Client statistics separately, the Client negative movement is higher than that of the Contractor; perhaps due to the MEP subcontractor position, but potentially could indicate that the Client team perceived themselves as *less-central* as the project delivery became more Contractor focussed. Again, given the nature of the procurement, should this have been the case?

Degrees of Trust

Case study	Name	Mean Pre-con	Mean Post-con	Mean Movement	Coeff of variation Pre-con	Coeff of variation Post-con	Coeff of variation Movement
0	SJPS	3.162	3.107	-0.055	9.09%	11.36%	2.27%
1	BPS	3.180	3.043	-0.137	16.35%	17.58%	1.23%
2	VPS	3.155	3.019	-0.136	13.16%	13.61%	0.45%
3	CLPS	3.068	2.958	-0.110	15.62%	15.96%	0.34%

Table 5.2.3.4 Trust statistical output

The mean view of trust reduced post contract in all case studies, albeit by some very small margins. In Case Study 0, this might have been anticipated

given the network expansion to include the Contractor more, and this does partially reflect the comments made by the actors involved (albeit the degree of trust in the later stages was significantly improved). The collaborative procurement approach of Case Studies 1-3 should have meant no decrease in trust levels but, as is narrated elsewhere, trust levels were already being affected by relationships and activities. The small negative movements may simply be a factor of the number of connections and the scoring generally (noting that the general view towards the network – RII - was slightly more negative). In regards coefficient of variation (CoV) and increase in the percentage describes a larger discrepancy in inter-actor view. So whilst the movement in the mean was a slight negative the upward movement in the CoV suggest that there was a less commonality in the view of individual connections in the network. This both shows a disconnect between actors and that some had differing views of how they were trusting and being trusted.

Degrees of Collaboration

Case study	Name	Mean Pre-con	Mean Post-con	Mean Movement	Coeff of variation Pre-con	Coeff of variation Post-con	Coeff of variation Movement
0	SJPS	2.925	2.746	-0.179	9.37%	12.86%	3.49%
1	BPS	2.716	2.644	-0.072	22.03%	29.42%	7.39%
2	VPS	2.727	2.57	-0.157	17.98%	21.89%	3.91%
3	CLPS	2.702	2.544	-0.158	21.98%	22.19%	0.21%

Table 5.2.3.5 Collaboration statistical output

The mean view of collaboration reduced post contract in a similar way to Trust. These small reductions again may be a factor of the scoring but do reflect, at least for Case Studies 1-3, the narration by the actors where they considered collaboration became less active across the networks. The increase in the CoV again mirrors the degrees of trust, showing less commonality; some felt that collaboration was still prevalent whereas others did not reciprocate this.

Transfer of Knowledge

Case study	Name	To Actor			From Actor			Mean differential
		Mean Pre-con	Mean Post-con	Mean Movement	Mean Pre-con	Mean Post-con	Mean Movement	
0	SJPS	3.039	2.746	-0.293	2.582	2.672	0.090	-0.102
1	BPS	2.727	2.671	-0.056	2.529	2.592	0.063	0.004
2	VPS	2.685	2.663	-0.022	2.495	2.474	-0.021	-0.022
3	CLPS	2.660	2.614	-0.046	2.488	2.424	-0.064	-0.055

Case study	Name	To Actor			From Actor			Coeff of variation differential
		Coeff of variation Pre-con	Coeff of variation Post-con	Coeff of variation Movement	Coeff of variation Pre-con	Coeff of variation Post-con	Coeff of variation Movement	
0	SJPS	8.57%	12.86%	4.29%	12.45%	19.52%	7.07%	5.68%
1	BPS	18.66%	26.46%	7.80%	21.41%	26.57%	5.16%	6.48%
2	VPS	13.76%	19.76%	6.00%	13.72%	19.11%	5.39%	5.70%
3	CLPS	16.43%	21.18%	4.75%	17.07%	18.46%	1.39%	3.07%

Table 5.2.3.6 Knowledge Transfer statistical output

The scoring generally shows that the actors believe themselves to be transferring knowledge TO other network members more prevalently than they are receiving FROM the same actors. This is not practically possible but does display the *view* of the actors on their positioning and potential importance within the networks. The change in the mean between the two periods is minimal in all instances, and a reduction of *information* transfer would be anticipated in both procurement models. However, *Knowledge* Transfer would perhaps be expected to continue on a level basis across the two periods, especially within the 2-stage approach as the collaboration continues. The slight increases on Case Studies 0 and 1 FROM actors could be due to the nature of what was occurring, practically, within the projects. On Case Study 1, there would require to be a high degree of knowledge assimilation between the Contractor and the Design team as delivery commenced. On Case Study 1 this could be to do with there still being a degree of information being transferred and learnings being deployed as the site works commenced. This was potentially more relevant on this, and not so much on Case Studies 2 and 3, as it was the first of the three projects. So this may imply that lessons were

learned from this project and carried through to the following ones (the overall mean differential is the only positive).

The CoV increases are all of very similar magnitude, for all case studies, and are all higher TO actor when compared to FROM. Again this displays some discrepancy in how the individual actors score one another, but that the overall CoV's are still considered relatively low does represent that there is a degree of commonality within the networks. i.e. there are no significant outliers canting the results.

Professional Relationship

Case study	Name	Mean Pre-con	Mean Post-con	Mean Movement	Coeff of variation Pre-con	Coeff of variation Post-con	Coeff of variation Movement
0	SJPS	3.178	3.135	-0.043	9.89%	11.74%	1.85%
1	BPS	3.110	3.089	-0.021	16.37%	16.86%	0.49%
2	VPS	3.094	3.117	0.023	15.62%	15.34%	-0.28%
3	CLPS	3.062	3.038	-0.024	17.65%	16.96%	-0.69%

Table 5.2.3.7 Professional Relationship statistical output

Mean scores between the two periods vary only very slightly (and the scoring is relatively high), as do the CoV's. The slight degradation in the scoring (Case Study 2 excepted) may be due to the changes within the networks rather than an actual degradation in professional relationships. The same may be said about the increase in Case Study 2, but that this is a positive is potentially due to the specific personalities involved.

The CoV's indicate that the view remains very similar, the negative movements for Case Study 2 and 3 indicate a more common view of the relationships.

5.2.4 Synthesis

In synthesising the outcomes from the case study research aspects a tabular approach is adopted with overall comments included therein. Tables follow similar approach as those in the Case Study summaries and are ordered as;

- Levels of Trust : Table 5.2.4.1
- Degree of Collaboration : Table 5.2.4.2
- Extents of Knowledge Transfer : Table 5.2.4.3
- Professional relationship of the Network : Table 5.2.4.4
- Client Objectives defined : Table 5.2.4.5
- Building Services procurement : Table 5.2.4.6

	Levels of Trust		
Case study	Interview Narrative	Social Network Analysis	Synthesis
0 - SJPS	Some highly effective trusting relationships impacted positively on the project outcomes	"Mostly Trusting"	<p>There is some general disparity between comments made in interview and the SNA scoring (representing "Mostly Trusting"). However this does note that there were trust issues across the 4 case studies, with differing procurement arrangements.</p> <p>This suggest that trust cannot be imposed or expected through a collaborative procurement arrangement (albeit it may enable trust relationships), and is more reliant on how individuals within the project teams respond in regards their willingness to trust and be trustworthy.</p> <p>That RPS had high trust between actors and led to effective outcomes supports this.</p>
1 - BPS	Initially positive trusting relationships diminished as pressures showed the fragility of these; impacted on outcomes	"Mostly Trusting", reducing post contract	
2 - VPS	Initially positive trusting relationships diminished as pressures showed the fragility of these; impacted on outcomes	"Mostly Trusting", reducing post contract	
3 - CLPS	Initially positive trusting relationships diminished as pressures showed the fragility of these; impacted on outcomes	"Mostly Trusting", reducing post contract	
Side - RPS	Commented on as being high in the project team and led to effective outcomes	N/A	

Table 5.2.4.1 – Levels of Trust

	Degree of Collaboration		
Case study	Interview Narrative	Social Network Analysis	Synthesis
0 - SJPS	The procurement route was not a precursor for collaboration. Central actors facilitated collaboration for the benefit of the project.	A "high degree" of collaboration	<p>A "middling to high degree of collaboration" from the SNA scoring does not typify a high proportion of the comments from those interviewed in Case Studies 1-3, where it is noted collaboration was ineffective.</p> <p>The suggestion that collaboration cannot be mandated purely through a procurement methodology is made; it still requires those involved, as organisations and as individuals, to fully embrace collaborative arrangements and succumb, at times to <i>vulnerability</i> for the benefit of the project.</p> <p>A clear signal from Clients and leadership from the very outset in how they arrange the collaborative engagement; terms and conditions, contract form selection, and behaviours will direct others within project networks to act in a collaborative manner.</p>
1 - BPS	The selection of procurement approach was to enable collaboration to benefit the projects. This was seen as generally being ineffective, save two specific areas. Some actors considered that there had been some, limited benefits due to the collaboration, but majority considered it could have been enacted better.	A "middling to high degree" of collaboration, reducing post contract	
2 - VPS		A "middling to high degree" of collaboration, reducing post contract	
3 - CLPS		A "middling to high degree" of collaboration, reducing post contract	
Side - RPS	A very high degree of collaboration from the very outset until the project conclusion	N/A	

Table 5.2.4.2 – Degree of collaboration

	Extents of Knowledge Transfer		
Case study	Interview Narrative	Social Network Analysis	Synthesis
0 - SJPS	There was a generally positive view on the effectiveness of the transfer of knowledge, with two specific areas where it was problematic.	A high degree initially, erring towards “middling” post contract(?)	<p>The act of effective knowledge transfer appears not to be procurement methodology reliant. Some good and bad instances of effective knowledge transfer in the case study projects imply this. But a collaborative early engagement, such as a 2-stage approach is likely to benefit projects, IF enacted appropriately.</p> <p>The act of transferring knowledge may not be dependent on the trust relationship, as it can be transferred with a lack of trust, however, those receiving the knowledge will have to trust in its accuracy or relevance if it is to be utilised effectively. So, trust is still a significant factor. Likewise, it is observed that enhanced knowledge transfer instances were noted in the same locations within the networks where collaboration was most prevalent.</p> <p>The observation that actors sensed they were transferring knowledge to others to a higher degree than they were receiving from others in the network may suggest that there are <i>over-inflated</i> views of self position within networks, as not ALL network members can be transferring more knowledge than they are receiving. This may also indicate a focus within the network on SELF rather than the TEAM.</p>
1 - BPS	The view from the networks was that there was a varied degree of effective knowledge transfer and that this was impacted by the individuals involved and the levels of trust and collaboration between various network members.	A “middling” degree initially, with Mean and Mode scores reducing overall post contract. Notably Mode score was “little and not on time” post contract for transfer FROM actors.	
2 - VPS	A high degree of communication did not lead to high degrees of Knowledge Transfer.	A “middling and on time” view generally, both pre and post contract. Individuals appear to see themselves transferring more TO others than they get FROM others.	
3 - CLPS	The cross-agency collaboration was supposed to reap the benefits of extensive knowledge transfer; this did not transpire.	Between “middling and on time” and “High degree and timely” view TO other Actors, but a lesser view when considering FROM Actors. Individuals appear to see themselves transferring more TO others than they get FROM others.	
Side - RPS	Case Study 1 suffered the most due to failings, as the first of the three projects.		
	Expressed as being done in such a way as to ensure know one was in any doubt over any aspect. was open and exhaustive with an environment of enquiry and response being key to the process.	N/A	

Table 5.2.4.3 – Extents of Knowledge transfer

Professional Relationship of the Network			
Case study	Interview Narrative	Social Network Analysis	Synthesis
0 - SJPS	Relationships were noted as generally being both professional and effective throughout the project.	Initially "Good", then erring towards "Very Good" post contract	<p>Having a professional relationship may not be reliant on having trust nor on collaborating to a higher degree. Professional behaviour may actually dictate the opposite; a degree of mistrust may be necessary along with an arms length interaction, depending on the procurement and contract arrangements.</p> <p>However, it was the view of those involved in the case studies that, where trust was low and collaboration was affected, the relationship was impacted; this included some degradation of the professional nature of that relationship.</p> <p>It is observed that trust is likely to be enhanced, or at least facilitated, with a strong professional relationship as its foundation. There are similar parallels with the act of collaboration being potentially better enacted with a professional relationship as its starting point.</p>
1 - BPS	There were some comments on personality clashes and arguments occurring between some members of the networks. This does not mean that the professional relationships were diminished. However, it was noted that the degradation of trust meant that some actors questioned elements of the professional advice being provided by other network actors.	Initially "Good", with slight reduction in scoring post contract	
2 - VPS	There were comments that the procurement route should have enhanced relationships but, due to issues within the projects, these were put under pressure and continued to be in the same state of tension when entering the delivery phase.	"Good" both pre and post contract, with a very slight increase after contract execution.	
3 - CLPS	Strong and key to delivery. Reliance on each other to ensure delivery, with no one wanting to be the one to let others down.	"Good" both pre and post contract, with a very slight decrease after contract execution.	
Side - RPS		N/A	

Table 5.2.4.4 – Professional Relationship of the Network

Client Objectives defined			
Case study	Interview Narrative	Social Network Analysis	Synthesis
0 - SJPS	The client definition of their requirements was considered poor for the projects reviewed as case studies. The lack of written briefs was noted and that requirements were communicated verbally, by and large. This, it was stated, had a negative impact on how the actors were able to perform, interact, collaborate and deliver the projects. It also had an impact on the degrees of trust within the networks.	Noted as being an “essential” requirement. Poor definition of objectives; success despite this	It is considered that a fulsome and robust client brief is essential to project delivery. As well as being the benchmark to which project outcomes will be compared to determining success or failure, it also enables clarity for those employed to deliver the projects, their common objectives and the priorities that need considering. The lack of a clear set of client value objectives or Client brief is noted as being a significant factor in poorly performing projects. In the context of this research it would also be the reference point for activities in regards collaboration and the nexus for trust between actors. It might also be the location that outlines specific requirements of the MEP approach, detail what is and is not acceptable in this regards, and enable early discussions with MEP supply chain members.
1 - BPS		Noted as being an “essential” requirement. Poor definition of objectives with some commenting on this not being provided with any clarity. Confusion apparent from the network and this caused issues within the activities.	
2 - VPS		Noted as being an “essential” requirement. Poor definition of objectives with some commenting on this not being provided with any clarity (i.e. not in written form). Confusion apparent from the network and this caused issues within the activities, and that this may be due to objectives being “perception based”.	
3 - CLPS		Noted as being an “essential” requirement. Poor definition of objectives with some commenting on this not being provided with any clarity (i.e. not in written form). Confusion apparent from the network (including with the “project charter”) and this caused issues within the activities. A lack of clarity sometimes means the Contractors experience can not be applied fully.	
Side - RPS		Noted as being robust, informed and a reference point for all decisions; an education led process as the basis of decision making.	

Table 5.2.4.5 – Client Objectives defined

Building Services Procurement			
Case study	Interview Narrative	Social Network Analysis	Synthesis
0 - SJPS	Earlier involvement would have improved the project. Late appointment of Sub-contractor caused issues.	The disconnect between MEP supply chain and the wider network was evident, in both periods considered.	With MEP services being a significant part of projects such as these (in terms of value, design requirements, works involved and interface coordination) it is noted that early engagement with the Supply chain who are likely to undertake the design detailing and installation of the services is likely to prove beneficial; virtually all of those providing input in to the case studies agreed on this principle. Where this engagement is enabled it is considered that ALL relevant stakeholders in this area are party to the collaboration activities and are given clear understanding of proposals, outcomes and benefits. The earliest opportunity for these discussions is advocated in order to enable decision making or even assist in the narration of the specific elements of the Client Brief.
1 - BPS	Those involved in the early engagement provide positive comments on this aspect and note that without this being undertaken, delivery to development programme would have been impossible. Trust, Collaboration, Knowledge	There were some network disconnections in regards the MEP supply chain and the wider networks; in part this was to be anticipated. However, some key actors were amongst these (partial) disconnections and this may explain the lack of understanding of the engagement activities and the outcomes of same.	
2 - VPS	Transfer and professional relationships generally score higher within the network from those involved in this aspect.		
3 - CLPS	Was affected by team input and key decisions being made early and collaboratively.		
Side - RPS	N/A		

Table 5.2.4.6 – Building Services Procurement

5.2.5 Inductive discovery

The collection of data, analysis of potential patterns, and the construction of generalisations or relationships is the inductive nature of this research. The observations and synthesis above therefore has to be translated into definitive discoveries in bridging the gap between them and formulation of findings. The theoretical themes (those refined following extended review of existing evidence) are used here to categorise the discoveries from the data and the patterns observed.

5.2.5.1 Impact of trust on collaboration in construction procurement

1. Trust has a significant impact on behaviours generally within construction teams.
2. The absence of trust within construction teams, in whichever contractual setting, will have a negative impact on outcomes.
3. Trust can be engendered even within conflict-model contract settings, but will be reliant on other, potentially self-serving, factors and individuals as well as corporate entities.
4. A collaborative procurement approach requires the parties involved to start out with a trust-based relationship, ensuring steps are taken to ensure this is maintained throughout despite practical issues arising which might impact on the relationship.
5. Selection of construction partners is best based on a trust model as part of process in order to gauge trustworthiness of parties.

5.2.5.2 Impact of trust on knowledge transfer

1. Trust has a significant impact on behaviours which influence the transfer of knowledge between network actors
2. Knowledge transfer can be enacted in the absence of a trust relationship, but utilisation is enhanced when actors involved trust each other.
3. The absence of trust or active mistrust will have a detrimental impact on successful knowledge transfer and the deployment of the knowledge.
4. Where collaboration is enacted successfully with trust as its basis, the transfer of key knowledge between network actors and its deployment should be enhanced.
5. Generally, network actors believe they are transferring higher degrees of knowledge to others than they are receiving. This cannot be the case in reality and the perception may be detrimental to attitude towards other network members; how trust is factored in to this perception is not clear.

5.2.5.3 How early engagement with building services supply chain impacts on delivering to client defined values

1. The building services supply chain must, at the very least, have an understanding of the values defined by the Client; where possible they should have the opportunity to input in to this aspect.
2. The earliest possible opportunity for engagement with the building services supply chain is likely to have a higher degree of influence on project outcomes; the technical expertise of the supply chain can assist in early decision making.
3. Early engagement with the building services supply chain will have a positive impact on a number of project elements and, where they are defined, is likely to have a positive impact on delivering to client objectives.
4. Collaborative engagement with the building services supply chain is likely to be considered more positive when the wider project network is involved in discussing outcomes.
5. The building services supply chain members involved in the early engagement should be representative of all aspects of the project and not solely focus on cost issues; technical and delivery representatives are likely to enhance the benefits derived from engagement.

5.2.5.4 How project delivery is impacted by the manner of Client defined value

1. Measuring against defined values requires robust and clear Client definition from the project outset.
2. The lack of clear and definitive Client objectives is likely to have a significant impact on the relationships within the project network and may have a deleterious effect on trust and collaboration.
3. Poorly communicated value objectives are likely to impact negatively on project team performance.
4. Clearly constructed and written client definitions of their value objectives, with a clear hierarchy, are advocated in order to ensure the best opportunity for project teams to deliver successfully.

5. When issues arise within projects, the formulated Client defined value should be referred to in decision making for project direction.

5.2.5.5 How teams deliver in an environment of collaboration where trust levels are disparate or unequal

1. Strong trust leadership is required from the main protagonists from each party to engender a trust-based project network; without this, inequality of trust reciprocity is likely to be prevalent and destructive.
2. The strongest characters within a project network should also be those ones who lead in regards being trustworthy and expressing trusting behaviours.
3. Where network actors display lack of trust or trustworthiness, actions should be taken within the project leadership to resolve appropriately; not resolving these issues will have negative consequences for the project delivery.
4. Disparate levels of trust between network actors can lead to the degradation of trust, not only between the two nodes involved but within the wider network; this is potentially worse when leadership actors perceive disparity.
5. Where significant disparities in trust levels are encountered across the project network, collaboration and activities will be sub-optimal, communication and knowledge transfer will be less effective, and successful delivery to objectives is likely to be subject to degradation.

5.2.6 Discovery crystalised

The outlined discoveries above are then subjected to triangulation with further sources in order to formulate findings for discussion in the following chapter.

6 DISCUSSIONS AND FINDINGS

6.1 Response to the Problem

The perceived problem is noted as being;

... the nature of procurement of schools, and particularly of the building services element, is sub-optimal without early engagement and collaboration from those involved in, from Client to Building Services Subcontractor and specialists. This leads to a low opinion of the construction industry from those client bodies engaging to deliver education facilities, with a similar view on their ability to attain value for money in these projects.

Whilst there will be some excellent examples of school project delivery, the nature of the construction industry, and the practitioners involved, generally propagates this issue and there are sound reasons for carrying out procurement in a more intelligent and collaborative way.

Given the combination of Academia and Industry, as this thesis purports to, it is necessary to consider if both of those arenas consider the problem to exist and is this clearly conveyed. For discussive purposes it is considered that the Academic view comes from the review of the existing evidence with its peer-reviewed expertise within existing research paradigms and the like, and the Industrial view comes from the Action Research Focus-group outcomes and the cross-case study analysis; however there are some areas where these cross refer (as research design). Within the research design the evidence is corroborated within the real-world context; the existing knowledge from the peer-reviewed academic literature supported and augmented by the outcomes of both the Action Research and the Cross-case Study (further adding to evidence).

6.1.1 Academic view of the problem

The review of existing evidence was focused on the key areas originally designed for the Focus-group Study discussions, and following the outcomes of that, refocussed on additional key areas as detailed elsewhere. Plainly these areas of review align with the view of the problem and so it would be expected to find commonality between the problem and the review. However, the synthesised evidence advises that there is a suitably broad body of evidence that support the view of the problem; the existing evidence shows there is a gap in the knowledge, so there is a problem and, as yet, it is not clear why. The specific elements of “public bodies”, “schools” and “education facilities” required extrapolated generalisations from the literature, but not unreasonably, and the seemingly limited body of literature specific to “building services procurement” led to further generalisation from related evidence; again, not unreasonably. From the outputs of the extended review (including post-Focus-group elements) it was found that there was suitable basis to further address the problem through enquiry in the key areas noted and formulate a number of propositions aligning with the original research questions and the areas of investigation. In addition, there were some areas of existing research which the Focus-group sought to add to; *The 20 top ranked aspects of collaboration* (Hughes *et al* (2012)) and Constructing Excellence’s *Top 10 benefits of Collaborative working* (2015). The Cross-case Study outcomes were to be triangulated with Focus-group outcomes as an element of the view on collaboration generally, but also were to be related to these two pieces of research. Refer to 6.2.

The *20 top ranked aspects of collaboration* were also correlated against ‘Antecedents of Trust’ and “Consequences of Trust” (Paluri & Mishal, 2019) within the evidence review, as the evidence suggested that there were key links between trust and collaboration. This correlation, amongst other evidence, found that the two factors are inexorably linked which further supported the problem area of a lack of engagement and effective

collaboration; again showing that the problem and the gap had been highlighted effectively.

It is acknowledged that the *problem* was likely to be supported by the existing evidence but, even when inherent bias within the subject matter and literature accessed is taken account of, the vehemence of the narrative supporting the problem outlined and the factors explored is significant. Therefore it is stated that the academic response to the problem is entirely appropriate.

6.1.2 Industrial view of the problem

The problem very much evokes apocryphal or anecdotal views available from within the industry (including the researcher's own experienced and those communicated to him). There are also numerous articles and editorials from within the industry press which assimilate or directly relate to the problem outlined. Therefore it was evident that the problem was worthy of enquiry from the industrial perspective.

The Focus-group outcomes very much find that the problem exists and has existed for some time in the groups' experiences, but as there were inconsistencies in approaches taken towards projects there were also inconsistent outcomes. There was general acknowledgement that suitably structured collaborative procurement would prove beneficial but may be impacted by specific contexts, that significant extents of building services add additional complexity, and that engagement with specific supply chain members at an early stage might only be suitable for specific types of projects. These outcomes, which highlight some of the issues in relation to the identified gap, provide early evidence (which required further exploration) confirming the problem existed more so than filling the gap (albeit it was the kernel of the gap-filling evidence seeking approach).

The Cross-case Study research sought the views of those directly engaged within projects that could be considered subject to the areas within the problem, and there is a degree of synergistic feedback between the problem and the case studies; this is acknowledged elsewhere. The narrative

investigation and the statistical analysis directly relate to the problem factors outlined and, in summary (refer further to “observations”), there was evidence from the outcomes that the problem existed. Additionally, it is argued that the case study projects were also good examples of how the problems manifest and, in at least one project, how factors can be improved for Client benefit. The exploration undertaken through the case studies and the cross-case analysis has explained aspects of this particular social phenomena around the key focuses of the research. The outcomes from the cross-case study analysis fill the gap identified extensively, and the further conclusions respond to the problem.

6.1.3 Did the enquiry respond to the problem appropriately?

The design of the enquiry sought to investigate wider aspects of the problem initially through the review of existing evidence and the Action Research undertake through the Focus-group study. This then enabled a focus on, what the outcomes inferred to be, the key factors within the problem and then developed the research’s further stage; the case study analysis. At all times the *Unit(s) of analysis* (see figure 3.3.1) were alluded to and developed in line with the research progression. The grounding was key to ensure that the continued focussing of the research was maintained and not allowed to expand along tangential enquiry lines. The main unit of analysis is considered as the “project organisation”; the research is fundamentally related to how projects are delivered in the context of both the sub-units of analysis and the overarching context of “procurement of highly serviced buildings”. The sub-units drove the specific questioning but were only finalised once the Focus-group element of the research concluded and were directed by some of the outcomes. This is particularly pertinent in regards the *team* and how trust is of significance. At the start of this research journey it was not the case that trust would form a central tenet of the enquiry; as it turns out this appears to be the most significant aspect of note, particularly from both the Focus groups and the narrative outcomes of the case studies.

Underlining all of this was the key element of the problem – that Clients potentially had low opinions of the industry as there were insufficient suitable procurement methodologies that deliver value for money outcomes. Given the subjective nature of the term *value for money*, the research crystallised this aspect by focusing on *value drivers*. This may seem a broader aspect, but it does reflect that some Clients see value as being more than monetary; social value, community value and timely delivery and operation being other measures of the value benchmark. Notwithstanding that, bottom line costs (and therefore value for money) was still noted as a factor. This also reflects the view that the construction industry is embedded within a VUCA environment, with degrees of uncertainty, complexity and ambiguity being prevalent both within the case study projects and the enquiry itself.

So, did the enquiry respond to the problem appropriately? It is suggested that this enquiry was undertaken precisely in line with the key factors of the outlined problem. Could it have been undertaken in a different manner? Assuredly yes, but the research design, its evolution throughout the process, and particularly its response to the availability of the sources of data (case studies) suggest that it provided the best opportunity to respond to the problem and answer the related research questions in the most effective manner. The problem was responded to through enquiry in the key areas of the factors of collaboration, the approach to engagement with the MEP supply chain, Client definition of value measures, and relationships within project settings.

It is reiterated here that the Action Research outcome of the advised change in methodology of procurement added to knowledge (for both academy and practice), responded to the problem and was another part of the filling of the gap identified. It was an intervention that may not have been made without the initial, Action Research, aspect of this overall enquiry. That this action afforded the opportunity to further examine propositions formed and enrich the research is a testament to the flexible but proactive research design and the reactive abilities of the researcher.

6.1.4 Were the analysis methods used successful?

The justification for the use of cross-case studies including elements of Social network Analysis are made in chapter 3 but it must be considered if the approach has successfully achieved the objectives set out. Firstly, the amount of data derived from the case studies is considered appropriate and, in the key areas, verbose, contextual and full of utility (both for Academia and Practice). The data collection tools used enabled this and invited those providing primary data (network actors) to deliver this with minimal limits, whilst still maintaining the research boundaries. That this extensive data set was then able to be analysed following the analysis methodologies prescribed, both qualitatively and quantitatively, to develop key discoveries in all the research questions posed gives initial justification of the methods selected. It is acknowledged that other methods *may* have provided equally valuable outcomes, but this is not guaranteed. Further, that the discoveries have then been further tempered with triangulation to outline findings which relate directly to propositions and theoretical themes outlined in the initial enquiry setting, is further justification for the appropriate analysis methods chosen.

6.2 Observations

Observations are made on key areas of the research in relation to the factors discussed. These are specifically related to;

- *The 20 top ranked aspects of collaboration* (Hughes *et al* ,2012)
- Constructing Excellence's *Top 10 benefits of Collaborative working* (2015)
- The formulated propositions

The response of the Focus-groups, the Case Studies and Overall are commented on.

6.2.1 The 20 top ranked aspects of collaboration

Referring to Table 6.2.1; Taking Hughes *et al's* original ranking of the twenty aspects and then combining the overall Focus-group scoring (*unmetered* ranking, taking a slightly different approach to that in para. 4.2.10) to then re-rank them as the outcome of this element of the enquiry places the aspects in a slightly different order, but not significantly when it comes to narrowing down the, say, top 10 aspects. The top 10 aspects (actually the top 12) appear in both, and this is significant in that there is mutual agreement between the original research and this enquiry. Add to this the extrapolation of the narrative outcomes from the cross-case study analysis and what is considered “Essential”, “Beneficial” or “Useful” and the following aspects are observed as being *critical* to collaboration;

- An environment of **open dialogue** exists between all parties
- An environment of **mutual trust** exist between all parties
- All **team members contribute** to the project
- A **common aim** is shared by all contributors to the project
- Everyone understands the other team members **roles and responsibilities**
- Collaborative projects encourage more **effective information sharing**

It is further observed that these are essentially all factors of high performing teams and teamwork, and that the term is not mutually exclusive to collaboration in a general sense. A more collaborative approach requires a higher emphasis on effective teamwork (Pinsent Mason, 2016).

Aspect of Collaboration	Original ranking	Focus Group Ranking	Case Study narrative response
An environment of open dialogue exists between all parties	1	1	Essential for collaboration
An environment of mutual trust exist between all parties	5	2	Essential for collaboration
All team members contribute to the project	4	3	Essential for collaboration
A common aim is shared by all contributors to the project	2	4	Essential for collaboration
Team spirit exists between all personnel involved in the project	8	5	Beneficial to collaboration
Early warning systems for any problems are integral to the project	3	6	Useful for collaboration
Everyone understands the other team members roles and responsibilities	7	7	Essential for collaboration
Collaboration creates a problem-solving environment	6	8	Beneficial to collaboration
The contract supports collaboration	9	9	Beneficial to collaboration
Collaborative projects encourage more effective information sharing	10	10	Essential for collaboration
Risks are allocated fairly to the parties	11	11	Beneficial to collaboration
There are regular meetings between the various parties (client and supply chain)	12	12	Beneficial to collaboration
The client and supply chain should achieve a reasonable profit margin	20	13	Useful for collaboration
Everyone respects the input of the other team members	16	14	Essential for collaboration
The project operates in a non-adversarial environment	13	15	Beneficial to collaboration
Relationships between the parties are managed	14	16	Beneficial to collaboration
The pain share gain share mechanism is fair to both the client and the contractors	15	17	Useful for collaboration
Collaboration promotes long term relationships	19	18	Useful for collaboration
There is early involvement of key members of the supply chain	17	19	Beneficial to collaboration
Collaboration produces a win/win outcome	18	20	Beneficial to collaboration

Table 6.2.1 : Observations on Top 20 factors of collaboration
(Note: Red factors were not included in Top 20 by all respondents)

6.2.2 Constructing Excellence’s Top 10 benefits of Collaborative working

		FG combined overall	Case Study Narrative response
1	Opportunities and risks are more transparent and manageable.	1	Benefit of Collaboration
2	Solutions are more appropriate and more buildable.	2	Potential outcome of Collaboration
6	Shared problem solving leads to better problem resolution.	3	Benefit of Collaboration
3	Everyone is able to contribute; you get to use all the experience in your team not just some of it.	4	Benefit of Collaboration
4	More innovation from all team members.	6	Potential outcome of Collaboration
5	It’s more enjoyable and more satisfying.	6	Likely to be context dependent
7	Time and cost are more predictable, so are outcomes and profit.	6	Potential outcome of Collaboration
8	Whole life implications are actually considered.	8	Likely to be context dependent
9	It’s cheaper.	10	Likely to be context dependent
10	It’s quicker.	10	Likely to be context dependent

Table 6.2.2 : Observations on 10 “benefits of collaborative working”

Referring to Table 6.2.2; Taking Constructing Excellence’s original ranking and re-ranking these on the basis of the Focus-group view again displays minimal change to the order; the most notable is that *Shared problem solving leads to better problem resolution* ranks significantly higher. Add to this the extrapolation of the narrative outcomes from the cross-case study analysis and what may be considered a “benefit”, a “likely outcome”, or a “*context-dependent* consequence” and the following aspects are observed as being the most relevant *benefits of collaborative working*;

- Opportunities and risks are more transparent and manageable
- Solutions are more appropriate and more buildable
- Shared problem solving leads to better problem resolution

- Everyone is able to contribute; you get to use all the experience in your team not just some of it
- More innovation from all team members.
- Time and cost are more predictable, so are outcomes and profit

It is further observed that these are also some of the observations from the 5 case studies, to a varying degree; particularly the *side* case study of Renton Primary School, where the collaboration appears to have achieved at least some of the benefits. So conversely, where collaboration has not been enacted effectively one might argue that these benefits should NOT be delivered. This is not entirely the case in the experience of the case study respondents; for example, even where collaboration was noted as being difficult or impacted by relationships, solutions to problems were done in an environment of common input so that all could contribute, with solutions being beneficial for the project as a whole.

This then directs that benefits from collaborative activities are unlikely to be a simple *on/off situation*, and that context is key to the situation under scrutiny. The impositions placed on organisations or individuals by the presence of Construction Contracts or design appointments may enforce collaborative actions, even when those enacting this are not actively collaborating in a wider sense. This does not detract from the view that enhanced collaboration is likely to provide project benefits. More so, it highlights the appropriate focus of the investigated propositions and the strength of the findings narrated. As has been noted earlier, the importance of context cannot be understated when exploring issues of this nature, and to avoid this would mean the findings herein would be less valuable.

6.2.3 The formulated propositions

The six research questions are directly linked to the formulated *correlative* propositions and rival explanations by way of enquiry. These have then been reviewed in the context of the cross-case study outcomes and each

considered in turn to understand what the outcome of the overall enquiry suggests. These findings, in relation to each of the propositions are noted in table 6.2.3 but will be further discussed within chapter 6.5 (Findings and Discussions). It is not the case that all primary propositions have been confirmed by this research, with alternative explanations also forming findings. There is nuance in the link between proposition, explanation and proposed finding; the ever present *context* again is relevant in this but, again, this is not unexpected (and in itself is representative of the *problem*).

Ref	Proposition	Rival explanation (1)	Rival explanation (2)	Finding
1	That high levels of trust between project actors enhances the outcomes of a project	Project Outcomes are not reliant on high levels of trust between project actors	There is no correlation between the levels of project actor trust and project delivery	Trust plays a significant part in how relationships between project actors impact on overall project delivery
2	Trust between project actors is necessary for effective knowledge transfer	Knowledge Transfer can be effective without trust between project actors	Project knowledge transfer relies on many factors, which may or may not include trust	Knowledge transfer does not necessarily rely on trusting relationships. It may however, make the transfer more effective or be deployed more widely.
3	That a disparity between actors' perceptions of the level of trust between them can cause conflict and barriers within the project network.	That network relationships are not affected by the perceptions of levels of trust, even if they differ between actors	Inter-project relationships rely on many factors, which may or may not include trust	Differing view of the levels of trust between project actors can cause issues within that relationship and to wider networks. However, it is acknowledged that other factors may impact this.
4	That poorly defined client value objectives have a detrimental effect on the performance of the project delivery team; and that it also affects their ability to collaborate	The level of definition from the client of their value objectives has no effect on the project delivery teams performance, nor their ability to collaborate	That overly prescriptive client's value objective definition has a detrimental effect on the performance of the project delivery team; and that it also affects their ability to collaborate	Poorly defined Client value objectives are a primary factor in poor project delivery and are likely to induce issues which impact on a network's ability to work effectively or collaborate.
5	That the collaborative early engagement with the Building Services supply chain has a positive effect on delivering to the client's value outcomes	Collaborative early engagement has no impact on delivering to the Client's defined value outcomes	That the collaborative early engagement with the Building Services supply chain has a negative effect on delivering to the client's value outcomes	Engaging collaboratively with the Building Services Supply chain at the earliest opportunity is likely to provide project benefits in regards client value.
6	The alternative procurement approach adopted for the 3 further school projects had a positive impact on the initial stages.	The alternative procurement approach adopted for the 3 further school projects had no impact on the initial stages.	The alternative procurement approach adopted for the 3 further school projects had a negative impact on the initial stages.	It is the view of the networks that, whilst it SHOULD have provided some benefits, the alternative procurement approach adopted appears to have delivered negative outcomes.

Table 6.2.3 : Proposition outcomes

6.3 Meeting the Objectives

The research objectives noted in table 1.4.1 are reviewed in turn here to confirm that, or to what degree, these tasks have been met in order to comment on the effectiveness of the enquiry design. It is the successful “ticking off” of the objectives that might suggest a successful enquiry has been undertaken.

1. *To conduct a focused, contextual, literature review in the key areas of Trust, Early Engagement, Supply Chain involvement, Building Services, Knowledge transfer, and Social Network Analysis.*

Comments : Chapter 2 is the review of existing evidence and responds to this objective fully. It is acknowledged that further review could have been undertaken, but the limitations placed on this by time and word count caps are key to this.

Result : The outcome of the literature review focused the subjects for further enquiry and highlighted key aspects of the problem as outlined.

2. *To design a suitable research strategy to investigate behaviours within teams, which affords the research to take advantage of the active involvement of the researcher on 4 Primary School projects (cases), through a benefit of analysis of comparative research possibilities.*

Comments : The cross-case study approach outlined in Chapter 3 answers this objective and by adopting a nominally mixed methodology the use of both quantitative and qualitative research techniques are deployed. It is also noted that the research strategy took account of practical aspects within the industrial setting to ensure enhanced relevance.

Result : The inductive discovery from the cross-case study has enabled the formulation of findings and further discussions on the subject matter outlined, and forms the key outputs from this enquiry. These can be further reviewed in chapters 5 (discoveries) and Chapter 6.5 (findings and discussions).

3. *To investigate how trust might impact on collaborative behaviours in the procurement of Building Services.*

Comments : Trust was identified as being a significant aspect of the overall enquiry and so the research design took account of this with specific elements to be responded to by the actors within the case study networks. This has proven to be a key aspect of the subject matter, noted as impacting on a number of other factors.

Result : The aspects of trust within the procurement of building services and the wider project setting are central to the outcomes of this enquiry. The fuller narrative on the nuanced outcomes of trust aspects can be found in chapters 5 (discoveries) and Chapter 6.5 (findings and discussions), but the central role of trust in collaboration and procurement of buildings services cannot be understated.

4. *To examine how early engagement of the building services supply chain impacts on delivery of Client defined value.*

Comments : The SNA approach, with a specific element focusing on this noted aspect enabled examination both in a quantitative and qualitative manner, meets this objective. It was somewhat difficult to precisely align the correlation between the engagement and Client defined value aspects due to their not being necessarily directly linked (i.e. the definition of Client value drivers may not be made, but project benefits may still be experienced), but extrapolation of narrative data allowed examination.

Result : Notwithstanding comment above, this enquiry finds that early engagement with the building services supply chain will prove beneficial to making a positive impact on delivery outcomes in the key area of building services and potentially wider, but this may not be dependent on how the Client had defined their objectives; whether this be well formulated or poorly advised.

5. *To understand how defining Client value might have an impact on project delivery.*

Comments : The SNA approach, with a specific element focusing on this noted aspect enabled examination, meets this objective. There is reliance on the views of the network in this aspect, but the side case study also had a bearing on narrative outcome.

Result : It appears clear that there is a correlation between well-defined, well articulated and robust Client objectives, defining value requirements, and project teams performing well in delivering to these objectives. The outcomes from the Case Studies suggests that poorly defined objectives have a damaging impact on team performance and affect relationships negatively.

6. *To analyse the research outcomes in order to offer conclusions and recommendations for potential improvement.*

Comments : The analysis elements are present in chapters 4 and 5, as these are iterative, and are concluded in this chapter.

Result : The analysis has been concluded and has been able to make recommendations based on clearly linked data and the interpretation of this. Recommendations for improvement are subject to the consideration that the observations and findings are generalisable to the wider industrial setting. In regards the academic setting and how this research contributes to knowledge, Chapter 7 conclusions offers narration in this regard.

6.4 Achieving the Aim

It was the aim of this research;

To investigate how the factors of collaborative procurement of building services affect the delivery of “Client defined value”.

This has been undertaken in a thorough and rigorous manner with suitable reference to industrial relevance, as the Professional Doctorate approach dictates. The research has thoroughly investigated what are considered the most relevant factors of collaborative procurement in the context of buildings services, and how this may impact on delivering to Client defined value drivers. Part of this has also highlighted that there are fundamental issues within a collaboration setting which dictates that *project teams* are more than homogenous, faceless, construction entities and that there are nuanced societal, social and personal aspects which impact on delivering “value”. The complexity of design and delivery of building services is considered to further obfuscate these aspects. The Aim has been achieved and further discussions on findings follow in 6.5.

6.5 Findings and Discussions

The key findings and discussions around these will summarise the individual aspects noted elsewhere in the research and are divided into the key areas as described by the research questions posed following the outcomes of the Focus-group study. The propositions formed relate directly to these questions and, in turn, relate to the *problem* identified.

6.5.1 How do levels of Trust between project actors impact on project delivery?

6.5.1.1 Summary of key facts discovered within enquiry and further developed

1. Trust is central to behaviours within construction teams and lack of trust leads to poorer outcomes.
2. Trust is of equal import in whatever contractual arrangement set; whether this is based on collaboration between parties or set up on a conflict model.
3. Trust is reliant on other, potentially self-serving, factors and individuals as well as corporate entities; it cannot be imposed through contract or dictate, but relies on individual actors propensity to act in a trusting manner.

4. Effective collaboration requires trust-based relationships and, in order to ensure successful delivery, those relationships require all parties to actively maintain the trusting nature of the relationships and project setting.

5. Project delivery is more likely to be successful when selection of construction partners is based on aspects of trust in order to gauge trustworthiness of parties.

6.5.1.2 Further narrative

Reference is made here to the *working definition* of trust proposed in Chapter 2. The noting of the “*confidence in others*” and the “*intention to perform*” is the first aspect considered. It is considered that the majority of actors would have, as their starting point, confidence in the other network members’ abilities and their ability to provide all requirements. Similarly, it is also considered that they would intend to perform within the project and as part of the network. This may generally be a reasonable assumption, however there are subjective factors apparent in that previous experience plays a part in actor’s trust levels *before* the network initially forms; for good or ill. Personal experience or second-hand information may impact on credible trusting relationships consciously or sub-consciously. This reflects Nilsson & Mattes’ (2015) views on third-party gossip impacting on trust formation and on previously developed resilient trust relationships being important.

The deployment of suitable collaborative workshops with an emphasis on the relationships within the team or network, and what standards are expected, can engender trust but ultimately an individual has to display trusting and trustworthy characteristics. Trust and its consequences are largely dependent on its purpose and between whom it is required (Barbalet, 2009).

The next elements of acting in “*a credible and predictable fashion*” requires those interacting to deliver as would be anticipated by the rest of the network. Where standards of credibility fail or unpredictable actions become prevalent, it is likely that trust will be degraded.

The final element of the definition is in regards mutuality, reciprocation and a basis of fair exchange, which will be discussed further in 6.5.2 and 6.5.3.

Where trust within a project network fails it is found that project relationships are negatively impacted, and this has an impact on how individuals and teams perform. That is not to say that procurement approaches which do not enable trusting relationship necessarily under-perform consistently. Whilst this has not been part of this research it is proposed that it simply cannot be the case; adversarial relationships within construction contracts have been prevalent for as long as Clients have engaged others to deliver their buildings and *active mistrust* may actually be preferable in some situations. However, the research finds that positive trust relationships are more likely to lead to positive project outcomes, under whatever procurement approach utilised.

The case studies indicate that some key issues arose around the issue of a lack of trust, misplaced trust or a failure in trust leadership. The research found that a trust agenda or culture needs to be driven from the leaders of the project teams, Client included, and should be endemic through the network. Leaders require to establish a “*strategic agenda for project success*” (Meng, 2011) and an “*architecture of collaboration*” to deal with aspects of complexity (Smith & Robinson, 2021). Where trust leadership is absent or is actively mistrustful the network is likely to reflect this direction and the network relationships will tend to suffer through degraded communication and interaction. Collaboration is fundamentally linked with the presence of trust within construction relationships. This is noted within Chapter 2, where the key aspects of collaboration (Hughes *et al*, 2012) are directly correlated to the antecedents and consequences of trust (Paluri & Mishal, 2019). This has been corroborated by the responses from the case study actors who observe that collaboration is better enacted within a trust-oriented relationship.

6.5.2 How do the levels of trust affect the transfer of key project knowledge?

6.5.2.1 Summary of key facts discovered within enquiry and further developed

1. Trust has a significant impact on behaviours which influence the transfer of knowledge between construction practitioners.
2. Knowledge transfer can be enacted in the absence of a trust relationship but is less effective and utilisation is enhanced when those involved trust each other.
3. The absence of trust or active mistrust will have a detrimental impact on successful knowledge transfer and the wider deployment of the knowledge derived.
4. Where collaboration is enacted successfully with trust as its basis, the transfer of key knowledge within a project team and its utilisation is enhanced.
5. Construction practitioners tend to believe they are transferring higher degrees of knowledge to others than they are receiving. This may be detrimental to attitudes towards other team members.

6.5.2.2 Further narrative

Behaviours within trusting relationships should be based on the ethos of “*reciprocated fair exchange*” and it is this element that should be considered to be at the centre of the effective transfer of knowledge between actors. Trust is also noted as a significant antecedent of willingness to share information in a collaborative arrangement (Paluri & Mishal, 2019), so it is observed that it should be the case that the greater the trust within a network or between individual actors, the better knowledge transfer should be. It is found that this may not be entirely the case however, that knowledge transfer can be enacted where trust is absent, or even in an environment of mistrust, and that there are other factors which impact the transfer of key knowledge. This may well be the case, but lack of trust or mistrust is likely to be of some

significance. Taking the example where there is mistrust between actors; if one actor provides knowledge to another, they may hold back some knowledge as they do not wholly consider the recipient trustworthy and are not sure how they will utilise or deploy this; this is suboptimal knowledge transfer. In this scenario it is unlikely that the receiving actor will fully trust what they are being told and may not act upon, what is, sound knowledge. This knowledge may be fundamental to the network or project and ultimately outcomes are likely to be degraded.

So, it is found that, whilst there are other factors impacting on knowledge transfer and it may not be wholly reliant on trust being present, it is affected by the levels of trust within a network. This would clearly depend on the context that the knowledge transfer is situated within and those involved. As Dougherty (1999) notes, within an organisational strategy, knowledge transfer requires a voluntary action from the individuals who *choose* to interact fully.

6.5.3 How do different actors' perceptions of the levels of trust between them and the other team members affect intra-project relationships?

6.5.3.1 Summary of key facts discovered within enquiry and further developed

1. Strong trust leadership is required from the main protagonists from each party to engender a trust-based project team; without this, inequality of trust reciprocity is likely to be prevalent and destructive.
2. The strongest characters within a project team should also be those ones who lead in regards being trustworthy and expressing trusting behaviours.
3. Where construction practitioners display lack of trust or trustworthiness, actions should be taken within the project leadership to resolve appropriately; not resolving these issues will have negative consequences for the project delivery.
4. Disparate levels of trust between practitioners can lead to the degradation of trust, not only between those directly involved but within the wider team; this is potentially worse when leadership actors perceive disparity.

5. Where significant disparities in trust levels are encountered across the project team, collaboration and activities will be sub-optimal, communication and knowledge transfer will be less effective, and successful delivery to objectives is likely to be subject to degradation.

6.5.3.2 Further narrative

Effective trust relationships rely on “*mutually acceptable behaviours*” and “*reciprocity*”, and it is this balance that affords equity in a dyadic actor relationship and as a project network in its entirety. As in most equitable relationships or interaction, if one is perceived to have more power or more acclaim than the equivalent within that relationship it is unbalanced. A trust imbalance in a relationship is likely to induce a degradation of the relationship if not resolved. It may also be impacted by other factors (and this was partially acknowledged within the case study outcomes) with trust aspects acting as a catalyst for further decline in the relationship status when events apply pressure or are problematic. An equality of trust within a network or an actor relationship can act as a support mechanism when other elements conspire to derail projects or progress. This was noted within case study 0 when the trust relationships which had been developed on an equal basis were relied upon to deliver key aspects. Similarly, noted positive outcomes within case studies 1-3 (MEP supply chain and Commercial relationship) had as their basis trust relationships that appeared to be balanced and equitable.

Another aspect of different perceptions of trust levels is when actors’ trust views within a network affect other actors’ views of the network, either willingly or unwittingly. This is particularly pertinent where members of the network leadership are able to influence other actors. Having a balanced view of the network, not showing favouritism to some over others, displays an equitable approach to trust as a team and this is likely to have a positive impact. Displaying negative impressions on the trust levels with some members of the network may influence other, somewhat subordinate, actors to have a less

trusting starting point with the network. By behaving in ways that build trust with one person, trust is built with many (Vaughan-Smith, 2013).

6.5.4 How does the level of definition of Clients' value objectives impact on the performance of delivery teams; how does it impact on their ability to collaborate effectively?

6.5.4.1 Summary of key facts discovered within enquiry and further developed

1. Clients should provide robust and clear definition of value objectives from the project outset in order to enhance the ability of teams to deliver effectively.
2. A lack of clear and definitive Client objectives will have a significant impact on the relationships within the team and is likely to have a deleterious effect on their ability to collaborate.
3. Poorly communicated value objectives are likely to impact negatively on project team performance.
4. Clearly constructed and written client definitions of their value objectives, with a clear hierarchy, will ensure the best opportunity for project teams to deliver successfully.
5. When issues arise within projects, the formulated Client defined value brief should be the primary reference source to aid decision making for project direction.

6.5.4.2 Further narrative

The review of existing evidence and the outcomes of the cross-case study analysis clearly indicate that clarity from the outset, a clearly defined brief including the value objectives that the project will be measured against, is a fundamental requirement to facilitate successful outcomes within a project. The absence of this is likely to inhibit effective delivery, degrade the performance of the project actors and also impact on the ability to collaborate to a high level. Instances were recalled within interviews for the case studies

where there was plainly confusion over what the over-arching requirements were for the projects under considerations. Even some within the same organisations within the networks had differing views of what the Client's ultimate value measures would be. The lack of a clear, written, brief was identified by many as being a primary factor in this, with the conferring of requirements via verbal communication proving inadequate, confusing and having an impact on the delivery. This corroborates the view that virtually all of those within a collaboration agree on the need for goals to be clearly set, being crucial to progress successfully (Huxham & Vangen, 2000). Some comments were noted on how the confusion around the definition of requirements had a negative effect on their ability to collaborate within the project setting, and that it had a secondary impact on both how communication was provided and received (further impacting knowledge transfer). Being clear and unambiguous is noted as being a governing principle of trusting relationships (Vaughan-Smith, 2013) and it is clear that the poor clarity in Client definition will impact on these relationships. Highways England have stated that "defining good value" is one of their six project priorities for successful delivery (Masters, 2016).

6.5.5 How does collaborative procurement of buildings services affect projects "Client defined value" outcomes?

6.5.5.1 Summary of key facts discovered within enquiry and further developed

1. The building services supply chain must have an understanding of the values defined by the Client; where possible they should have the opportunity to input in to this aspect.
2. The earliest possible opportunity for engagement with the building services supply chain is likely to have a higher degree of influence on project outcomes; the technical expertise of the supply chain can assist in early decision making.

3. Early engagement with the building services supply chain will have a positive impact on a number of project elements and, where they are defined, is likely to have a positive impact on delivering to client objectives.
4. Collaborative engagement with the building services supply chain is considered more positive when the wider project network is involved in discussing outcomes.
5. Building services supply chain members involved in the early engagement should be representative of all aspects of the project and not solely focus on cost issues; technical and delivery representatives are likely to enhance the benefits derived from engagement.

6.5.5.2 Further narrative

We have to consider that in answering this question that the “Client defined value” outcomes need to be clearly articulated and are able to be measured against. As in 6.5.4, if these are not clearly defined it becomes difficult to measure performance against. There was some commentary on this situation in the primary case studies but despite this there was also positive comments on the collaboration around the building services aspect proving beneficial where it was undertaken (case studies 1-3).

The existing evidence states that engagement with the building services supply chain and having their considered input in to the design is likely to prove beneficial in most project settings. Those involved with the collaboration in the case studies, in the most part, were also positive about the process and the outcomes. It was undertaken with an agenda of collaboration, trust, openness and innovation, recognised by those involved. It also has tangible outcomes; the projects would not have been able to enter into contract to the timescales outlined without the supply chain involvement and the collaborative work done with the building services designers and commercial teams.

This research finds that the positive impact witnessed here is generalisable to the wider construction industry; this is supported by existing evidence. However, careful consideration is required on the timing of the interaction

(*earlier* would be considered nominally more impactful), the structure of the collaboration, and the organisations and individuals involved. In the case study instances, it was noted that the projects did benefit where the attitude and behaviours towards collaboration were positive and aligned. As Percy (2021) notes there are two key themes for inter-organisational collaborations to work, *collaborative alignment* and *collaborative culture*, and it is essential that both organisations and individuals align in these respects.

6.5.6 How might the *designed intervention* (the advised procurement approach) have an impact on the case study projects under consideration?

6.5.6.1 Summary of key facts discovered within enquiry and further developed

1. When designing a bespoke procurement route, ultimate client expectations and procurement environment changes need to be included in decision process.
2. The selection of key construction partners for a collaborative procurement approach need to
 - a. Be selected on their propensity for reciprocal trusting approach
 - b. Understand the hierarchy of Client requirements and the decision process involved when prioritising project elements.
3. Client leadership within alternative procurement models needs to be informed, clear of objectives and, where collaboration is required, be of a trust-centric nature. They should be the predominant leadership voice as far as collaboration and trust ethos is concerned.
4. At the conclusion of projects, fulsome review of lessons learned should be undertaken rather than subjective commentary on failures and issues arising. These lessons learned should be communicated to wider construction industry.

6.5.6.2 Further narrative

Disappointing. A single word sums up a number of the responses from those involved in the alternative procurement approach for case studies 1-3. The existing evidence suggested that the designed intervention by way of a 2-stage collaborative engagement procurement route *should* provide benefits to the Client and their requirements, as was described in the procurement advice papers (Appendix A). A number of factors have had impact on the approach taken, some of which are discussed above and further in this research. It is considered that the advised procurement strategy did not provide the benefits anticipated by the Client; the early engagement advocated is seen, by the Client, as being an unnecessary expense which has not provided tangible benefits for the project outcomes. Therefore it is considered a failure. Arguably however, this view does not consider the positive input in to programme revisions without which delivery would have been more difficult, building services collaboration and how this is viewed relatively positively, and the out-turn buildings being of high quality with positive feedback from building users and school staff.

The majority of the actors within the case studies agreed that the procurement route should have had significantly better outcomes than it has displayed, that in part it may have had some negative effects on how the projects were delivered, and that aspects of the failure were not due to the outlined process but instead were, perhaps, due to the individuals, their personalities and organisational loyalty inherent in any project network. Vaughan-Smith (2013) suggested that a high degree of trust will not salvage a poor strategy, but low trust often derails a good strategy particularly when that strategy is centrally established on trust; it is found that this is, at least partially, the case. Other factors noted in regards observations on the poor performance of the alternative procurement approach are;

- The 2-stage traditional approach had implications on the division of responsibility which was not conducive to collaboratively derived outcomes. This was particularly pertinent to design responsibility.

- The poor definition of Client value requirements was a hindrance to the operation of the procurement approach
- The failure of trust within the networks, between some key actors, was a significant factor. Positive trust relationships proved beneficial.
- Previous relationships, which should have benefitted the projects, did not prove to be as strong as suspected and their failures were key to poor performance.
- Strong characters within the network had influence over others and, at times, this led to negative outcomes.
- The entire network should have been able to deliver the projects in a more effective way, but the environment and the pressures that it came under was unsuitable for the outlined approach to be able to be enacted. Kadefors (2003) notes that Client-Contractor relationships easily deteriorate once problems appear, due to the *transaction costs* involved.
- Some outcomes from aspects of the approach were positive and enabled key aspects of the projects, but these were disregarded or forgotten by some due to the over-riding negative emotions towards the approach taken and early outcomes.

It is noted here that the Client involved in case studies 1-3 has stated that they would be unlikely to adopt a similar approach given the outcomes from these projects. They are currently procuring large school projects utilising, generally, a 2-stage *Design and Build* model with a combination of either Contractor-led multi-discipline teams or later stage (Stage 4) novation of Client appointed design teams, depending on the framework arrangements utilised. It is noted that the approach of seeking Contractor engagement and, one can assume, supply chain involvement is still being deployed in one of these procurement models.

6.5.6 Further discussion

One aspect which was not directly addressed within the research questions was the *nature of the individual* within a project setting; aspects of trust, knowledge transfer and perception aside. The existing evidence alludes to the notion that projects are not delivered by *faceless project organisations*, rather they are delivered by PEOPLE. It was noted that construction projects are generally unique, and this is further exacerbated by the deployment of individually nuanced practitioners, with varying degrees of experience and knowledge, to enact the development and delivery of built assets. Add to this their personal and professional views, their propensity to collaborate, attitude towards trust and likelihood that they will sacrifice self for the benefit of the project, the inherent uncertainty, complexity and ambiguity (VUCA) of construction, and there are components too numerous to make simple generalisations on how specific procurement methods or delivery models will work or prove better over others. The designed procurement intervention and the enquiry outcomes are testament to how the behaviours individuals display have the ability to significantly impact, both positively and negatively, on project deliverables; from the project leadership to the supply chain members. Successful collaboration, like most things in life, requires dedication and commitment (Percy, 2021).

6.5.7 Reliability and generalisability

Given the nature of this enquiry, its cross-case study approach, and the somewhat slender subject matter, considerations of the data reliability and if the outputs can be generalised to the wider construction landscape have to be considered.

6.5.7.1 Reliability

The outcomes are based largely on the data derived from case studies and the analysis between these. Suggestions that this manner of data is less reliable than other sources are levelled but refuted through the close

adherence to process outlined by Yin (2003). Biases are acknowledged and have been somewhat tempered through the research filter of multiple responses and the triangulation to other data sources and the existing evidence, some of which is most recently published and appears to concur with findings outlined. On that basis, the reliability of the data and the findings is considered suitable.

6.5.7.2 Generalisability

The narrowing of the subject for enquiry is necessary in order to produce rich, thorough and actionable findings. The focus on collaborative procurement of building services provides for detailed enquiry of the key themes outlined. However, it is observed that the nature of construction procurement process has many moving and interconnected parts, and those elements which are the focus of this research are fundamentally part of the wider procurement context. The areas of trust, of collaboration, of knowledge transfer, of early supply chain involvement, and of Client defining their objectives clearly are all equally applicable to construction generally as well as in the focus subject here. So, on that basis, it is stated that the findings derived are generalisable in the construction, and potentially to wider industrial, setting. This also lends further corroboration to the claim of reliability above. The following Conclusions chapter further expands upon aspects of applicability to the wider context as well as for collaborative building services procurement.

7 CONCLUSIONS

7.1 Contribution to knowledge

The research purports to contributing to knowledge in both the academy and within industry, the very point of the Professional Doctorate approach. In contributing to this, firstly the gap for enquiry was identified. The enquiry then sought to close that gap through rigorous and relevant research. In support of this gap assessment, it appeared that both academy and industry consider there being a problem in this enquiry's realm.

7.1.1 Gaps identified

The gap identified at the commencement of the enquiry regarded the disparity between a seemingly academic view that enhanced collaboration brings project benefits, whereas there appeared to be minimal progress in practice of widespread and large scale collaborative procurement and delivery models with repeated and heralded success. The enquiry sought to understand what aspects of collaborative working practices were likely to be causing this academic-practice divide to not be closed. It hinged upon the academic view that largely affirmed that collaboration in a construction project setting would prove beneficial in a number of key criteria and the industrial practitioners, who were more critical of the enactment of collaborative approaches due to a dearth of practical guidance and of guidelines based on repeated successful projects. An element of this was that some academic writing on the subject may lack relevance to practical application and, reciprocally, industry commentary on the collaborative process lacked a rigour that may not withstand scrutiny in an academic sense. This gap identified at the beginning of the research journey still appears to be prevalent; most recent industry publications still advocate a collaborative approach to be the ideal in project settings, but that this is still being highlighted and advised indicates that it is still not widespread nor the norm.

The reviewed evidence links enhanced collaboration with improved project performance but there is scant evidence of correlative evidence of large scale adoption of wholly collaborative procurement arrangements. There must be a reason behind this; if collaboration was the answer to many of construction procurements issues, then why has it not been adopted at scale across the industry?

The enquiry was particularly relevant in the specific area of Building Services procurement where there is a notable independent gap within the available evidence on the manner of improved procurement of this critical aspect; there being very little available.

7.1.2 Gaps closed

The research synthesised the available evidence and proposed that collaborative procurement of projects with a high degree of reliance on building services should prove beneficial. The Action Research Focus-group outcomes supported this overall proposition, but also that there was a high degree of context in relation to this. Alongside this, there was discussion on the nature and requirements of trust within the teams delivering built assets and how these impact on individual's delivery.

The procurement approach advised, the effective outcome of the Action Research undertaken, attempted to take a collaborative approach within the bounds of the Client procurement preferences and it was these procurements that were further reviewed through case study. The analysis of the response to the propositions through the case studies (and the earlier research aspects) finds that there IS a gap between theory of collaboration in construction projects and how these principles are enacted because, even with mandated collaboration in the procurement and contract approach, and with some actors within the networks championing collaboration, failures in the process of collaboration and the outputs of same are apparent in the cross-case study analysis. The comments in the findings do not close the gap entirely nor do they suggest a *panacea procurement* approach, but they do close the gap

somewhat by noting the contextual aspects of practical collaboration in construction settings. These are further discussed in recommendations (Chapter 8).

The gap has been closed in a number of ways;

- Capitalises on the insight of practitioner experience and tacit knowledge
- An INSIDER's view of the practicalities of collaborative procurement
- A combination of "Practitioner" and "Practice-Informed" research
- Formed propositions tested and responded to appropriately
- Approach has a "legitimate intellectual pedigree" (Chynoweth, 2013)
- Adds to development of practitioner knowledge and therefore the knowledge base
- Has generated Mode 2 (Gibbons *et al*, 1994) knowledge "in the context of application", adding to the Academy
- Knowledge derived is "actionable" (Sexton and Lu, 2009) – assuages the perceived conflict of academia and industry (*rigor v relevance*)

In relation to the propositions tested, the findings discovered and the gap identified, table 7.1.1 indicates contributions to why there appears to be a discrepancy between the evidence reviewed stating that collaborative procurement practices should be the norm and be successful, and the limited practical evidence of the same within practice as identified. These six clear contributions, along with the earlier findings and discussions provide tangible and actionable points for those within industry to undertake to gain better outcomes from collaborative procurement models. In an academic sense, they identify potential reasons for failures in procurement approaches which should, on paper, be effective each time deployed. It highlights how the *human factor* within mechanistic modelling has significant impacts.

Proposition	Finding	Contribution to closing "gap"
That high levels of trust between project actors enhances the outcomes of a project	Trust plays a significant part in how relationships between project actors impact on overall project delivery	Collaboration cannot be considered the "norm" in a construction setting. In order for collaboration to be more widespread, trust must be understood to be central to the relationship between Clients and their delivery teams.
Trust between project actors is necessary for effective knowledge transfer	Knowledge transfer does not necessarily rely on trusting relationships. It may however, make the transfer more effective or be deployed more widely.	The actionability of transferred knowledge is enhanced when dyadic trust relationships form the basis of the transfer. This will also enhance wider dissemination throughout networks.
That a disparity between actors' perceptions of the level of trust between them can cause conflict and barriers within the project network.	Differing view of the levels of trust between project actors can cause issues within that relationship and to wider networks. However, it is acknowledged that other factors may impact this.	Practitioners cannot expect reciprocated trust if they themselves are not willing to display trusting behaviours and this is one factor in creating barriers within teams along with developing conflict within collaborative settings.
That poorly defined client value objectives have a detrimental effect on the performance of the project delivery team; and that it also affects their ability to collaborate	Poorly defined Client value objectives are a primary factor in poor project delivery and re likely to induce issues which impact on a network's ability to work effectively or collaborate.	Clients who wish to adopt a collaborative approach successfully must communicate their value objectives clearly. Without this collaborative approaches to project delivery will fail.
That the collaborative early engagement with the Building Services supply chain has a positive effect on delivering to the client's value outcomes	Engaging collaboratively with the Building Services Supply chain at the earliest opportunity is likely to provide project benefits in regards client value.	The collaborative procurement of building services, if done appropriately, will provide project benefits in terms of value.
The alternative procurement approach adopted for the 3 further school projects had a positive impact on the initial stages.	It is the view of the networks that, whilst it SHOULD have provided some benefits, the alternative procurement approach adopted appears to have delivered negative outcomes.	This approach is also valid for other high value, design focused, elements.

Table 7.1.1 Contributions to gap identified

7.1.3 Discrepancies identified

The case studies indicate that there is potential discrepancy between how individuals score themselves and others in the network analysis, compared to how they narrate the same relationships and aspects of the network. An example would be that whilst an actor states that “trust was poor within the network” in interview, they then scored this as “3 – Mostly trusting” in the SNA scored matrix. This means that the scoring is potentially swayed by the individual’s view of themselves within the network setting and not taking a more subjective view of the network entirely until asked in conversation. Again, this reflects on the presence of CONTEXT and the (potentially lacking) objectivity of the human actors who were subjects of the research. This does not degrade the data collected as it distils the subjectivity inherent within the response from those involved in the case study project; there was expectation of subjectivity and the analysis methodology sought to temper this through the statistical analysis and the mathematical tests included. Whilst the ability to remove all subjectivity in this manner of research is unlikely to be available, the outcomes from the analysis, having been triangulated with other data sources, are not influenced by the discrepancy. However, that this discrepancy exists must be recognised in the contextual setting; in a practical application sense network actors are likely to perceive themselves as operating at a higher level than others within the network view their delivery. This is also reflected in the scoring of knowledge transfer to and from other actors in networks, where the majority of respondents within the case studies scored themselves higher in transferring knowledge TO others. Harking back to the review of existing literature, there was narrative on practitioners potentially having an elevated view of their abilities in a procurement setting.

7.2 Limitations noted

The research, like any research, is constrained by a number of factors; by the time available, by the restrictions sometimes placed on objectivity by the individual’s employment and employer position, by personal views or

agendas, and by emotion within the case studies where some actors were still quite critical of one another (a later review might have tempered some of this emotion).

The nature of seeking the views of actors within the case studies may in itself be considered a limitation, but this is assuaged by the introduction of the statistical elements of the Social Network Analysis in order to cross reference the quantitative and the qualitative aspects of the data. Whilst it may be argued that there may be individual actors within the case studies who have a leaning towards being combative rather than engaging in collaborative process and that this limits the data sources, the opposite is the case; the data gained from these actors is contextual and essential for understanding the dynamic of the issue being researched.

The case studies themselves, albeit noted as being serendipitous, might be considered a limitation given that a number of the teams had common actors and that 3 of them were procured in identical fashion. The model of the cross-case study analysis, focusing on the teams AND the individual, somewhat answers this limitation but it is considered that the research may have benefitted from a wider number of network actors to seek broader view.

Is the focus on Schools a limitation in itself? Does this make the findings less applicable to other building types? Simplistically put, buildings are buildings. Schools were selected largely due to the problem being encountered by the practitioner-researcher, but they have a high proportion of building services within them in order to deliver the learning environment fully; the social value aspect, the real *value objective*, rather than simply value for money. But the contributions to knowledge identified can be applied to other education projects, commercial buildings, civils infrastructure, and other built assets.

The researcher reflects that, had there been a wider selection of projects chosen as case studies, not focusing on school buildings, this would have taken the emphasis away from the practical problem been encountered. It also may have limited the comparability of some of the data within the

analysis undertaken and might not have derived the contributions as succinctly.

Despite these noted limitations, the outcomes are still considered generalisable given the triangulation with other information within the case studies and the existing evidence.

7.3 Current considerations

As this research concludes, the construction industry is facing volatile times in terms of resource availability, spiralling cost increases, and a general response to national and global pressures (COVID, BREXIT, and the Ukraine conflict). It has been noted that levels of collaboration and social connection in teams have dropped during the COVID-19 era (Hayward, 2021), however it is observed that in the latter stages of Case Studies 1-3, being subject to COVID restrictions, it was the actors who engaged within a collaborative paradigm that enabled delivery to continue (and ultimately be successful in handover). Good (2020, p.1) notes similar when he stated *“One of the few positives to emerge from the COVID-19 pandemic has been a greater sense of community and collaboration – not only in construction, but other sectors too. In our industry, I would say there is a greater willingness to work together on common challenges and re-assess how competitors within the industry engage with one another”*. This research suggests that the approach outlined above is likely to drive improvement.

In this landscape it is also noted that there has been a shift in the delivery of school buildings across Scotland, with a significant focus on sustainability, reduction in carbon and minimising energy usage (alongside improving the learning environment); mirroring the Scottish Government’s drive for these requirements generally. A number of Local Authorities are investigating a *Passivhaus* route to delivering their education assets in order to meet funding requirements and for long term portfolio improvement.

In the environment of significant resource and cost pressures on buildings and building products which require significantly more consideration in design and

delivery, the clamour for collaboration is becoming more strident; the focus on a team approach more critical. Responsive teamworking requires collaboration fundamentally, especially across agencies (Hayward, 2021). This research finds that the factors are particularly pertinent to building services and those that design and deliver these.

8 RECOMMENDATIONS

8.1 For the Academy – Further research

This research concurs with the existing evidence, at least partially. The theory of collaboration and of the aspects of this within construction procurement are considered appropriate and well-articulated. The context of procurement is recognised to some degree but further research in this area either has to consider how context could be removed as a factor (this research found this difficult), or how it could be acknowledged within a research model in such a way as to be more generalisable. The context noted in this research is not unusual in projects.

One aspect that is considered as requiring further research is the nature of procurement of building services and how undertaking this in different manners impacts on overall project outcomes. It is proposed here that undertaking this collaboratively is likely to have benefits. One network member from the pilot case study initially suggested that having the Building Services as “lead designer” and having the services being prioritised in certain project types might be of benefit. This was discussed within interviews thereafter with a mixture of positivity and mooted response. However, it was not fundamentally part of this enquiry. Research in to differing approaches of this nature may prove of worth in this limited field.

In looking at construction team efficacy and project outcomes it is recommended that the use of Social Network Analysis may be a suitable vehicle to further research the impact of trust, individual’s approach to teamworking, and relationship strength on the delivery of school buildings or others with high reliance on building services.

8.1.1 The Professional Doctorate

The researcher comments here on the process of undertaking this research through a Professional Doctorate route as an active practitioner completing an enquiry in to an issue encountered in practice. The Professional Doctorate

model is considered ideal for undertaking research of this manner and, as a practitioner, you are well prepared by the modular content in advance of undertaking the research element. What needs to be considered by the practitioner-researcher is the time required to complete this effectively. The research design also requires to take this in to account. The approach taken in this research was exhaustive and this was not fully understood when designing the methodology; what appeared to be relatively straight forward in design did not fully consider the resource required to undertake data gathering, data analysis and authoring the outcome. Future Professional Doctorate candidates would be well advised to discuss the nature of resource/time with their peers and supervisors, taking advice on limitation in order to meet timescales effectively. The Professional Doctorate route was described within the modular workshops as a *troublesome journey*; this researcher wholly agrees with that description. The amount of personal resource requiring application should be understood before embarkation, and not underestimated.

Having said that, the process has significantly improved the researcher's analytic and research skills, has led to opportunities in collaborating with other academics on practical-research (in parallel with finalising this enquiry), and has developed an understanding of the specific subject matter which would not be equalled without having undertaken this. The researcher is a more rounded practitioner due to completing this rewarding enterprise, but this also opens opportunities for them to undertake further research within or alongside practice, along the lines of those themes noted in 8.1, or other emergent propositions.

8.2 For Practice

"We have evidence of a direct correlation between collaboration and project performance", noted from Highways England (Masters, 2016, p.1).

The key findings from the research have been distilled as the contributions and are identified here along with triangulated, comparative and corroborative positions noted from the reviewed literature, in regards the practical aspects of collaboration, with the findings to the formed propositions being clearly aligned;

Contribution to closing "gap"	Comparative and corroborative positions
<p>Collaboration cannot be considered the "norm" in a construction setting. In order for collaboration to be more widespread, trust must be understood to be central to the relationship between Clients and their delivery teams.</p>	<p>Effective teams can exist outside of collaborative working arrangements (Pinsent Masons, 2017)</p> <p>Higher levels of trust in business teams are nominally associated with enhanced levels of team performance (Morrisette & Kisamore, 2020)</p>
<p>The actionability of transferred knowledge is enhanced when dyadic trust relationships form the basis of the transfer. This will also enhance wider dissemination throughout networks.</p>	<p>An early commitment to collaboration is likely to have value in embedding the culture of collaboration, which will engender savings over the long term (Pinsent Masons, 2017)</p>
<p>Practitioners cannot expect reciprocated trust if they themselves are not willing to display trusting behaviours and this is one factor in creating barriers within teams along with developing conflict within collaborative settings.</p>	<p>Clients need to be structurally ready and have suitable processes in place to fully engage in collaborative procurement, to enable suitable behaviours from those collaborating (McKinsey, 2020)</p>
<p>Clients who wish to adopt a collaborative approach successfully must communicate their value objectives clearly. Without this, collaborative approaches to project delivery will fail.</p>	<p>"Unclear responsibility between designers and contractors" causes uncertainty and degrades trust (from the Client) as their expectations are not met by either party (Ive & Chang, 2006)</p> <p>Frameworks do not necessarily promote collaboration. They are often perceived as a way of avoiding further OJEU procurement since there is then a mini-competition on framework projects. Such frameworks are essentially zero value frameworks and there is no security of work (Pinsent Masons, 2017)</p>

<p>The collaborative procurement of building services, if done appropriately, will provide project benefits in terms of value. This approach is also valid for other high value, design focused, elements.</p>	<p>Clients are generally suspicious of contractor's claims as well as suggestions for improvements coming from them (Kadefors, 2003)</p> <p>Collaborative working practices have a positive impact on project outcomes and satisfaction (Greenwood & Wu, 2012)</p>
<p>Collaborative models of procurement cannot simply be outlined and then be expected to be implemented. This manner of procurement requires all involved to be willing to work at collaborating, have the propensity for trust, be willing to make sacrifices at times and have the Client's value objectives as their primary goal, in order to provide positive outcomes.</p>	<p>There is historic and deep-seated distrust between those charged with procuring and the supply chain side of the industry (Pinsent Masons, 2017)</p> <p>Relationship quality within the UK construction industry is impacted more, in a positive way, by higher levels of interpersonal trust than it is, negatively, by adversarial structures (Jiang et al 2012)</p> <p>Participants may import behaviours from contract forms or arrangements with which they are familiar. Those who have been involved in more adversarial contract types might find it difficult to act in more collaborative models (Laan et al, 2010)</p>

Table 8.2.1 : Key findings contribution and triangulated comparators

8.2.1 Further Key finding

The findings of this research also directs the industry towards a better understanding of the **PEOPLE** involved in projects and how they interact, how their effectiveness might be reliant on the trust relationships within project networks and how collaboration might not necessarily be able to be mandated or enforced through contract, but rather reliant on the propensity of the individuals and organisations involved in projects. For trusting cooperative relationships to develop, Client and contractor organisations have to staff the project appropriately (Laan *et al*, 2010). The encouragement of trust, the development of the network and an ethos of reciprocity are key items noted by Patrick *et al* (2007) in developing an appropriate culture for future delivery.

It is recommended that, whatever the procurement model adopted, building procurers adopt collaborative approaches, where feasible, to enable benefits to be gained through deploying the correct *people* or *agencies* on the appropriate project activities. Kadefors (2003) suggested that it is questionable if trust can be developed and maintained in a traditional contractual arrangement where the Client retains the higher degree of control; this research reflects that this may be the case however, this research finds that the absolute necessities of benevolence and openness required in relational trust are achievable in whatever procurement setting. Kadefors (2003, p.179) also notes that *informal, cooperative relationships between individuals are not uncommon, even within traditional contracts.*

The review of existing evidence queried if industry leadership should come from government. In this research's life cycle the "*Construction playbook*" has been published; one aspect of which is a greater focus on building positive relationships within the industry and particularly between project leads and industry. Collaboration by any other name? Where collaboration is to be part of the procurement and contract model adopted, the leadership of the project should endeavour to engender trusting relationships across the network; specific actions may be required to enable trust and ensure it continues throughout the project life cycle. Kadefors (2003) says that collaborative workshops (team building and communication) are a key element of partnering and are more likely to develop trust within the team than it otherwise would. McDermott, Khalfan & Swan (2005) suggest the same and that they can formulate key relationships which drive project success; this research found that this approach proves beneficial. It is through this process that project wide benefits are likely to be gained, but this must start from a position of knowing what is required from the outset in their value defining brief. It might be not so much the value of the answers they pursue, but the quality of the questions they pose in defining requirements (Cooper, 2021).

In regards building services; it is the recommendation of this research that undertaking procurement of this aspect of built assets is particularly sensitive

to the benefits of collaboration and that early engagement between Client, Designers and MEP supply chain is likely to provide enhanced value outcomes. This concept is also generalisable to other cost sensitive elements with a focus on design completion by supply chain members within projects, should clients and their teams seek to act more collaboratively in wider contexts which, it is suggested by both Academia and Practice, is the best approach to determine positive outcomes.

REFERENCES

Abbott, Carl, Sexton, Martin, Jonas, Veronica & Lu Shu-Ling (2007) 'Action Learning as an enabler for successful technology transfer with construction SME's', RICS Research Paper Series, 7:16, RICS Research

Akintoye, A. (2007), 'Collaborative relationships in construction: the UK contractors' perception', *Engineering, Construction and Architectural Management*, Vol.14, Iss.6. pp.597-617, DOI: 10.1108/09699980710829049

Alharthi A., Soetanto R., & Edum-Fotwe F. (2014) 'The changing role of the public Client in Construction Procurement', *Proceedings of 30th Annual ARCOM Conference*, 1-3 September, Portsmouth, UK, Association of Researchers in Construction Management, pp.403-412

Ambrose, M.D. & Tucker, S.N (1999), 'Matching a Procurement System to Client and Project Needs: A Procurement system evaluator', part of *Customer Satisfaction: A focus for research & practice*, CIB W55 & W65 Joint Triennial Symposium, Cape Town, 5-10 September 1999, <http://www.irbnet.de/daten/iconda/CIB3395.pdf>
Last accessed 02/08/16

Anderson M G & Katz P B (1998) 'Strategic Sourcing', *The International Journal of Logistics Management*, Vol. 9, nr.1, pp. 1 – 13

Arain F., McFarlane T., Mah D., & Zahed M. (2014) 'Emerging Project Procurement Trends in Canadian Construction Industry', *Construction Research Congress 2014*, ASCE

Aram, John D & Salipante Jr., Paul F (2003) 'Bridging Scholarship in Management: Epistemological Reflections', *British Journal of Management*, Vol. 14, pp.189-205

Baiden, B.K., Price, A.D.F, & Dainty, A.R.J. (2006) 'The extent of team integration within construction projects', *International Journal of Project Management*, Vol.24(2006), pp.13-23, Elsevier Ltd

Barbalet, Jack (2009) 'A characterization of trust, and its consequences', *Theory and Society* issue 38, pp.367-382, Springer

Barrett, Peter S. & Barrett Linda C. (2003) 'Research as a kaleidoscope on practice', *Construction Management and Economics*, 21:7, 755-766

Bates, Suzanne (2010) 'The number 1 requirement for exiting this recession: rebuild trust! Recent survey reveals trust as critical', *Business Strategy series*, Vol.11, no.2, pp.81-83, Emerald group publishing

Baxter, Susan K & Brumfitt Shelagh M (2008) 'Professional differences in interprofessional working', *Journal of interprofessional Care*, June 2008, 22:3, pp.239-251

Beaumont, Wes (2015) 'Culture for success', *Construction Journal*, Nov/Dec 2015, pages 21-22, RICS, London

Bingham, Tony (2016), 'Collaboration Express Line', *Building Magazine*, Issue 31, dated 5th August 2016

Bonham, Mary Ben (2013), 'Leading by example: new professionalism and the government Client', *Building Research & information*, 41:1, pp.77-94, DOI: 10.1080/09613218.743251

Botham, David & Vick, Donna (1998) 'Action Learning and the Program at the Revans Centre', *Performance Improvement Quarterly*, 11:2, pp. 5-16

Boud, David & Tennant, Mark (2006) 'Putting doctoral education to work: challenges to academic practice', *Higher Education Research & Development*, 25:3, 293-306, Routledge

Bourner, Tom, Bowden, Rachel, & Laing, Stuart (2001) 'Professional Doctorates in England', *Studies in Higher Education*, 26:1; 65-83, Routledge

Bowen P A, Pearl R G, & Edwards P J (1999), 'Client briefing processes and procurement method selection: a South African study', *Engineering, Construction and Architectural Management*, Vol. 6 Iss: 2, pp.91 - 104, Blackwell Science Ltd

Boyd, David (2008) 'Researcher attitudes and motivation', *Advanced Research Methods in the Built Environment*, Wiley-Blackwell, Chichester, UK

Branson, Christopher (2007) 'Effects of structures self-reflection on the Development of Authentic Leadership Practices among Queensland Primary School Principals', *Educational Management Administration & Leadership*, 35(2), pp.225-246

Bresnen, Mike (2013) 'Advancing a 'new professionalism': professionalization, practice and institutionalization', *Building Research & Information*, Vol. 4 No. 6, pp.735-741, DOI:10.1080/09613218.2013.843269

Bresnen, Mike & Marshall, Nick (1999), 'Building partnerships: case studies of Client-contractor collaboration in the UK construction industry', *Construction Management and Economics*, 18-7, pp.819-832, DOI: 10.1080/014461900433104

Brewer, Graham & Strahorn, Scott (2012), 'Trust and the Project Management Body of Knowledge', *Engineering, Construction and Architectural Management*, Vol.19, iss.3, pp. 286 – 305, DOI: 10.1108/09699981211239616

BSI Group (2010) 'BS11000 Collaborative Business relationships – Product Guide', BSI Group, BSI/UK/135/CS/0213/en/DD

Bunge, Mario (1969) 'Technology as applied science', Technology and Culture, Vol. 7 No. 3 (summer), pp. 329-347, The John Hopkins University Press and the Society for the History of Technology

Burnard V. & Muse A. (2014) 'Cost led Procurement Guidance: Guidance for the procurement and management of capital projects', Cabinet Office, UK government

Cabinet Office (2011), 'Government Construction Strategy'

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/61152/Government-Construction-Strategy_0.pdf, last accessed 14/12/16

Cabinet Office (2014a), 'New Models of Construction Procurement',

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/325011/New_Models_of_Construction_Procurement_-_Introduction_to_the_Guidance_-_2_July_2014.pdf, last accessed 14/12/16

Cabinet Office (2014b), 'Cost Led Procurement Guidance',

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/325012/Cost_Led_Procurement_Guidance.pdf, last accessed 14/12/16

Cabinet Office (2022), 'The Construction Playbook', Version 1.1 September 2022

<https://www.gov.uk/government/publications/the-construction-playbook> , last accessed 02/11/22

Chakkol, Dr. Mehmt & Johnson, Dr. Mark (2015), 'Benefits Realisation from Collaborative Working', Operations Management Group, Warwick Business School, Commissioned by the Institute for Collaborative Working, London

Chang, Chen-Yu (2015), 'A festschrift for Graham Ive', Construction Management and Economics, 33:2, 91-105, DOI: 10.1080/01446193.2015.1039044

Cheng, Eddie W.L., Li, Heng, Love, Peter E.D., & Irani, Zahir (2003), 'Strategic Alliances: A model for establishing long-term commitment to inter organisational relations in construction', *Building and Environment*, 39 (2004), pp.459-468, Elsevier.

Cheung S-O., Lam T-I., Wan Y-W., & Lam K-C. (2001) 'Improving Objectivity in Procurement Selection', *Journal of Management in Engineering*, Vol. 17(3), pp.132-139

Chinowsky, Paul, Diekmann, James, & Galotti, Victor (2008), 'Social Network Model in Construction', *Journal of Construction Engineering and Management*, Volume 134 issue 10, pp. 804-812, American Society of Civil Engineers, Reston, VA

Chong H-Y, & Preece C.N., (2014) 'Improving Construction Procurement Systems using Organizational Strategies', *Acta Polytechnica Hungarica*, Vol. 11, No.1, pp. 5-20

Chynoweth, P. (2013) 'A Taxonomy of Research Styles for the Chartered Surveying Profession: Research into Practice, for Practice, and through Practice', *Proceedings of the Royal Institution of Chartered Surveyors Construction, Building, and Real Estate Conference (COBRA) New Delhi, India, 10th – 12th September 2013.*

Chynoweth, P. (2013a), 'Practice-informed research: An alternative paradigm for scholastic enquiry in the built environment', *Property Management*, Vol.31 no.5, 2013, pp.435-452, Emerald Group Publishing

Chynoweth, P. (2014), 'Professional doctorate research methodologies: new possibilities from beyond the social sciences', *Proceedings of the 4th International Conference on Professional Doctorates, (ICPD-2014) Cardiff, UK, 10th-12th April 2014*

Cole, John (2017) 'Report of the independent inquiry into the Construction of Edinburgh Schools – February 2017', For the City of Edinburgh Council, accessed via http://www.edinburgh.gov.uk/news/article/2245/independent_report_into_school_closures_published , last accessed 24/04/17

Colquitt, Jason A, Scott, Brent A & LePine, Jeffrey A, (2007) 'Trust, trustworthiness, and Trust Propensity: A Meta-analytic test of their unique relationships with risk taking and job performance', *Journal of Applied Psychology* 2007, Vol.92, no.4, pp.909-927

Constructing excellence (2009), 'Never Waste a Good Crisis – A Review of Progress since *Rethinking Construction* and Thoughts for Our Future' (The Wolstenholme Report), Constructing Excellence, London

Constructing excellence (2015) 'Top 10 Benefits of Collaborative Working', <http://constructingexcellence.org.uk/resources/top-10-benefits-collaborative-working-2/>, last accessed 18/05/17

Constructing excellence (2015a) 'Alliancing, BS11000 and Behaviours4Collaboration', <http://constructingexcellence.org.uk/alliancing-bs11000-behaviours4collaboration/>, last accessed 18/5/17

Constructing excellence (2017) 'Ward's words: Don't use the C word unless you mean it!' <http://constructingexcellence.org.uk/wards-words-dont-use-the-c-word-unless-you-mean-it/>, last accessed 18/5/17

Construction index, The (2020), 'UK flops in quest for Construction 2025 trade targets', <https://www.theconstructionindex.co.uk/news/view/uk-flops-in-quest-for-construction-2025-trade-targets>, last accessed 24th October 2022

Construction index, The (2022), 'Construction 2025 target out of reach as building materials deficit passes £13bn', <https://www.theconstructionindex.co.uk/news/view/construction-2025-target-out-of-reach-as-building-materials-deficit-passes-13bn> , last accessed 24th October 2022

Construction Innovation hub (2020), 'An introduction to the Value Toolkit', The Construction Innovation Hub, July 2020, constructioninnovationhub.org.uk

Construction Leadership Forum (2022), 'Scottish Construction Accord; A shared vision to improve outcomes for industry and the public sector', October 2022

Conley, Randy (2017), '3 Levels of Trust You Experience in Relationships', Leading with trust, <https://leadingwithtrust.com/2017/12/03/3-levels-of-trust-you-experience-in-relationships/>; last accessed September 13th 2021

Conway, Ian (2018), 'Optimising collaborative working in the construction industry', UK Construction media, 22nd January 2018;
<https://www.ukconstructionmedia.co.uk/features/optimising-collaborative-working-construction-industry/> Last accessed 24th January 2018

Cooper, Kate (2021), "Accept Ambiguity", EDGE – The journal of the Institute of leadership & Management, Summer 2021, p.17

Cornick T C & Barre N J (1990), 'Quality Management and Design-Build: The Opportunities for this Method of Procurement', International Journal of Quality & Reliability Management, Vol.8 no.3, 1991, MCB University Press

Costley, Carol (2013) 'Evaluation of the current status and knowledge contributions of professional doctorates', Quality in Higher Education, 19:1, 7-27

Costley, Carol & Lester, Stan (2012) 'Work-based doctorates: professional extension at the highest levels', Studies in Higher Education, 37:3, 257-269

Court, Martyn (2016), "A Collaboration Carol", published on LinkedIn, 12th December 2016, <https://www.linkedin.com/pulse/collaboration-carol-martyn-court-mrics-mciob?trk=hp-feed-article-title-like>
Last accessed 20th December 2016

Crotty, M. (1998) 'The Foundation of Social Research: Meaning and Perspectives in the Research Process', Sage publications, London

Crown Commercial Service (2016), 'Procurement Policy Note – Onerous Practices in Procurement and Contracting', Action Note PPN 10/16, December 2016

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/577259/PN1016-OnerousPracticesinProcurementContracting_1 .pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/577259/PN1016-OnerousPracticesinProcurementContracting_1.pdf), last accessed 14/12/16

Currie & Brown (2019), 'Construction activity and market outlook: United Kingdom – Q3 2019'; Currie & Brown

Dainty, Andrew (2008) 'Methodological pluralism in construction management research', *Advanced Research Methods in the Built Environment*, Wiley-Blackwell, Chichester, UK

Danton S A (1980), 'Integration and co-ordination of building services', *Building Service Engineering Research and Technology*, Vol. 1, nr. 3, pp. 128 – 133, The Chartered Institution of Building Services Engineers (CIBSE), SAGE publications

Davidson C H (2009), 'Procurement – in the globalizing context', *International Journal of Managing Projects in Business*, Vol. 2 Iss: 3,

<http://www.emeraldinsight.com/journals.htm?issn=1753-8378&volume=2&issue=3>

last accessed 10/11/16

DesigningBuildings.co.uk (2016) 'Building Services', Designing Buildings Limited

http://www.designingbuildings.co.uk/wiki/Building_services , last accessed 22/05/16

Department for Levelling Up, Housing and Communities (2022), 'Guidance on Collaborative Procurement for Design and Construction to Support Building Safety', January 2022

Dickinson M., Oyegoke A., McDermott P., & Hawkins J. (2010) 'Transparency in UK Public Construction Procurement', Conference paper, accessed via

www.researchgate.net/publication/302433791 Last accessed 28/07/16

Dissanayaka, Sunil M. & Kumaraswamy Mohan M. (1998), 'Comparing contributors to time and cost performance in building projects', *Building and Environment*, Volume 34,

Issue 1, Pages 31-42, ISSN 0360-1323, [http://dx.doi.org/10.1016/S0360-1323\(97\)00068-1](http://dx.doi.org/10.1016/S0360-1323(97)00068-1).

<http://www.sciencedirect.com/science/article/pii/S0360132397000681>

Dougherty, Vicky (1999) 'Knowledge is about people, not databases', *Industrial and Commercial Training*, Vol.31 Iss:7, pp.262-266, Emerald Insight, <https://doi.org/10.1108/00197859910331962>

Doyle J (2006), 'Rebalancing Risk and Rewards, From Clients Driving Construction Innovation – Moving Ideas into practice', Cooperative Research Centre for Construction innovation, Brisbane, Australia

Eadie R., McKeown C., & Anderson K., (2012) 'The impact of recession on construction procurement routes', *International Journal of Procurement Management*, Vol. 6. No. 1, pp. 24-38

Edmondson, Ron (2016) 'The Supply chain is a Key Part of Successful Collaboration', *Constructing Excellence*, 15th September 2016, <http://constructingexcellence.org.uk/supply-chain-key-part-successful-collaboration/>
Last accessed 18/5/17

Egan, Sir John (1998) 'Rethinking Construction – The report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the scope for improving the quality and efficiency of UK Construction, Department of Trade and Industry, HMSO
Eraut, Michael (1985) 'Knowledge creation and knowledge use in professional contexts', *Studies in Higher Education*, 10:2, pp.117-133

Erdem, Ferda (2003), 'Optimal trust and teamwork: from groupthink to teamthink', *Work Study Journal*, Volume 52, number 5, 2003, pp.229-233, MCB UP Limited, DOI 10.1108/00438020310485958

Erdem, Ferda & Ozen, Janset (2003) 'Cognitive and affective dimensions of trust in developing team performance', *Team Performance Management: An international journal*, Vol.9, no.5/6, pp.131-135, Emerald Publishing group

Eriksson P E & Westerberg M (2010) 'Effects of cooperative procurement procedures on construction project performance: A conceptual framework', *International Journal of Project Management*, Iss. 29 (2011), pp. 197 – 208, Elsevier, www.sciencedirect.com

Farmer, Mark (2016), 'The Farmer review of the UK Construction Labour Model: Modernise or Die', Published by The Construction Leadership Council

Finlayson, Alexander (2016) 'Developing a reflective practice model for engineering leadership', *Reflective Practice*

Flyvberg Bent (2001) 'Making social science matter – Why social inquiry fails and how it can succeed again', The Press syndicate of the University of Cambridge, UK.

Fridgeirsson, T.V.; Ingason, H.T.; Jonasson, H.I.; Kristjansdottir, B.H. (2021) 'The VUCAity of Projects: A New Approach to Assess a Project Risk in a Complex World.' *Sustainability* 2021, 13, 3808. <https://doi.org/10.3390/su13073808>

Fulford, Richard & Standing, Craig (2013) 'Construction industry productivity and the potential for collaborative practice', *International Journal of Project Management* 32 (2014), pp.313-326, Elsevier Ltd publications

Fullalove, Simon (2015) 'NEC addresses IACCM top contract terms', NEC users' group newsletter, July 2015, www.neccontract.com

Fulton, John, Kuit, Judith, Sanders, Gail & Smith, Peter (2012) 'The Role of the Professional Doctorate in developing professional practice', *Journal of Nursing Management*, 20, 130-139, Blackwell Publishing Ltd

Gabriel, Deborah (2013) 'Inductive and Deductive approaches to Research'

<http://deborahgabriel.com/2013/03/17/inductive-and-deductive-approaches-to-research/>;
last accessed 29/04/18

Gardiner, Joey (2015) 'Construction on hold', BUILDING magazine, 11/09/2015

Gibbons, Michael, Limonges, Camille, Nowotny, Helga, Schwartzman, Simon, Scott, Peter, & Trow, Martin (1994) 'The New Production of Knowledge. The Dynamics of Science and Research in Contemporary Societies', Sage Publications, London

Gillespie, Nicole A, and Mann, Leon (2003), 'Transformational Leadership and shared values: the building blocks of trust', Journal of Managerial Psychology, Vol.19. No. 6 pp.588-607, Emerald Publishing group limited, DOI 10.1108/02583940410551507

Given, L. M. (2008). 'Rich data'. In The SAGE encyclopaedia of qualitative research methods (Vol. 1, pp. 795-795). SAGE Publications, Inc., <https://dx.doi.org/10.4135/9781412963909.n408>

Gluch P. (2009) 'Unfolding roles and identities of professionals in construction projects: exploring the informality of practices', Construction Management and Economics, Issue 27, pp.959-986, Taylor & Francis, DOI: 10.1080/01446190903179728

Good, Stephen (2020) 'Five construction themes for 2021 – from collaboration to supply chain resilience', Scottish Construction Now,

<https://www.scottishconstructionnow.com/article/stephen-good-five-construction-themes-for-2021-from-collaboration-to-supply-chain-resilience>

Published 17 December 2020

Good, Stephen (2023) 'Bold leadership and brave decisions required across Scotland's built environment', Scottish Construction now,

<https://www.scottishconstructionnow.com/articles/stephen-good-bold-leadership-and-brave-decisions-required-across-scotlands-built-environment>

Published 23 January 2023

Goodier, C.I., Soetanto, R., Fleming, A., Austin, S.A. & McDermott, P. (2006) 'The future of construction procurement in the UK: a shift to service provision'. Proceedings of CIB W92 Symposium of Sustainability and Value through Construction Procurement, McDermott, P. and Khalfan, M.M.A (eds.) University of Salford, 29 November – 1 December, pp. 182-193. ISBN 1-905732-11-2

Gray, David E. (2009) 'Doing research in the real world', 2nd edition, Sage publications, London

Green, Chris (2020), "Sticking Together", in RICS Construction Journal, April/May 2020; RICS, London

Greenwood, David, & Wu, Shuwei (2012 'Establishing the association between collaborative working and construction project performance based on Client and contractor perceptions', Construction Management and Economics, Vol. 30:4, pp.299-308, DOI: 10.1080/01446193.2012.666801

Gribben M A (2011), 'Building Services – The Dark Art?', <http://gsgme.blogspot.co.uk/2011/06/building-services-dark-art.html>, last accessed 08/05/2016

Griffiths, Ron (2004) 'Knowledge production and the research-teaching nexus: the case of the built environment disciplines', Studies in Higher Education, 29:6, pp.709-726

Grix, Jonathan (2004) 'The Foundations of Research', Palgrave Macmillan, Basingstoke

H.M. Government (2013) 'Construction 2025 -Industrial Strategy: government and industry in partnership', H.M Government, London

Hamza N & Greenwood D (2007) 'The impact of procurement methods on delivering environmentally sensitive buildings', In: Boy D (Ed) Procs 23rd Annual ARCOM Conference, 3-5 September 2007, Belfast, UK, Association of Researchers in Construction Managements, 723 – 732. Downloaded from Northumbria Research Link: <http://nrl.northumbria.ac.uk/3154/>

Hasnain M. & Thaheem M.J. (2016) 'Best Value procurement in construction and its evolution in the 21st Century: A systematic Review', PBSRG 2016, cibw117.com/journal, accessed via www.researchgate.net/publication/305304622

Hayward, Simon (2021), "Use it or Lose it", EDGE – The journal of the Institute of leadership & Management, Spring 2021, p.46

Hébert, Cristyne (2015) 'Knowing and/or experiencing: a critical examination of the reflective models of John Dewey and Donald Schön', Reflective Practice, 16:3, p.p. 361-371

Hibberd, Peter (2019), "Alliancing with excellence", Building Magazine, 13th December 2019

Higham, A.P (2020), "Quantitative Research Methods", University of Salford, Collaborate lecture, accessed via <https://eu-lti.bbcollab.com/recording/4b5a0a07fdd7433c9fadd25169f9ec60> last accessed 19th June 2020

HKA Global Limited (2022), 'Battling the Headwinds : A regional analysis of claims and dispute causation', CRUX Insight, 5th Annual report, October 2022. <https://www.hka.com/crux-insight-fifth-edition-battling-the-headwinds/> Last accessed 2nd November 2022.

Hodgkinson, Gerald P. & Rousseau, Denise M. (2009), "Bridging the Rigour-Relevance Gap in Management Research: It's Already Happening", Journal of Management Studies, Vol. 46 Issue 3, pp.534-546, Blackwell Publishing, Oxford

Holti, R, Smalley, M, & Smith, K (2007) 'Advancing the integration of the supply chain in construction – the challenges for commercial practice. Final Evaluation report Findings from Action Research 2006', Constructing Excellence, London

Honor, Lt Col A.M.F. RE (2016) 'What would Captain Francis Fowke RE and Major-General Henry Darracott Scott RE think of the Corps' Current Construction Skills?', The Royal Engineers Journal, Vol. 130, no.1, August 2016, pp.37-41, ISSN 0035-8878, www.InstRE.org

Hope-Hailey, Veronica, Searle, Ros & Dietz, Graham (2012) 'Organisational effectiveness: How trust helps', People management, March 2012, peoplemanagement.co.uk

Hughes D, Williams T, & Ren Z (2012), 'Differing perspectives on collaboration in construction', Construction Innovation, Vol. 12, Iss. 3, pp.355-368, Emerald publishing Limited, DOI 10.1108/14714171211244613

Huxham, Chris, & Vangen, Siv (2000) 'Ambiguity, complexity and dynamics in the membership of collaboration', Human Relations, June 2000, Volume 53(6), pp.771-806

Ive G. & Chang C-Y. (2006) 'The Principle of inconsistent trinity in the selection of procurement systems', Construction Management and Economics, Vol. 25, pp.677-690, DOI: 10.1080/01446190601164089

Jayasuriya S., & Rameezdeen R. (2011) 'Is construction procurement method selection habitual?' The Pacific Association of Quantity Surveyors 15th annual congress. Colombo, Sri Lanka

Jelodar M. B., Yiu T.W., & Wilkinson, S (2016) 'A conceptualisation of relationship quality in construction procurement', International Journal of Project Management, issue 34, pp. 997-1011, Elsevier

Jiang, Zhizhong, Hennenberg, Stephan C & Naudé, Peter (2012) 'Supplier relationship management in the construction industry: the effects of trust and dependence', Journal of Business & Industrial Marketing, Vol.27 issue: 1, pp.3-15.

Jones, Elizabeth (2010) 'Enhancing professionalism through a professional practice portfolio', *Reflective Practice*, 11:5, pp.593-605

Kadefors, Anna (2003) 'Trust in project relationships – inside the black box', *International Journal of Project Management*, issue 22 (2004), pp. 175-182, Elsevier Ltd.

Khalfan Malik M.A., Peter McDermott, & Will Swan, (2007), "Building trust in construction projects", *Supply Chain Management: An International Journal*, Vol. 12 Issue: 6, pp.385-391, <https://doi.org/10.1108/13598540710826308>

Khalique, Farah (2021), "The Power of Many", *EDGE – The journal of the Institute of leadership & Management*, Spring 2021, p.28

Koskela, Lauri (2008), 'Which kind of Science is Construction Management', *Proceedings for the 16th Annual Conference of the International Group for Lean Construction Theory*

Kumaraswamy M.M. & Dissanayaka S.M. (2001) 'Developing a decision support system for building project procurement', *Building and Environment*, Vol.36, pp.337-349, Elsevier

Laan, Albertus, Noorderhaven, Niels, Voordijk, Hans & Dewulf, Geert (2010) 'Building Trust in construction partnering projects: An explanatory case-study', *Journal of Purchasing & Supply Management*, no. 17 (2011), pp.98-108, Elsevier Ltd

Lam K C, Gibb A G F & Sher W D (1997), 'An analysis of building procurement factors affecting coordination of building services'. In: Stephenson, P (Ed.), 13th Annual ARCOM conference, 15 – 17 September 1997, King's College, Cambridge. Association of Researchers in Construction Management, Vol. 1, pp. 83-92

Lam K C (article undated, accessed 2013), 'Management of Building Services procurement for highly serviced healthcare facilities', <http://www.cibse.org/pdfs/healthcare.pdf>, last accessed 02/08/2013

Latham, M (1994), 'Constructing the Team', London: HMSO

Lee, Nancy Jane (2009), 'Achieving your Professional Doctorate', Open University Press, Maidenhead, UK

Lencioni, P (2002) 'The five dysfunctions of a team: a leadership fable', Josey-Bass: San Francisco

Lester, Danielle (2020), "Building educational bridges", in RICS Construction Journal, April/May 2020; RICS, London

Levermore, Kirsten (2021), "Trust me, I'm a leader, EDGE – The journal of the Institute of leadership & Management, Spring 2021, p.42

Lewis, J. David, & Weigert, Andrew J. (2012) ,The Social Dynamics of Trust: Theoretical and Empirical research, 1985-2012', Social Forces Vol.91(1), pp.25-21, Oxford University Press

Lincoln, Y.S. & Guba, E.G. (2013). 'The Constructivist Credo' (1st ed.). Routledge. <https://doi.org/10.4324/9781315418810>

Love P.E.D., Edwards D.J., Irani Z., & Sharif A, (2012) 'Participatory Action Research Approach to Public Sector Procurement Selection', Journal of Construction Engineering and Management, Vol.138, No.3, March 1, 2012, ASCE, ISSN 0733—9364/2012/3-311-322

Luu D T, Ng T S, & Chen S E (2003), 'A case-based procurement advisory system for construction', Advances in Engineering Software, No. 34 (2003) pp. 429 - 438, Elsevier

Luu D T, Ng T S, & Chen S E (2003a), 'Parameters governing the selection of procurement system – an empirical survey', Engineering, Construction and Architectural Management, Vol.10, Iss.3, pp.209-218, DOI: 10.1108/09699980310478458

Maher, M (2022) 'Growing Economy & Employment | The Construction 2025 Progress Report', Maxim Recruitment, 17 May 2022,

<https://www.maximrecruitment.com/news/post/growing-economy-employment-the-construction-2025-progress-report/> , last accessed 24th October 2022

Mann, Pete & Clarke, Davina M (2007) 'Writing it down – writing it out – writing it up: researching our practice through action learning', *Action Learning: Research and Practice*, 4:2, pp.153-171

Marquardt, Michael & Waddill, Deborah (2004) 'The power of learning in action learning: a conceptual analysis of how the five schools of adult learning theories are incorporated within the practice of action learning', *Action Learning: Research and Practice*, 1:2, pp.185-202

Marsh C (2003) 'Building Services Procurement', Spon Press, London

Masterman J W E (2005), 'Introduction to Building Procurement Systems', 2nd edition, Spon Press, Taylor & Francis, London

Masters, Jon (2016) 'Everyone's talking about behaviour', <http://www.infrastructure-intelligence.com/article/nov-2016/everyones-talking-about-behaviour> , 18th November 2016.

McDermott, P, Khalfan, M, & Swan, W (2005) 'Trust in construction projects', *Journal of Financial Management of Property and Construction*, Vol.10 Issue:1, pp.19-32

McKay, Ian (undated) 'Building Services Design Dilemma' RIBA
<https://www.architecture.com/Files/RIBAProfessionalServices/Practice/Archive/BuildingServicesDesignDilemma.pdf> , last accessed 22/05/2016

McKinsey.com (2020) 'Collaborative contracting: Moving from pilot to scale-up',
<https://www.mckinsey.com/business-functions/operations/our-insights/collaborative-contracting-moving-from-pilot-to-scale-up#>, 17 January 2020

Meehan J. & Bryde D. (2010) 'Sustainable Procurement Practice', Business Strategy and the Environment, Issue 20, pp.94-106; DOI: 10.1002/bse.678

Meng, Xianhai (2011) 'The effect of relationship management on project performance in construction', International Journal of Project Management, Vol.30(2012), pp.188-198, Elsevier Ltd

Mentieth W., O'Carroll O., Curtis R., & Sawyers B. (2014) 'Public construction procurement trends 2009-2014', Project Compass CIC, accessed via www.researchgate.net/publication/289127090

Michie A (1981) 'Integration and co-ordination of building services and its relationship with project management', Building services Engineering Research and Technology, 2:15 - 26, The Chartered Institution of Building Services Engineers, SAGE, <http://bse.sagepub.com/content/2/1/15> , last accessed 10/08/16
Modus (December 2016), 'Source Code', page 33, RICS, London

Minshall, T (2009), 'What is knowledge transfer?', University of Cambridge, Centre for Technology Management in the IfM, published online in 2009, <https://www.cam.ac.uk/research/news/what-is-knowledge-transfer> , last accessed 24th October 2022

Morrisette, Amy M, & Kisamore, Jennifer L. (2020) 'Trust and performance in business teams: a meta analysis', Team Performance Management: an international journal, Vol.26, no. 5/6, pp.287-300, Emerald Publishing Ltd

Mosey D (2009), 'Early Contractor Involvement in Building Procurement: Contracts, Partnering and Project Management', Wiley-Blackwell, Chichester, UK

Mosey D (2016), 'Collaboration and partnering in Irish Construction Procurement' Keynote address, 15th October 2016, published by Conlab16 conference @ UCD Architecture, accessed via <https://www.youtube.com/watch?v=lwuzlDOmEk4> last accessed 14th July 2018

Mosey D (2021), 'Constructing the Gold Standard : An Independent Review of Public Sector Construction Frameworks', UK Cabinet Office

Mudi, A (2016) 'Quantity Surveyor's Role in Public-Private Partnership Highway Concession', International Journal of Engineering Research & Technology, Vol. 5, issue 2, pp.407-417

NEC User group (2017), NEC User Group Newsletter, March 2017

Nilsson, Magnus & Mattes, Jannika (2015) 'The spatiality of trust: Factors influencing the creation of trust and the role of face-to-face contacts', European Management journal, Vol.33 (2015), pp.230-244, Elsevier Ltd.

Nimkulrat, N, Niedderer, K & Evans M A (2015) 'On understanding expertise, connoisseurship, and experiential knowledge in Professional Practice', Journal of Research Practice, 11(2), Article E1

Ng, S.Thomas, Luu, Chris D.T., & Skitmore, Martin (2005), 'Capitalising experiential knowledge for guiding construction procurement selection', The Australian Journal of Construction Economics and Building, 5(1), pp.32-40

O'Leary, Z. (2020), 'The importance of research questions', Sage Campus guest blog dated 4th December 2020, <https://campus.sagepub.com/blog/the-importance-of-research-questions> , Last accessed 24th October 2022

Ofori G. (2012) 'New aspects of Quantity Surveying Practice', Construction Management and Economics, 30:12, pp.1103-1105, DOI: 10.1080/01446193.2012.723128

Olanrewaju A. & Anahve P.J. (2015) 'Duties and responsibilities of quantity surveyors in the procurement of building services engineering', Creative Construction Conference 2015 (CCC2015), pp.352-360, accessed via www.sciencedirect.com

Olanrewaju A., Anavhe P. J., Abdul Aziz A. R., Chen C. H., & Han W.S., (2016) 'Determinants of procurement strategy for construction works: quantity surveyors' perspectives', MATEC Wed of Conferences 66, 00093 (2016), IBCC 2016, DOI:10.1051/mateconf/20166600093

Orgnet (2017) 'Social Network Analysis: An Introduction', <http://www.orgnet.com/sna.html>, Last accessed 28/7/18

Osipova E., & Eriksson P.E. (2011) 'How procurement options influence risk management in construction projects', Construction Management and Economics, 29:11, pp.1149-1158, DOI:10.1080/01446193.2011.639379

Oxford English Dictionary (2017), Online access to define "collaboration", <https://en.oxforddictionaries.com/definition/collaboration>, last accessed 29/4/17

Oyegoke, Adekunle (2011) 'The constructive research approach in project management research', International Journal of Managing Projects in Business, Vol. 4 Iss. 4, pp. 573-595

Padmaja, V. (2019) 'Leading in a VUCA World – The World is changing', International Journal of Advance and Innovative Research, Vol. 6 Iss. 1, pp. 207-210

Paluri, Ratna Achuta, & Mishal, Aditi (2019) 'Trust and commitment in supply chain management: a systematic review of literature', Benchmarking: an international journal, Vol.27, No.10 2020, pp.2831-2862, Emerald Publishing Limited, DOI 10.1108/BIJ-11-2019-0517

Park, Julia (2017), 'Why design and build doesn't work', Building Design, 11 August 2017,

<https://www.bdonline.co.uk/opinion/why-design-and-build-doesnt-work/5089136.article> ,
last accessed 24th October 2022

Patrick, Keith, Rourke, Grahame, & Phillips, Nigel (2007) 'Issues of trust in Knowledge Management', VINE 121, pp.44-51, Emerald Publishing Group

Pedler, Mike & Trehan, Kiran (2008) 'Action Learning, organisational research and the 'wicked' problems', Action Learning: Research and Practice, 5:3, pp.203-205

Percy, Sally (2021), "Embrace the Brainstorm", EDGE – The journal of the Institute of leadership & Management, Spring 2021, p.5

Pesämaa O, Eriksson P E, & Hair J F (2009), 'Validating a model of cooperative procurement in the construction industry', International journal of Project Management, Iss 27 (2009), pp. 552-559, Elsevier

Philosophy basics (2018) 'The basics of philosophy – Epistemology', web-based article, https://www.philosophybasics.com/branch_epistemology.html, last accessed 11/03/18

Pinsent Masons (2016), 'Collaborative Construction: More myth than reality?', Pinsent Masons LLP, London

Pinsent Masons (2017), 'Collaborative Construction 2: "Now or Never?"', Pinsent Masons LLP, London

Pollitt D (2009), 'Training helps Rok and NG Bailey to save on procurement', Human Resource Management International Digest, Vol. 17 No.4 pp. 30-31, Emerald Group Publishing Limited

Pryke, Stephen (2012), 'Social Network Analysis in Construction', Wiley-Blackwell publishing, Chichester, UK, ISBN 978-1-1183-4391-3

QAA (2014) 'The Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies', The Quality Assurance Agency for Higher Education, Gloucester, UK.

Race, Glyn (2015) 'Roadmap to reliability, Construction journal, Feb/March 2015, pages 8-9, RICS, London

Rawlinson S (2017), 'Procurement update: Construction Management', Building magazine, 25th August 2017

Rawlinson S, Nugent B & Dedman A (2013), 'Procurement: Building Services', Building Magazine, <http://www.building.co.uk/data/procurement-building-services/3086544.article> last accessed 31/07/2013

Reddy, K.R.K., Kalpana, P. (2021) 'Impact of COVID-19 on Global Supply Chains and the Role of Digitalisation: A VUCA Approach'. In: Sakthivel, A.R., Kandasamy, J., Davim, J.P. (eds) Managing Supply Chain Risk and Disruptions: Post COVID-19. Management and Industrial Engineering, pp.125–137. Springer, Cham. https://doi-org.salford.idm.oclc.org/10.1007/978-3-030-72575-4_11

Reeve, Paul (2015) 'Yes, no, maybe', comment article, BUILDING magazine, 30/10/2015

Rowell, Steve (2015) 'NEC: delivering collaboration and best value on infrastructure megaprojects', NEC users' group newsletter, September 2015, www.neccontract.com

RICS (2013) 'Developing a construction procurement strategy and selecting an appropriate route', RICS guidance note, 1st edition, UK (GN 109/2013)

Roy, Carole & Eales Jacquie (2010) 'Masks & Mirrors: from autobiographical reflection to unmasking interdisciplinary collaboration', Reflective Practice, 11:4, pp.433-450

Sabatier, Marielena (2014) 'As a leader are you trustworthy? Building trust to transform team working', *Development and learning in Organisations*, Vol.28, no.5, pp.3-5, Emerald Publishing group, London.

San Miguel, C & Nelson, CD (2007), 'Key writing challenges of practice-based doctorates', *Journal of English for Academic Purposes* 6, pages 71-86, Elsevier

Saunders L.P. & Thornhill, A (2012), 'Research methods for business students', 6th edition, London, Pearson Publications

Saunders, Mark & Tosey, Paul (2012) 'The Layers of Research Design', *RAPPORT*, Winter 2012/2013, pp.58-59

Sexton, Martin & Lu, Shu-ling (2009) 'The challenges of creating actionable knowledge: an action research perspective', *Construction Management and Economics*, 01 July 2009, Vol.27(7), pp.683-694

Seymour, David & Rooke, John (1995) 'The Culture of the Industry and the Culture of Research', *Construction Management and Economics*, 13(6), pp.511-523

Schön, Donald A. (1983) 'The Reflective Practitioner – How Professionals Think in Action', Basic Books, Perseus Book Group. U.S.

Scottish Parliament (2019), The Economy, Energy and Fair Work Committee's 'Under Construction: Building the future of the sector in Scotland', The Scottish Parliament Corporate Body; 2 July 2019

Shelbourn, M.A., Bouchlaghem, D, Anumba, C & Carrillo, P. (2007) 'A framework for effective collaborative working in construction', *Management, Procurement and Law* 000, issue MP0, pp.1-9

Smith J. & Love Peter E.D. (2015) 'Changing Construction Procurement for the Millennium', accessed through Researchgate.net, <https://www.researchgate.net/publication/266217169> Last accessed 15/08/16

Smith J, Zheng B, Love P E D, & Edwards D J (2004), 'Procurement of construction facilities in Guangdong Province, China: factors influencing the choice of procurement method', *Facilities* Vol. 22, no. 5/6 pp. 141-148, Emerald, www.emeraldinsight.com/0263-2772.htm last accessed 19/10/13

Smith, Jonathan & Robinson, Simon (2021), "Altogether now", *EDGE – The journal of the Institute of leadership & Management*, Spring 2021, p.32

Smyth, Hedley, Gustafsson, Magnus, & Ganskau, Elena (2009) 'The value of trust in project business', *International Journal of Project Management*, Vol.28 (2010), pp.117-129, Elsevier Ltd

Staykova, G & Underwood, J (2017), 'Assessing Collaborative performance on construction projects through knowledge exchange: a UK Rail Strategic Alliance case study', accessed via USIR repository of the University of Salford; <http://usir.salford.ac.uk/40910/>

Strahorn S., Gajendran T., & Brewer G. (2015) 'The influence of trust and traditional contracting: Investigating the "lived experience" of stakeholders', *Construction Economics and Building*, 15(2), pp.81-101, accessed via www.researchgate.net/publication/279226411

Taleb, Nassim Nicholas (2007), "The Black Swan: The impact of the highly improbable", The Random House Publishing Group, USA; ISBN 978-0-141-03459-1

Tassabehji R & Moorhouse A (2008) 'The changing role of procurement: Developing professional effectiveness', *Journal of Purchasing & Supply Management* Iss. 14 (2008), pp. 55 – 68, Elsevier, www.sciencedirect.com

Taylor, Fergus (2020), 'Key failings and risks impacting construction', LinkedIn article, <https://www.linkedin.com/feed/update/urn:li:activity:6681481117767360512/>

last accessed 25/6/20

Thomas, Kenneth W. & Kilmann, Ralph H. (2015) 'An Overview of the Thomas-Kilmann Conflict Mode Instrument (TKI)',

<http://www.kilmanniagnostics.com/overview-thomas-kilmann-conflict-mode-instrument-tki> , last accessed 09/05/2016

Thomas, Kevin (2019), 'Modern Collaborative Working; The top 10 of what to do and how to do it. Number 8: Working with Cost (Price and Value)", Constructing Excellence, <https://constructingexcellence.org.uk/modern-collaborative-working-the-top-10-of-what-to-do-and-how-to-do-it-number-8-working-with-cost-price-and-value/>

last accessed 12th November 2019

Thompson, Neil & Pascal, Jan (2011) 'Reflective practice: an existentialist perspective', Reflective Practice, 12:1, pp.15-26

Tookey J E, Murray M, Hardcastle C, & Langford D (2001) 'Construction procurement routes: re-defining the contours of construction procurement', Engineering, Construction and Architectural Management, Vol. 8 Iss: 1, pp. 20 – 30, Blackwell Science Ltd

Tyler, Tom R (2003) 'Trust within organisations', Personnel Review, Vol.32 No.5, 2003, pp. 556-568, MCB UP Limited, DOI 10.1108/00483480310488333

University of Oxford (undated) 'Importance of your research Q', online resource, [https://www.studyhigher.ac.uk/our-partners/university-of-oxford/bqlq-1-2-importance-research-](https://www.studyhigher.ac.uk/our-partners/university-of-oxford/bqlq-1-2-importance-research-question/#:~:text=The%20research%20question%2C%20if%20correctly,time%2C%20energy%2C%20and%20effort.)

[question/#:~:text=The%20research%20question%2C%20if%20correctly,time%2C%20energy%2C%20and%20effort.](https://www.studyhigher.ac.uk/our-partners/university-of-oxford/bqlq-1-2-importance-research-question/#:~:text=The%20research%20question%2C%20if%20correctly,time%2C%20energy%2C%20and%20effort.) , last accessed 24th October 2022

Vaaland, Terje I. (2003) 'Improving collaboration start with the conflicts', International Journal of Project Management, Vol.22 (2004), pp.447-454, Elsevier Ltd

Vagle, Mark D. (2010) 'Re-framing Schön's call for phenomenology of practice: a post-intentional approach', *Reflective Practice*, 11:3, pp. 393-407

Vaughan-Smith, Kevin (2013), 'Harnessing the Strategic Power of Trust', *Strategic Direction*, Vol. 29, no.5, 2013,00.3-5, Emerald Publishing group, DOI 10.1108/02580541311316514

Vennström, A & Eriksson P E, (2010) 'Client perceived barriers to change of the construction process', *Construction Innovation*, Vol. 10 Iss: 2, pp.126 – 137

Vernikos, Vasileios (2015) 'Embracing innovation', *Construction journal*, Feb/March 2015, page 6, RICS, London

Vilasni N., Neitzert T. R, & Rotimi J.O. (2014) 'Correlation between Construction Procurement methods and lean principles', *International Journal of Construction Management*, Vol.11, No. 4, pp.65-78, DOI: 10.1080/15623599.2011.10773179

Wao, J. O. (2015) 'Predicting the future of Quantity Surveying profession in the Construction Industry', *Journal of Construction Project Management and Innovation*, Vol.5 (2): pp.1211-1223, ISSN 2223-7852

Watermeyer R.B. (2012) 'A framework for developing construction procurement strategy', *Proceedings of the Institution of Civil Engineers – Management, Procurement and Law*, 164(4):223-237

Watermeyer Ron (2012a) 'Changing the Construction Procurement Culture to improve project outcomes', Keynote Address at Joint CIB W070, W092 and TG72 International Conference on Facilities Management, Procurement Systems and Public Private Partnerships, Cape Town, 23rd -25th January 2012

Wates, James (2016), 'The Professionals', *Building Magazine*, online access, dated 27th January 2016, <http://www.building.co.uk/the-professionals/5079855.article> , last accessed 25/06/17

West, B (2016), "Getting more from the procurement process using NEC", NEC Users' group Newsletter, issue no. 79, July 2016, p. 2

Williams, John (2021), "Rethinking VUCA", EDGE – The journal of the Institute of leadership & Management, Summer 2021, p.15

Withers I (2014), 'Government 'will miss key 2016 BIM target'', Building magazine, online access <http://www.building.co.uk/news/government-will-miss-key-2016-bim-target%E2%80%99/5066460.article> , last accessed 11/08/16

Wood, Graham, McDermott, Peter, & Swan, Will (2002) 'The ethical benefits of trust-based partnering: the example of the construction industry', Business Ethics: A European Review, Vol.11 no.1, pp.4-13

Wordpress (2016) "Outer Layers", Web page, last accessed 25/11/16 <https://jl00282.wordpress.com/dissertation-part-1/mixed-methodology-2/research-onion/outer-layers/>

World Economic Forum (2016), "Shaping the Future of Construction; A Breakthrough in Mindset and Technology", in collaboration with The Boston Consulting Group.

Yin, Robert K. (1993). 'Applications of case study research', Applied Social Research methods series; vol. 34, Sage Publications, California

Yin, Robert K. (2003). 'Case study research: Design and Methods' 3rd Edition, Applied Social Research methods series; vol. 5, Sage Publications, California

Yusuf G A, Mohamed S F, Yusof Z M, & Misnan M S (2012), 'Framework for Enhancing Cost Management of Building Services', International Congress of Interdisciplinary Business and Social Science 2012, Procedia – Social and Behavioural Sciences nr. 65 (2012) pp. 697 – 703, Elsevier

Zhang, Lianying, & Fan, Weijie (2013) 'Improving performance of construction projects', Engineering, Construction and Architectural management, Vol. 20, iss. 2, pp.195-207, Emerald Insight

Zsolnai, Laszlo (2004), 'Honesty and Trust in Economic Relationships', Management Research News, Volume 27 Number 7, 2004, pp.57-61

Zuo J, Ness D, & Zillante G (2006), 'The Client's role in driving an appropriate project culture leading to innovative performance outcomes: In context of Australia and China, From Clients Driving Construction Innovation' – Moving Ideas into practice, Cooperative Research Centre for Construction innovation, Brisbane, Australia

APPENDIX A – PROCUREMENT ADVICE TO CLIENT BODY

Papers provided by the Researcher to Client regarding Projects considered;

- Alternative Procurement Approaches (Dated December 2017)
- Procurement Outline Approach (Dated February 2018)

Alternative Procurement Approaches

City of Edinburgh Council
3 new Primary Schools
Proposal

22nd December 2017



Proposal for potential alternative procurement approaches to introduce added value to forthcoming Primary School projects

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Executive Summary

The proposed alternative procurement approaches being discussed here-in are summarised as;

Option 1

Early selection of THREE Contractor's from the Major Framework through mini-competition based on QUALITY, followed by final selection based on Cost/Quality split tailored to the project specifics.

Option 2

Selection of a SINGLE Contractor from the Major Framework through mini-competition based on a specific set of criteria and on a Cost/Quality split, along with their ability to provide significant input to the project development and deliver value-add outcomes.

Both Options have potential benefits and risks and these are discussed further in the narrative for each.

However it is considered that adopting either of these options, at the appropriate juncture, can provide better value for money for the projects and wider *sustainable procurement* benefits.

It is recommended that these options are discussed by the appropriate personnel at the earliest opportunity, in order to maximise potential benefits.

Purpose / Basis

The Purpose of this paper is to discuss proposals for the potential adoption of alternative procurement strategies for three new Primary Schools currently in development. The three schools are;

- ❖ Broomhills Primary School
- ❖ Leith Victoria Primary School (also referred to as *Leith Western Harbour*)
- ❖ New South Edinburgh Primary School



The basis of this discussion is the school currently being delivered through the City of Edinburgh Council's (CEC) Major Framework, St John's Primary School, Duddingston Road, Portobello, the *current* benefits being realised from collaborative working practices between the Client team and the appointed Contractor (Graham Construction Limited), and the comments and thoughts of the team at an interim project review, held at the office of Currie & Brown on 6th December 2017.



It also takes cognisance of elements of Scottish Futures Trust's (SFT) "*Review of Scottish Public Sector Procurement in Construction – Guidance on Selecting a Procurement Strategy and a Form of Contract, Implementation of Recommendations 16,17 and 18*", dated 27 September 2017.

St John's Primary School – Model for improvement?

The replacement of St John's Primary School on Duddingston Road was part of CEC's development historically, and had been reviewed as potentially being delivered via HUB South-East (HUBSE). CEC having recently developed various Frameworks, for Professional Services and Construction, took the opportunity to potentially use their Major Construction Framework (+£5million in value) to procure the school.



The Consultant Team were also appointed from CEC's Frameworks.

The development of the design was carried out with reference to CEC's and SFT's published requirements, exemplar projects delivered through HUB, and the experience of the Designers on other Primary Schools.

The advice provided by the Project Team to CEC on procurement approach was influenced by various factors;

- Framework availability (as these were being finalised as the design progressed)
- The Client's input into the teaching environment requirements
- The Client's noted requirement to ensure close control of quality aspects of the design (with reference to the recently published Cole Report)
- The recent criticisms of procurement selection, where requirements had not been met
- The Programme complexities, including absorbing the demolition of the existing Portobello High School which was previously part of another project, as well delivering the required surrounding park.
- The requirement to meet SFT's benchmarks and requirements.

The considered advice was that the project should be procured by utilising the appropriate Frameworks (for both the demolition phase, and the main construction phase), as Work Package call-offs through mini-competition, on a TRADITIONAL basis.

This advice was taken, with the tenders being assessed based on a QUALITY/COST split of 60/40.



Graham Construction Limited (GCL) were the successful Contractor for the main construction contract.

Whilst the Contract was let as Traditional, it was clear from the outset that the existing relationships between GCL, the Client representative, and members of the Client Team, could be utilised in a collaborative sense to enhance delivery performance.

Currie & Brown (Project Managers) hosted a pre-engagement collaborative workshop in order to discuss risks and opportunities, set the ground rules for interaction and communication, and engender

the spirit of mutual trust and collaboration. There was also a design review meeting held at the offices of Holmes Miller (Architect), to set the communication standards for design information transferral, review the Contractor Design requirements, and have GCL present their thoughts on alternative specifications and the like.

Both the workshop and design meeting set the tone for the “whole-team” approach in advance of the official pre-start meeting and the start on site date.

As the construction works progressed issues naturally arose, but the team, under the leadership of Currie & Brown, have largely been able to communicate and collaborate on a professional basis to resolve these.

However, some significant issues surrounding design co-ordination, specification understanding, and potential alternatives, lead to the scheduling of a “mid-project review”, again held at the offices of Currie & Brown in December 2017.

Amongst the items discussed at this review, and a subsequent discussion within the Project Management Group (Currie & Brown and Doig + Smith) were a number of proposals for future procurement of similar projects.

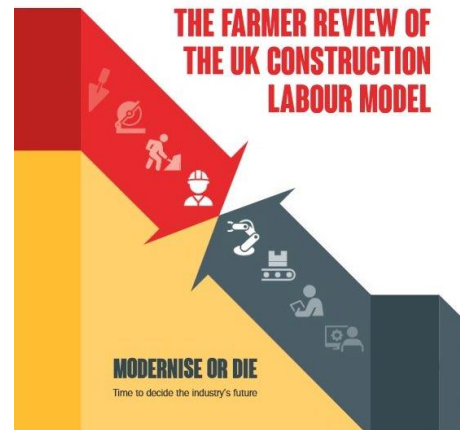
These were;

- Narrowing the field of Contractor selection based on Quality aspects, prior to tendering the Commercial aspects.
- Early engagement with selected Contractor, enabling;
 - design input,
 - alternative materials proposal
 - Programme review and discussion, and
 - selected Supply Chain liaison input; e.g. Building Services elements (high % of build cost)
- Potential 2-stage approach to be investigated
- Potential Direct Negotiation option to be investigated, on an open book basis.
- Adoption of a more NEC3 contract approach in order to engender further collaboration.
- Appropriate allocation of Risk

The project continues in a positive, collaborative, manner and the whole team remain hopeful of successful delivery. The team agree that, even though the Contract is Traditional, the collaborative working aspects used have assisted the delivery (to date) to be able to meet expectations, and have ensured relationships between all parties have been cordial as well as professional.

Potential alternative procurement approaches

It is not just the St John's PS team that consider that better integration of a "whole team" can provide advantages. The Construction industry has a history of reviews and reports on this very subject, dating back as far as 1964, with Sir Michael Latham's and Sir John Egan's reviews (1994 and 1998 respectively) being the most notable, but followed by a plethora of subsequent publications; governmental, industrial, and academic. Most recently, the 2016 **Farmer Review** also noted fragmentation and lack of integration as a key factor in delivery success. SFT recommend that "*procurement strategies under consideration should include the best practice integrated team option*".



It is not the case that current approaches to procurement are wholly inappropriate; the forming and execution of the Frameworks in place show a willingness to engage the construction supply chain in a more responsible and accessible manner. It is also the fact that a *traditional* approach to procurement and contract execution may be the correct way to engage a construction deliverer, but this is dependent on the definition of *value*, the requirements of programme and quality, and the appropriate allocation of risk.

There appears, however, a consensus throughout the industry that there are benefits to Clients in engaging appropriately with the supply chain, to seek their expertise and utilise their skills in not only delivering built assets, but also delivering better value.

On this basis the following procurement approaches are outlined for consideration for the procurement of the 3 new Primary Schools noted.

OPTION 1 - Select three (nominally) Main Contractors from Framework

Using the Major Framework short-listed Contractors, hold a mini-competition at an early stage on the basis of QUALITY only, to narrow the field to 3. The quality aspects should not be generic, but should be on the basis of;

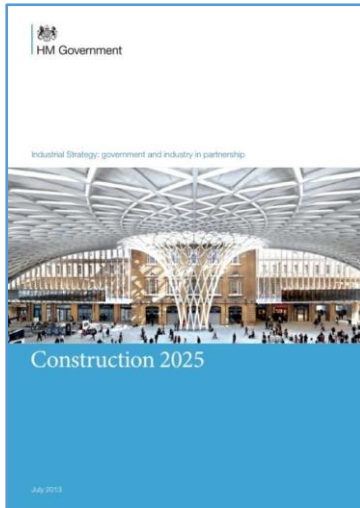
- Proven track record of early engagement with client teams on successful projects
- Capacity to deliver the project based on outline programme
- Ability to actively collaborate with client teams, leading when necessary
- Offering of advice on the design aspects, buildability, and the management of this
- Suitability and strength of key supply chain members (based on proportion and complexity of works, e.g. services) and the continued engagement of these in a “partnering” sense.
- Approach to continuous improvement, on the Framework and as a business unit
- Key personnel to deliver the collaboration and construction aspects (if known at this stage)

The 3 selected are then invited to further develop their bids based on Stage 2 information, being outline design from the engaged consultant team, outline delivery programme, and outline cost plan.

Their developed bids could be on the basis of;

- Project understanding,
- Key personnel to deliver the collaboration and construction aspects (if not known in initial stage), or evidence of their track record, capability, and *fit* to client ethos
- Potential innovation in design and delivery
- Logistics and programming approach
- Understanding of Risk and the appropriate allocation
- Commercial view (comments on outline costs, Fee for engagement, Costing of Programme related Preliminaries elements, and level of Overhead & Profit)
- Willingness to approach the commercial aspects on an “open-book” basis
- Evidence of ability to *Add Value* to a project
- Commitment to equalling or bettering the cost targets set at this stage

The selection process, whilst being open and auditable, should be tailored to ensure the most appropriate Contractor is chosen to deliver for the client, whilst also developing supply chain relationships and meeting the Client cost benchmark. The process would benefit from discussions with, or presentations by, the shortlisted Contractors, and would be best being assessed on a Cost/Quality split determined by CEC (say, 40/60).



This outlined process reflects key aspects of procurement approaches detailed and trialled in the UK Government's "*Industrial Strategy: government and industry in partnership: Construction 2025*", being *Cost Led Procurement* and *Two Stage Open Book*, also commented on by SFT and correlates to HUB models of procurement.

It also, should an individual project be successful and reviewed adequately, perpetuates longer term benefits within the Framework through continuous improvement, lessons learned, and performance review.

The consideration of this outlined approach should balance the benefits and risks inherent.

Potential Benefits

- Close alignment with the Client's key drivers and objectives
- Opportunities for developed design through innovation are enhanced due to expertise deployed
- Construction Programme more realistic and achievable due to collaborative authorship
- Exemplary collaborative Risk Management and allocation
- Likelihood of claims during the construction phase lessened due to the collaborative approach taken in the development phase
- Should engender clear commercial communication
- Provides significant input from the supply chain delivering the most cost sensitive works
- Develops Framework relationship and aims to provide continual improvement

Potential Risks

- Requires Strong and expert leadership, or the appointment of client representative to carry out role.
- Clarity of design responsibility can be diminished if not managed correctly
- Potential additional time and costs in the development phase, due to protracted discussions and Contractor's management and engagement fees
- Without clearly defined contractual relationships, disputes can be difficult to resolve expediently, and rather rely on the edicts of the collaborative approach to work through to resolution
- Diligence is required to manage the risks and assign them appropriately in the Construction Contract
- Initial cost plan requires expert benchmark information and commercial understanding in order to ensure appropriate value and in setting the client cost cap
- Potential lack of commerciality where significant work packages are negotiated with noted supply chain members, rather than where competitively tendered

OPTION 2 - Negotiation with individual selected Main Contractor from Framework



Using the Major Framework select a **SINGLE** Main Contractor on a similar basis to above to work with the client team in a similar manner. The timing of this selection should be chosen carefully to avoid engaging the Contractor when there is insufficient information for them to provide meaningful advice. The assessment for the selection would be best being assessed on a Cost/Quality split, weighting the Quality aspects higher, but determined by CEC (say, 40/60).

The selection criteria should be an amalgamation of the two elements noted above, and should encompass;

- Proven track record of early engagement with client teams on successful projects
- Capacity to work with Client team as the development programme dictates
- Key personnel to deliver the collaboration and construction aspects
- Potential innovation in design and delivery
- Evidence of understanding of logistics and programming approach
- Ability to actively collaborate with client teams, leading when necessary
- Offering of advice on the design aspects, buildability, and the management of this
- Suitability and strength of key supply chain members (based on proportion and complexity of works, e.g. services) and the continued engagement of these in a “partnering” sense.
- Understanding of Risk and the appropriate allocation
- Commercial position (maybe only OH&P at the earliest stage, but could also be based on the pricing of programme related Preliminaries elements) and their approach to an “open-book” ethos
- Evidence of ability to *Add Value* to a project
- Commitment to equalling or bettering the cost targets set at this stage

The consideration of this outlined approach should balance the benefits and risks inherent.

Potential Benefits

- Programme – if the overall Programme is challenging, having a Contractor engaged to develop the procurement and construction programme can provide reductions in overall delivery.
- Early engagement assists with the development as it progresses or at its outset
- Close alignment with the Client’s key drivers and objectives
- Opportunities for developed design through innovation are enhanced due to expertise deployed
- Construction Programme more realistic and achievable due to collaborative authorship
- Exemplary collaborative Risk management and allocation
- Likelihood of claims during the construction phase lessened due to the collaborative approach taken in the development phase
- Should engender clear commercial communication

- Provides significant input from the supply chain delivering the most cost sensitive works
- Develops Framework relationship and aims to provide continual improvement

Potential Risks

- Potential loss of commercial position by direct appointment and negotiation.
- Potential requirement to adopt a 2-stage procurement approach, which could further diminish the Client's commercial position.
- Requires Strong and expert leadership, or the appointment of client representative to carry out role.
- Clarity of design responsibility can be diminished if not managed correctly
- Potential additional time and costs in the development phase, due to protracted discussions and Contractor's management and engagement fees
- Without clearly defined contractual relationships, disputes can be difficult to resolve expediently, and rather rely on the edicts of the collaborative approach to work through to resolution
- Diligence is required to manage the risks and assign them appropriately in the Construction Contract
- Client's commercial control requires to be stringent and interrogation of Contractor's provided costs can be time consuming
- Potential lack of commerciality where significant work packages are negotiated with noted supply chain members, rather than where competitively tendered

Protecting the Client's position



Both approaches outlined utilise the existing Major Framework and due to this an element of *pre-selection* is already undertaken.

The bespoke selection criteria is important in making the correct assessment of the most appropriate Contractor to work with CEC in delivering these schools. To ensure this criteria maximises benefits, the entire project team should be involved in authoring the criteria and the manner of the marking. This should be ratified by CEC Procurement team.

Whilst both approaches outlined offer benefits, the risk that the approach chosen does not meet the Client's primary requirements should be guarded against by ensuring there is a *fall-back* position. This can be ensured by timely engagement in the process, and being very clear that should there be failure in meeting specific requirements (Cost related, Programme related, etc.) then the appointment of a Contractor would revert to a Traditional approach (as St John's PS). This would require the programme to be considered fully and have the key milestone dates clearly indicated for all parties involved.

Commercially, the Client is potentially exposed to the risk of higher costs and a lack of commerciality. This however can be protected by the stringent behaviour of their Cost Managers, the relationship between them and the Contractor's commercial team and robust cost benchmarking coupled with engagement with the wider construction market. The Client should also have an understanding that the *value for money* gained through the process is not necessarily monetary, and that *sustainable procurement* benefits can be gained through seeking value in the entire process.

Recommendation

It is recommended that these potential alternative procurement methods are discussed between the relevant parties within CEC and the currently appointed Project team.

The timing of this will be key as the 3 new Primary Schools are already at Stage 2, and delay in this discussion may preclude the use of, what may prove to be, better value procurement options.

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Procurement Outline Approach

City of Edinburgh Council
3 new Primary Schools

February 2018



OUTLINE OF PROCUREMENT APPROACH FOR 3 NEW PRIMARY SCHOOLS

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Executive Summary

Following the general acceptance of the *proposed alternative procurement approach* for the three new Primary Schools currently being considered by City of Edinburgh Council (CEC), this advisory guide outlines the approach (with potential alternatives within the outline) to be undertaken. Due to it being applied to the three schools no “dates” are described. The guide does however include outline programmes (provided in collaboration with Currie & Brown Project Managers) as an appendix. The initial alternative approach was outlined to CEC in December 2017 following lessons learned from SJPS, and previous experiences for other clients.

The Three schools are:

- ❖ Broomhills Primary School
- ❖ New South Edinburgh Primary School
- ❖ Leith Victoria Primary School

The procurement approach deals with each of the schools as separate projects.

Doig+Smith (D+S) and Currie & Brown (C&B) have collaborated to review the alternative options previously proposed, adapt these to a workable solution, and have super-imposed the timeline required to deliver the solution to programme. The approach taken aligns with the Gateway requirements, CEC approval dates, and affords the opportunity to revert to the Framework for a *more traditional* approach taken for the procurement of St John’s Primary School (SJPS), should the requirements of the new solution not be met by a key date.

OUTLINE APPROACH

- ❖ Invite all Major Framework Contractors **OR** narrow the selection based on Quality aspects
- ❖ 1st Stage Tender – Based on Quality and Cost, to engage a single Framework Contractor to work with the Project Team to develop the design, programme, supply chain (engagement with significant Sub-Contractors, i.e Building Services), logistics, and costs to a 2nd Stage threshold.
- ❖ 2nd Stage Tender – Contractor engaged on the basis of the developments of the 1st Stage, meeting the threshold deadline items (nominally, 70% cost certainty, Package Procurement (significant packages), programme fixity, logistics planning
- ❖ Alternative – if threshold deadline not met, revert to Traditional approach from Framework

Note: More detailed narrative on the outlined approach, including rationale, advantages and disadvantages, can be found in D+S proposal to CEC “Alternative Procurement Approaches: 3 new Primary Schools”, dated 22nd December 2017

1.0 Pre-Procurement

1.1 Initially, a number of considerations must be reviewed in order to ensure that the approach to be taken is agreeable to all relevant parties.

These considerations are;

Party	Consideration	Current position
CEC Delivery Team	That the proposed procurement route is acceptable within their governance requirements, including any requirements of reporting to SFT.	Agreement in principle
Project Management Group (PMG)*	That the procurement model is deliverable and can be managed appropriately	Agreement in principle
Project Design Team members	That the proposed procurement route may have an impact on the order of the design delivery and that this in turn is achievable.	To be reviewed with Design Team members
Major Framework Supply Chain	CEC Procurement team to approach the Framework Contractors in regards the outlined approach to gauge the appetite from the supply chain	To be undertaken by CEC **

* The PMG consists of CEC PM, C&B PM team, D+S QS, and Holmes Miller Principal.

** CEC may wish the PMG to undertake this action

The wider delivery team should be assured that these considerations are fully executed prior to embarking on the outlined procurement approach fully.

This is the first **decision point**; if not fully assured then the procurement should revert to the traditional approach (as taken on SJPS) from the Framework call-off procedure.

1.2 Following execution of considerations above a further decision should be made by CEC Procurement. Should the Major Framework Contractors be engaged in either of the following ways:

- ❖ Invite all 6 Major Framework Contractors to take part in the Stage 1 Tender process (notwithstanding any *management* implications from the over-arching Framework precluding involvement) (1.2.1)
- ❖ Narrow the invitation list from the Framework to nominally 3 Contractors to take part in the Stage 1 Tender, based on specific quality criteria (1.2.2)

The quality criteria, if narrowing the invitation list (1.2.2), should be project specific, and be drafted to best reflect the project and procurement requirements. The engagement with the Framework Contractors should be on a formal basis and the criteria for response could include;

- ❖ Key experience on delivering Primary School projects.
- ❖ Proven track record of early engagement with client teams on successful projects
- ❖ Ability to actively collaborate with client teams, leading when necessary
- ❖ Offering of advice on the design aspects, buildability, and the management of this
- ❖ Suitability and strength of key supply chain members generally, and how they manage these relationships
- ❖ Approach to continuous improvement, on the Framework and as a business unit

The scoring of the chosen criteria should be outlined to the Contractors and the appropriate members of the CEC and Project team should undertake the assessment.

The outcome of this process is the second **decision point**; the outcome should be communicated to all Framework Contractors (LOT specific). If necessary, a *period of reflection* could be introduced to deal with prospective challenge from those Contractors who do not move forward in the procurement process.

2.0 1st Stage Tender

2.1 The (selected) Framework Contractors are then invited to provide a response to the 1st Stage of a 2 Stage Tender.

The outline of the entire process is issued as part of this 1st Stage Tender to enable the Contractors to have clear site of the requirements and expectations, including the *deadline* requirements noted for the 2nd Stage (refer to section 3.0).

2.2 The 1st Stage assessment is to be based on a (recommended) split of Quality (80%) and Cost (20%). The recommended split is based on the degree of cost certainty that can feasibly be attained at this stage based on the information able to be provided.

2.2.1 Quality

The Quality aspects are key to ensuring the project procures the most suitable Contractor from the Framework and to ensure this the Quality questions should be well structured and fully thought out. The CEC and Project team should author these questions in collaboration to ensure all requirements are included.

The questions should develop and add to the initial quality questions, if used in narrowing the field. These questions should be based on the required outcomes of the procurement model, which include;

- ❖ Proven track record of early engagement with client teams on successful projects
- ❖ Capacity to deliver the project based on outline programme provided
- ❖ Innovation in Design and Delivery
- ❖ Ability to actively collaborate with client teams, leading when necessary
- ❖ Offering of advice on the design aspects, buildability, and the management of this
- ❖ Evidence of ability to Add Value to a project
- ❖ Evidence of understanding of logistics and programming approach
- ❖ Understanding of Risk and the appropriate allocation
- ❖ Suitability and strength of key supply chain members (based on proportion and complexity of works, e.g. services) and the continued engagement of these in a “partnering” sense. This should include a list of preferred supply chain.
- ❖ Approach to continuous improvement, on the Framework and as a business unit
- ❖ Key personnel to deliver the collaboration and construction aspects (if known at this stage)

It is *highly recommended* that the opportunity of carrying out interviews with the prospective Contractors is utilised. The interview attendees from the Contractor’s team should be specially selected (and detailed in the Tender documentation), and should reflect the delivery team for both the pre-contract engagement and the construction delivery. Ideally there should be continuity from the team members (both from the Project team and the Contractor team)

This enables the Team to ask questions of the Contractor's proposed team members on a face-to-face basis, and ensures the potential *relationships* going forward can be tested at an early stage. The best outcomes of collaborative and early engagement in procuring complex construction projects are dependent on the relationships between team members.

The interview could be used to temper the Quality panel's scoring of the quality aspects. As such, the panel should be chosen carefully to carry out the entire quality scoring, and might be suitable to be the members of the current PMG along with selected specific members of the wider project team (e.g. Building Services Designers, to interact with significant members of the Contractor's supply chain).

2.2.2 Cost

The Cost aspects are somewhat more difficult to fix at this stage, but must be well thought out and be assessable with clarity and auditability. They should also be assessed independently of the Quality aspects.

The cost analysis is likely to be based on the following criteria;

- ❖ Preliminaries costs for both the Pre-construction engagement activities (cost of specific personnel to work with the Project Team, requirements being defined within the tender documentation) and the Construction period. The Preliminaries could be based on the issue of an outline Cost Plan (reflective of the design issued at 1st Stage Tender).
- ❖ The level of Overheads and Profit, capped from the Framework.
- ❖ The comparative pricing of a schedule of rates (items likely to be found in the finalised design) provided in the 1st Stage tender). The pricing of which should be projected to mid-point of the construction period. The Contractors would be advised that these rates would be referred to in the later stages, should they be successful.
- ❖ Commitment to equalling or bettering the cost targets set at this stage

The scoring and weighting of each of these criteria would be agreed within the PMG prior to 1st Stage tender issue, so that the Contractors are clear on the scoring regime.

2.3 Tender Review and Analysis

Notwithstanding the approach outlined above, the scoring aspects should be ratified with **CEC Procurement team** prior to 1st Stage Tender, and their guidance and direction will be required to carry out the tender review and reach a consensus on selected Contractor.

The outcome should be agreed between all the assessment panel members before appointment of the selected Contractor is actioned.

Doig+Smith would carry out the analysis of the Cost aspects, but this would be kept entirely separate from any D+S employee involved in scoring the Quality aspects. This ensures no degree of bias (based on cost levels) is introduced. CEC Procurement should also ensure that there is no instance of exposure to the cost information for any of the Quality assessment panel prior to the conclusion of their scoring.

The outcome of the Tender Review and Analysis is the decision to appoint the successful Contractor on the 1st Stage basis. This is the third **decision point**. CEC will need to decide, prior to issuing 1st Stage tender, on the manner of the contractual relationship they wish to engage the successful Contractor under. For the collaborative engagement period of the 1st Stage this might be on the basis of **Professional Services Contract** or through the **Framework Package Call Off** (as part of the potential full engagement).

In whichever case, there will need to be a contractual relationship introduced to ensure that both CEC and the Contractor has *security of appointment* for this period, up until the programmed threshold deadline and based on the resource costs from the 1st Stage Tender.

2.4 “Bundling” of the Projects

A questions has been raised previously regarding offering the three Schools as a single “bundled” procurement approach. Whilst there may be benefits in doing this (cross project innovation, resource efficiencies, etc.), there may also be issues of application of resource and the like when relying on a single Contractor to deliver all aspects of the three projects.

The approach outlined has considered this aspect, and it is believed that keeping the three projects separate will be the better value option at this time. The over-arching PMG team are able to ensure any innovations or benefits are able to be cross-pollinated between projects.

However, the three separate procurements may recommend the same Contractor for the three projects. This has to be considered by the CEC team. It is intended to include a narrative within the tender documents to gain a *cost position* from the Tendering Contractors in the instance that they are successful on *two or more* of the Tenders.

<<<<<< CEC Procurement to advise the appointment requirements above >>>>>>

3.0 2nd Stage Collaborative Engagement

3.1 Outline Engagement requirements

The manner of engagement required will have been outlined within the 1st Stage Tender documentation, and the personnel required along with the time allocated forms the initial appointment detailed. This will also detail the expectations of the outcomes from the 2nd Stage, including the deadline threshold.

- ❖ Construction Programme agreed for the delivery stage, indicating key dates as required
- ❖ Significant Sub-Contractors *procured* (in principle) along with their contributions to the collaborative approach
- ❖ Stage 4 design finalised (able to be issued to Tender on a Traditional basis) following the Contractor's *valid and valuable* inclusion within the Design Team
- ❖ Significantly complete logistics plan for the delivery stage including aspects of site establishment, H&S plan, and consideration of the local community requirements
- ❖ “70%” cost certainty (refer to **note** below) – working with D+S to inform the Stage 4 Cost plan. This may mean that the Stage 4 Cost Plan is provided in a dual format; both in the current format, and in a Package procurement format. The Contractor's Commercial Team and D+S will use the 1st Stage to define the best approach
- ❖ Contract terms agreed; may include a degree of PAIN/GAIN share of the agreed Programme and/or the remaining 30% of costs (**TBC**)

Note: if **70% cost certainty** is unacceptable, this level could be set higher. If CEC require 100% cost certainty as their threshold the requirements would need to be built into the programme, along with a review of the design requirements and the approvals process.

If these requirements are not met to a significant and appropriate level, the 2nd Stage cannot conclude, and the process will revert to a Traditional tender approach from the Framework. The Project Programme has been authored to ensure that this process aligns with the overall programme requirements. The selected Contractor is still able to be involved in the Traditional Tender, arguably at an advantage due to their involvement in the collaborative engagement.

It is anticipated that the collaborative engagement will provide the outcomes required as long as the approach is structured and rigorous. It will require active management from all parties involved.

3.2 Technical requirements of engagement

Ideally the fuller team would work in a co-located manner, as this has proven benefits for collaborative approaches such as this, but this is unachievable due to the parties involved. Therefore, the programme and locations of meetings should be scheduled and agreed for the duration of the 2nd Stage engagement period. The PMG should arrange this in discussion with the

successful Contractor, but for the purposes of the 1st Stage Tender it should be clarified that this will be in a location in Edinburgh (potentially Waverley Court or the office of C&B, TBC).

The schedule of meetings would then inform the resource requirements expected from the Contractor (i.e. *Expected Personnel * number of weeks * number of hours involved in engagement*) for inclusion within the 1st Stage Tender.

The initial meeting would require an element of *collaborative ice-breaking* (similar to the kick-off meeting held by C&B at the commencement of SJPS) but should also set the scene for the collaborative engagement; *the who, the how, the when, and the why*.

Initial consideration of Contractor personnel requirements has been undertaken and the following is currently proposed to be included in the 1st Stage Tender requirements as an outline for the 2nd Stage engagement;

7 week period to “Stage 3 Design”

- Contractor’s Project Manager – 1 day per week
- Contractor’s Design Manager – 1 day per week

Remainder of the period to “Stage 4” or Threshold Deadline

First 8 weeks, concentrated Design/Programme engagement

- Contractor’s Project Manager – 1 day per week
- Contractor’s Design Manager – 1.5 days per week
- Contractor’s Commercial Manager – 1 day per week
- Key Supply chain members (i.e. Building Services) – 1 day per week

Remaining period, Procurement/Commercial focus

- Contractor’s Project Manager – 1 day per week
- Contractor’s Design Manager – 0.5 days per week
- Contractor’s Commercial Manager – 1 day per week
- Key Supply chain members (i.e. Building Services) – 0.5 days per week

The 1st Stage Tender will also include a Schedule or Rates for the personnel above so that, should it be required, additional resource can be engaged on an agreed basis.

It is worth re-iterating that the resource deployed during the engagement period by the Contractor is subject to payment whatever the outcome at the Threshold Deadline. Their input and contribution should be acknowledged, and the technical output of this should be defined as belonging thereafter to CEC, including Intellectual Property Rights. The Contractor should be made aware of this within the narrative description within the 1st Stage Tender documentation.

3.3 Successful achievement of the Thresholds

It should be emphasised that successful delivery within this procurement model may require additional effort from all parties to ensure that the most effective benefits of collaboration are gained. But this should be seen in the context of the wider delivery landscape. This collaborative approach is seen as key factor in delivering success, supported by SFT's recommendation that "*procurement strategies under consideration should include the best practice integrated team option*". Success in this programme of school delivery may lead to similar approaches being considered in future procurements.

So, if appropriate effort is deployed by all parties and the threshold requirements are met, this should be considered as a successful milestone.

The Stage 4 report can be authored, presented for approval, and the next stage of delivery be considered. CEC approval at this stage is required (the fourth **decision point**) to then appoint the Contractor for the Construction stage.

The Contract documents are drawn together for finalised agreement and anticipated execution. This will include finalising the remaining **30%** of the costs (if **70%** remains the Threshold requirements), including any PAIN/GAIN considerations, so that when the Contract is executed there is 100% cost and programme agreement (as it would be under the Traditional approach) when Stage 5 (Construction) commences. Should the Threshold for cost certainty be 100% this element will not be required at this stage.

In parallel, the period between Stage 4 approval and Start on Site can be utilised fully for Contractor's mobilisation considerations and the logistic and procurement activities. This approach may mean that potential benefits within the programme that were *visualised* within the collaborative engagement period are realised fully.

3.4 Failure to achieve the Thresholds

If there is failure to meet *any* of the thresholds the Client team should carry out a review of the position to ascertain if there is still value in progressing with the approach following adjustment to the requirements – this however, should not be at *any cost*.

Should there be no way to progress, reverting to a Traditional Tender on the basis of a Work Package call off from the Framework (as SJPS) should be the position taken. The additional input from the Contractor will be incorporated into the Tender documentation, and should afford a better value outcome from the procurement in this way than if it had not been undertaken. The Stage 4 report would be authored at this point on this basis.

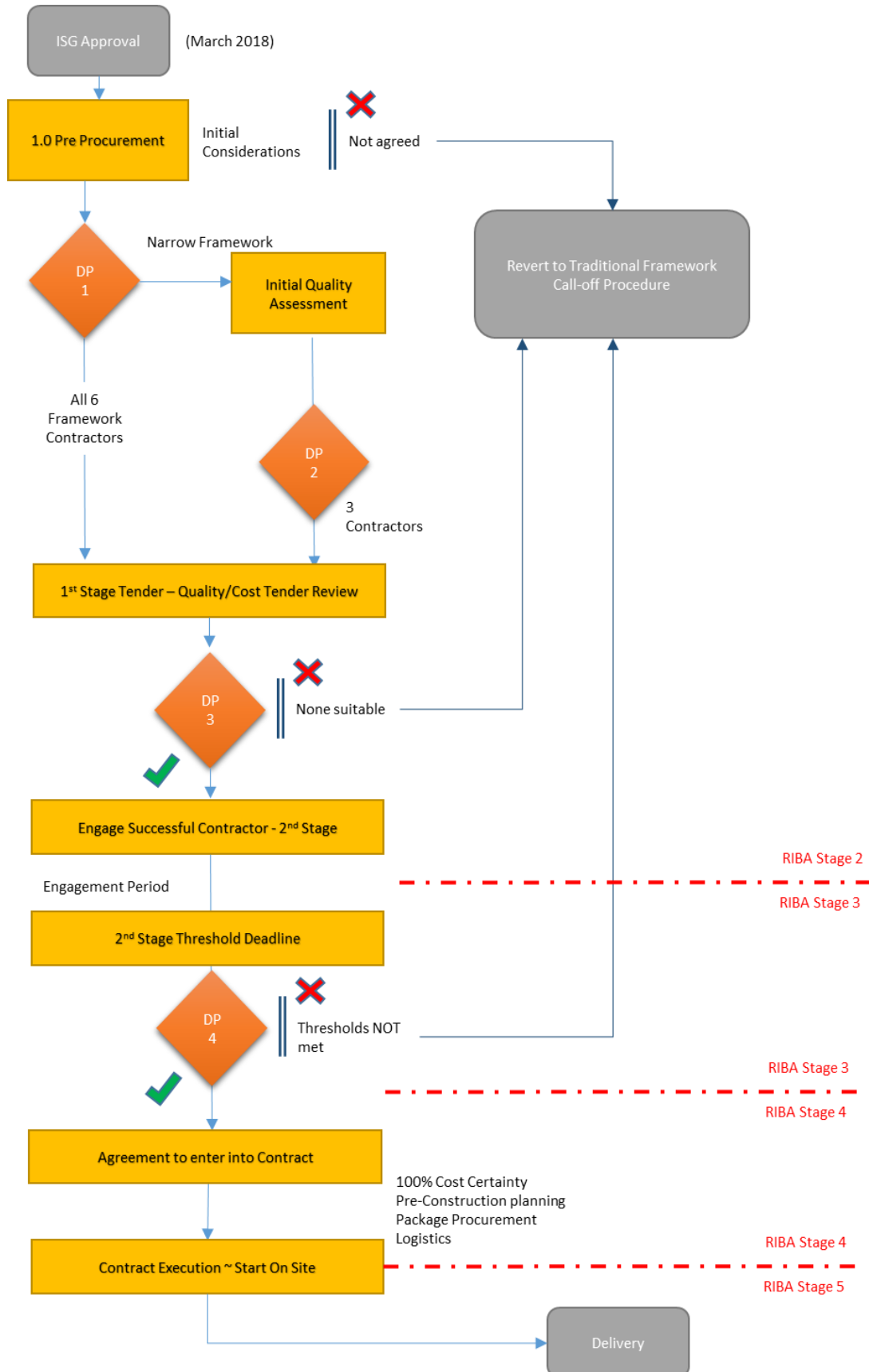
This approach safeguards CEC from potential poor performance from the selected Contractor in the 2nd Stage element, and mitigates a degree of risk which could be detrimental to the project outcomes.

3.5 **Lessons learned**

It is essential that, whatever the outcome of the procurement stage, a formal lessons learned process is undertaken for each of the projects. It may be that there are differing outcomes from each of the three school projects, or that they all progress on the basis outlined above. If there are programme differences realised and the decision points do not coincide, it may be that timely lessons learned sessions can inform the following projects. This should be considered fully when adjustments to delivery programmes are being reviewed.

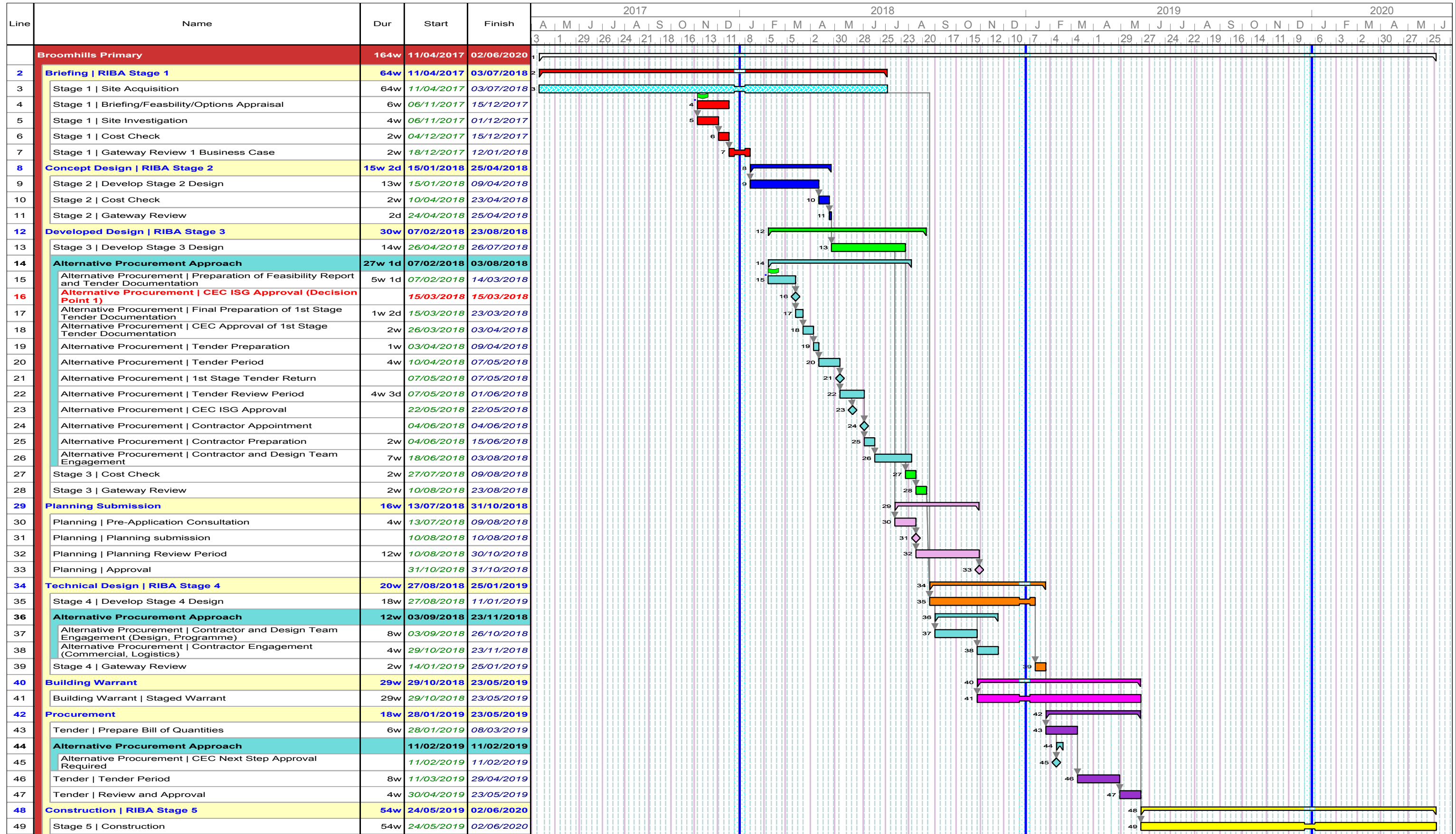
4.0 Guidance Flow Chart

4.1 Outline Guidance Flow Chart (DP = Decision Point)

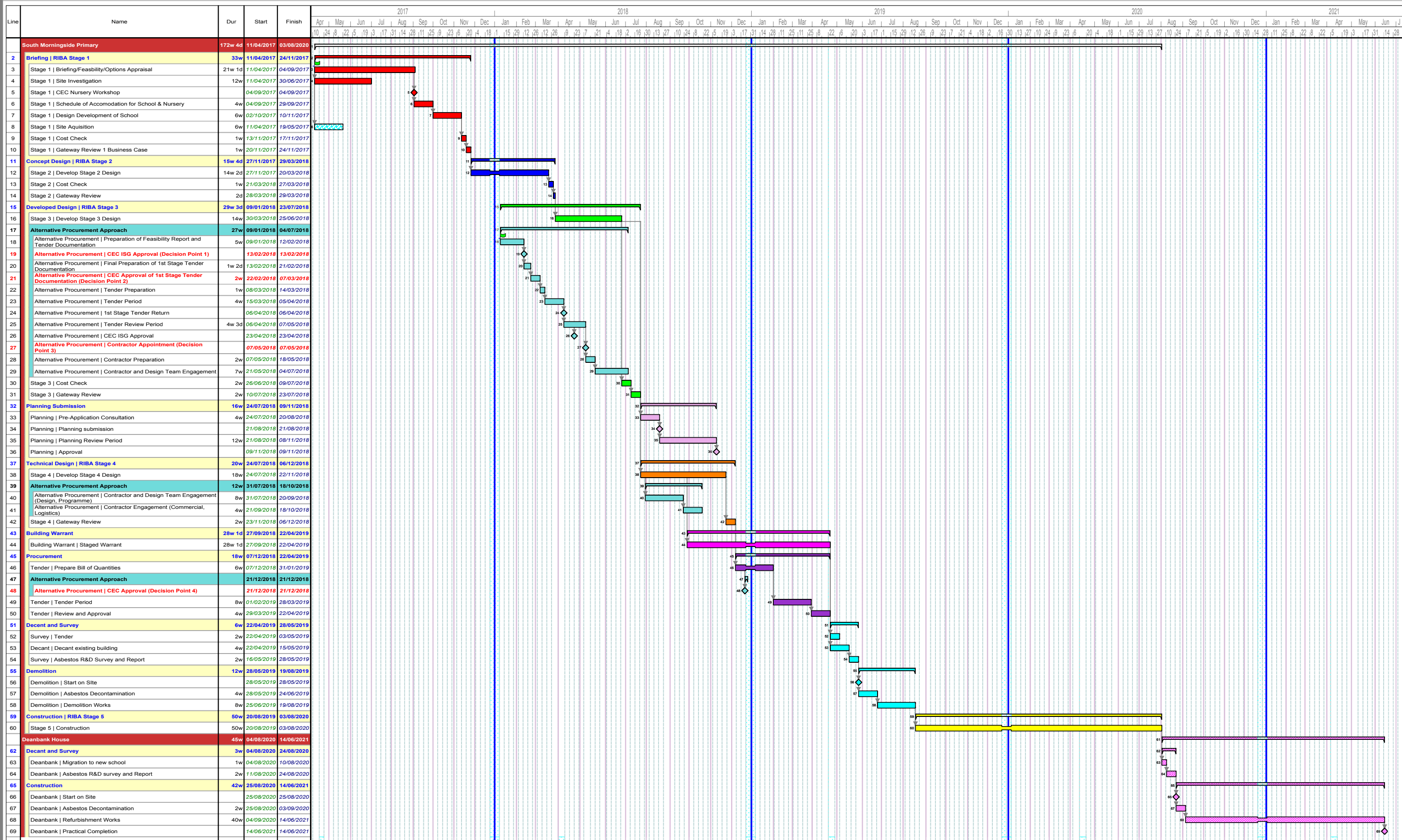


5.0 Project Programmes (Current position)

5.1 The Three Project Programmes, as currently drafted. Provided by Currie & Brown.

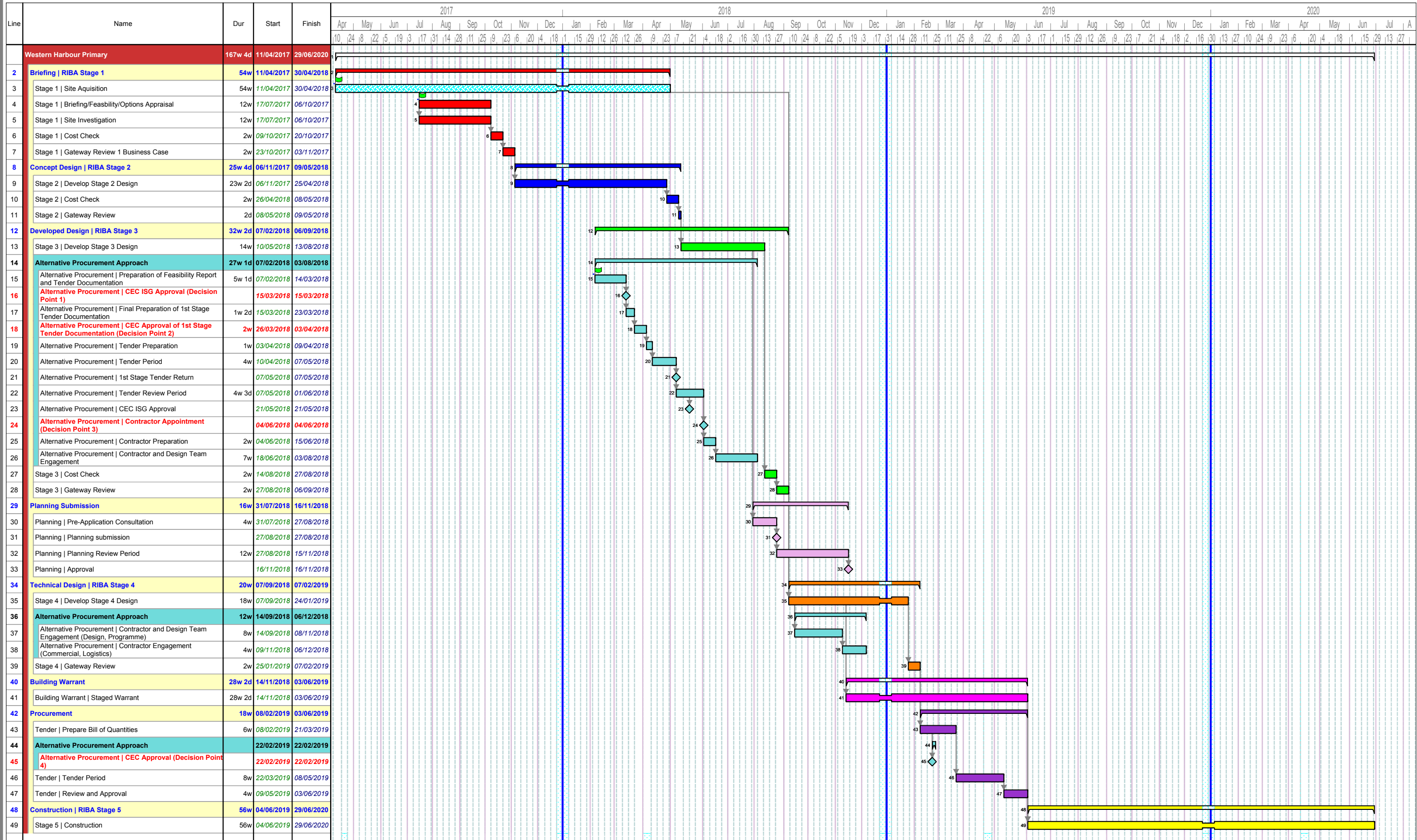


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Strategic Summary Stage 1 - Briefing Stage 2 - Concept Design Stage 3 - Developed Design Alternative Procurement Planning Consent Stage 4 - Technical Design Tender Construction Site Acquisition Building Warrant Enabling Works DeanbankHouse

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Strategic
█ Summary █ Stage 1 - Briefing █ Stage 2 - Concept Design █ Stage 3 - Developed Design █ Alternative Procurement █ Planning Consent █ Stage 4 - Technical Design █ Tender █ Construction █ Site Aquisition █ Building Warrant

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APPENDIX B – COMPARISON OF FACTORS OF COLLABORATION TO ANTECEDENTS AND CONSEQUENCES OF TRUST

Paluri & Mishal (2019) 'Antecedents of Trust'	Hughes et al (2012) Aspect of collaboration (in ranked order)	Paluri & Mishal (2019) "Consequences of Trust"
Communication Information Sharing Information Quality (Quality of information) Perceived conflict Shared Values	<i>An environment of open dialogue exists between all parties</i>	Collaboration Cooperation Customer involvement Functionality of conflict Information quality Information sharing Joint decision making (and sense-making)
Benevolence Joint relationship effort Perceived satisfaction Planning Satisfaction Shared Values	<i>A common aim is shared by all contributors to the project</i>	Collaboration Commitment Integration Satisfaction Shared vision
Accommodating conflict handling Compromising conflict handling Integrating conflict handling Perceived conflict Perceived Contract Breach Timeliness	<i>Early warning systems for any problems are integral to the project</i>	Collaboration Contract flexibility Cooperation Coordination Functionality of conflict Support for change
Dedicated investment Joint relationship effort Participation Power Reliability PAS - Investments in physical or human assets	<i>All team members contribute to the project</i>	Affective Commitment Calculative commitment Collaboration Commitment Customer involvement Exchange performance Joint decision making (and sense-making)
Benevolence Confidentiality Integrity Power Shared Values	<i>An environment of mutual trust exist between all parties</i>	Affective Commitment Calculative commitment Collaboration Commitment Contract flexibility Customer involvement Functionality of conflict Integration, Integration of suppliers
Cooperation Information availability Information Sharing Perceived conflict Reliability	<i>Collaboration creates a problem-solving environment</i>	Collaboration Cooperation Coordination Exchange performance Functionality of conflict Information quality Information sharing Innovativeness Joint decision making (and sense-making) Support for change

Competence Joint relationship effort Partners' reputation Power Reliability	<i>Everyone understands the other team members roles and responsibilities</i>	Collaboration Cooperation Operational efficiency Vertical control
Cooperation Integrity Joint relationship effort Participation Reliability Shared Values	<i>Team spirit exists between all personnel involved in the project</i>	Collaboration Customer involvement Integration Integration of suppliers Shared vision Willingness to invest
Contract Joint relationship effort Perceived conflict Shared Values	<i>The contract supports collaboration</i>	Collaboration Contract flexibility Integration Integration of suppliers
Confidentiality Information availability Information Sharing Information Quality (Quality of information) Learning capacity	<i>Collaborative projects encourage more effective information sharing</i>	Collaboration Coordination Exchange performance Information quality Information sharing Innovativeness Operational efficiency Relational outcomes, stability, commitment, quality
Joint relationship effort Opportunistic behaviour Perceived conflict Planning	<i>Risks are allocated fairly to the parties</i>	Collaboration Customer involvement Risk-taking ability
Cooperation Information availability Information Sharing Participation	<i>There are regular meetings between the various parties (Client and supply chain)</i>	Collaboration Cooperation Coordination Customer involvement Exchange performance Information quality Information sharing
Cooperation Integrity Perceived conflict Power	<i>The project operates in a non-adversarial environment</i>	Acquiescence Collaboration Cooperation Functionality of conflict Operational efficiency
Behavioural uncertainty Benevolence Joint relationship effort Planning Reliability Shared Values	<i>Relationships between the parties are managed</i>	Affective Commitment Behavioural uncertainty Calculative commitment Collaboration Cooperation Coordination Customer involvement Integration, Integration of suppliers
Benevolence Integrity Justice Perceived satisfaction Transaction-specific investment Satisfaction	<i>The pain share gain share mechanism is fair to both the Client and the contractors</i>	Collaboration Transaction costs Contract flexibility Satisfaction Transaction-specific investment Willingness to invest

<p>Information Quality (Quality of information) Participation Perceived conflict Power Shared Values</p>	<p><i>Everyone respects the input of the other team members</i></p>	<p>Collaboration Cooperation Information quality Information sharing Innovativeness Performance Vertical control</p>
<p>Dependence on customers and suppliers Supply chain planning Timeliness</p>	<p><i>There is early involvement of key members of the supply chain</i></p>	<p>Collaboration Contract flexibility Cooperation Innovativeness Integration, Integration of suppliers</p>
<p>Bargaining power Customisation Justice Perceived conflict Satisfaction</p>	<p><i>Collaboration produces a win/win outcome</i></p>	<p>Acquiescence Collaboration Cooperation Transaction costs Exchange performance Operational efficiency Relational outcomes, stability, commitment, quality Satisfaction</p>
<p>Duration of relationship Partners' reputation Perceived ability Perceived satisfaction Satisfaction</p>	<p><i>Collaboration promotes long term relationships</i></p>	<p>Collaboration Customer involvement Performance Propensity to leave Relational outcomes, stability, commitment, quality Satisfaction Strategic flexibility Willingness to invest</p>
<p>Integrity Opportunistic behaviour PAS - Investments in physical or human assets Perceived satisfaction Transaction-specific investment Satisfaction</p>	<p><i>The Client and supply chain should achieve a reasonable profit margin</i></p>	<p>Collaboration Transaction costs Contract flexibility Customer involvement Performance Relational outcomes, stability, commitment, quality Satisfaction Transaction-specific investment Willingness to invest</p>

Table B.1 : Comparison of Factors of collaboration to antecedents and consequences of trust

APPENDIX C – DIRECT QUOTATIONS FROM CASE STUDY INTERVIEWS

Case Study 0 - SJPS	Additional comments
<p>1. Trust and project delivery</p> <p>Q1.1 - In general, what is your view on trust and the role it plays in project delivery?</p>	<p><i>“it’s essential in any relational engagement; both trust in team as a whole, as a collective and trust that individual members can do their jobs.”</i></p> <p><i>“it makes a lot of processes more streamlined, issues can be resolved quicker because people are a bit more willing to tell the truth”</i></p> <p><i>“I think it’s crucial. I don’t think we see enough of it.”</i></p> <p><i>“It is a team effort and if you’ve not got trust then straight away you’ve got an issue”</i></p> <p><i>“we need to be able to trust each other and that’s from a main Contractor to Client, Client to Design Team, Sub-Contractors to Design Team and main Contractor”</i></p>
<p>Q1.2 - Specifically for this project, how do you think the level of trust between the actors had an impact on Delivery?</p>	<p><i>“Trust between the Council and the main contractor was actually quite good as well (as I had worked with them before). It was higher because of the team members we had worked with before”</i></p> <p><i>“it was a good relationship between PM, QS, Contractor and Client, but not so much the Design Team”</i></p> <p><i>“Paradoxically, it was trust that enabled the actually opening on time when it was really struggling but also, I think some of the lack of trust caused some of the problems in the first place”</i></p> <p><i>“the input from the Structural Engineer was detrimental and that level of trust was not there with that party. That did lead to delay and cost implications.”</i></p> <p><i>“there was a slight lack of trust been certain parties in the project. I felt there was divisions between the architectural side and the structural side”</i></p> <p><i>“level of trust between Design Team, Project Manager and Client is high... that contributed to the success of the project”</i></p>

<p>Q1.3 - Specifically for this project, what level of trust do you think was active between the actors?</p>	<p><i>“I think generally in the main it was one of the better projects I’ve been involved in and I think to be fair [PM1] helped greatly with that and was always constantly driving that.”</i></p> <p><i>“I don’t think anybody trusts 100% and I would say that for the answers to the previous questions there is always an element of having to protect your own position whether that is demonstrably explicit or even perhaps just inherent with a normal way of working in the construction industry.”</i></p> <p><i>“Post contract there was quite large trust issues between the Architect and Contractor which is not unusual on most projects”</i></p>
<p>2. Trust and knowledge transfer</p>	
<p>Q2.1 - In general, what is your view on the role of trust in the transfer of Project knowledge?</p>	<p><i>“the process, and therefore trust in the process ... is vital to the success of a project.”</i></p> <p><i>“The rest of the people have to trust that you have communicated that in the correct manner and the Client has to put quite a lot of trust and confidence in the team that they can deliver what they’ve actually said they are going to deliver.”</i></p> <p><i>“At its root is confidence in the design ... and if that is there then there is a high degree of trust.”</i></p> <p><i>“it is essential because you’ve got to trust the other person is competent, professional and are doing their job and giving you the right answer. You’ve got to trust them if they are giving you an answer you don’t like is actually the right answer you can’t just say no, I’m not doing that.”</i></p> <p><i>“I don’t think it really exists. I think there’s a lot of work to be done in that to improve”</i></p> <p><i>“Individual’s exclusion from problem solving exercises can lead to mistrust from them”</i></p> <p><i>“Being able to trust when transfer of knowledge its quite a complex thing and it is quite personal.”</i></p> <p><i>“The trust element comes into it when the Design Team are saying something, and you are trusting they have done as they are saying... When it transpires that it is not the case, trust disappears.”</i></p>

<p>Q2.2 - Specifically for this project, how do you think the level of trust between the actors had an impact on the transfer of key knowledge?</p>	<p><i>“(The lack of trust in one actor's communication of their part of the design) caused issues for all the other parties involved in the project.”</i></p> <p><i>“I think it was really quite positive. There were moments where there was questions about certain aspects that maybe weren't answered as correctly as they should have been, and I think it happens in every job. Actually every decision needs to be questioned and answered correctly and that's where you earn the trust of people and other members of the team earn the trust of the others as well”</i></p> <p><i>“I think in general it was good but there were some issues certainly from our part with confidence in some members of the team that the knowledge available be properly assimilated and acted upon.”</i></p> <p><i>“the lack of trust between Contractor and Designers really had an impact on the transfer of the knowledge”.</i></p> <p><i>“I think there was quite a good level of trust in the design team itself. After the appointment of the contractor, I am certain they really didn't trust us they hid the issues they were having with Building Services, and it caused a big problem. If they had trusted us, then it might have elevated a whole lot of issues that turned up because they were very late in appointment of MEP Subcontractor.”</i></p>
<p>Q2.3 - Specifically for this project, how effective was the transfer of key knowledge?</p>	<p><i>“Some conversations / briefings out with the core team meant there was some ineffective elements, and whilst we made it work it might have gone better if we were aware of all knowledge being transferred.”</i></p> <p><i>“I think it was effective when it needed to be. In terms of commercial issues, I would say the relationship we had was quite good in terms of that where the key knowledge required to be shared. We had a common goal which was nice and unusual, so I think that assisted.”</i></p> <p><i>“It was very effective. I think what was delivered ... was pretty comprehensive and was very well described”</i></p> <p><i>“it was reasonably successful and effective. Took a lot of effort from everybody at the project conclusion, but the fact that it was delivered successfully must indicate that there was effective transfer of knowledge.”</i></p> <p><i>“Within the design team it was effective. I feel that it might have been delayed or slow sometimes, but I don't necessarily think it was due to lack of trust; I think it was just time pressures. I feel that certainly from our point of view from Building Services perspective we issued our information and interacted with the other members of the design team in making sure that the services were accommodated in an appropriated way.”</i></p>

3. Differing inter-actor perception of trust	
<p>Q3.1 - In general, what is your view on the perception of differing levels of trust between construction project actors, and how this affects inter-project relationships?</p>	<p><i>“The key issue is breaking down the old traditions of “them and us” and it can be difficult, and I would say that time is a big issue in this. None of that happens without the right amount of time to allow to focus on the right things. What can help is prior experience off the individuals and parties can determine both the level of trust and at speed of which trust is developed.”</i></p> <p><i>“there needs to be a strong level of trust I think within the various actors but when a third party comes along who has a different sense of the worth of any given actor, there may be issues”</i></p> <p><i>“a good level of trust and openness is required. It is vital, if you don’t have trust, you typically get confrontation.”</i></p>
<p>Q3.2 - Specifically for this project, what is your view on how different perceptions of the levels of trust between actors affected relationships?</p>	<p><i>“On the whole the trust levels were high. I think levels of confrontation were low. I think there was, at all levels of relationship, good performance but the trust connection was not solely one to one and that had some impact.”</i></p> <p><i>“I think there were different levels of perceived trust between Project Manager/Contract Administrator and Designers, I think there was, certainly from our perception (Contractor). There were question marks over the Structural Engineer for example and his performance and that was even from the Client’s side”</i></p> <p><i>“On the whole the trust levels were high. I think levels of confrontation were low. I think there was, at all levels of relationship, good performance but the trust connection was not solely one to one, and that had some impact”.</i></p> <p><i>“there didn’t appear to be different perceptions of the level of trust all the actors seemed to be balanced.”</i></p>
<p>Q3.3 - Specifically for this project, to what level do you think any disparity in trust levels affected the outcomes of the Project Delivery?</p>	<p><i>“we trusted to the extent that we allowed time to pass, and what was apparent was at some points the trust was perhaps ill-founded.”</i></p>

4. Client definition of objectives	
<p>Q4.1 - In general, what is your view on how the Client defining their key value objectives affects performance delivery?</p>	<p><i>“if the Client is driven by any single one of cost, quality and programme, and if one is singularly more important than the others, this effects performance delivery in all ways, the budget effects the quality, and the programme also effects the end product. if everything is focussed on one of them there will always be an effect on delivery.”</i></p> <p><i>“Teams need to understand what Clients see as being essential as the core value.”</i></p> <p><i>“Effective briefing is key; lack of it can lead to confusion and impact on delivery.”</i></p> <p><i>“pulling together a good air tight brief is so important”</i></p> <p><i>“the Client has got to know what the key value objectives are and if they don’t, that’s going to obviously affect the entire project to delivery on site.”</i></p>
<p>Q4.2 - For this project, what were the Client's value objectives and how were they defined?</p>	<p><i>“I’m not sure that they actually really defined them as such, other than they wanted high quality and the most important point was they wanted it on time which I think was constantly reminded to everybody.”</i></p> <p><i>“I would have to say that other than the usual construction value objectives (cost, quality and programme) I wouldn’t really know what the Client’s objectives are.”</i></p>
<p>Q4.3 - Specifically for this project, what is your view on how the Client's communication of value objectives have affected the team delivery?</p>	<p><i>“we basically had nothing other than knowing that our Client wanted the project on time and on budget so it’s very difficult if there isn’t anything put down on paper.”</i></p> <p><i>“Delivery was probably affected because the Architect had a bit of poetic licence and would do things that possibly weren’t required. Might have been avoided if the Client had been more demanding of their Design Team and defined their parameters. They were probably a bit ‘wishy washy’ in their management style shall we say.”</i></p>

<p>Q4.4 - Specifically for this project, how do you think the manner of Client's communication of value objectives has impacted on the approach to collaboration between the delivery team?</p>	<p><i>“the collaboration was ok. I don't think it could have been simpler or with less complications. Obviously, making a lot of changes at certain stages makes things difficult for everybody, but I think the collaboration worked even in those difficult times, when things were being sprung on us.”</i></p> <p><i>“knowing what we had to deliver and when we had to deliver it enabled better collaboration. But this really didn't become totally clear until maybe too late.”</i></p> <p><i>“Touching back to the initial collaboration workshop, where the approach of the mutual trust and collaboration was spoken about; I think the turning point was actually witnessing it in action. I think the meeting set it out, but everybody's core value objectives are whether they are actually willing to stick to them and I think that even in the early stages there was enough examples of that, and I think that's what really bonded the teams together. I think it was true when both sides showed their hands a bit more and were a bit more open book and it actually worked really well.”</i></p>
<p>5. Collaboration and Building Services</p>	
<p>Q5.1 - In general, what is your view on how collaborative procurement of building services affects project outcomes when measured against "Client defined value requirements"?</p>	<p><i>“I would say collaborative procurement is good, but it cannot be used for a short cut on delivery time or as an early stage VE Exercise”</i></p> <p><i>“The earlier the better you get exposure to the guys who are going to do it rather than the guys who are going to manage it, the better the outcomes.”</i></p> <p><i>“An M&E Designer should be able to co-ordinate services in a ceiling void, in a riser, in a duct and should be able to do cross sections at key points where he knows there are clashes, so as to avoid the necessity for early engagement of the supply chain”</i></p> <p><i>“There is a lot of M&E which is Contractor Designed, if not everything, which means they have to be part of the team early on and actually participate as a Design Team member”</i></p> <p><i>“I think there's a good level of collaboration now between Engineers and their Contractors, if they're allowed to do that, if they're given sufficient access as that's another issue”</i></p>
<p>Q5.2 - Specifically for this project, how would you describe the approach to collaborative early engagement with the Building Services supply chain?</p>	<p>no additional comments</p>

Q5.3 - Specifically for this project, what effect did the approach to collaborative early engagement with the Building Services supply chain on delivering to Client defined value requirements?	<i>"it did have an impact because the information and the technical submissions for approval were delayed and there was pressure".</i>
Q5.4 - Specifically for this project, in what way was the collaborative approach taken towards the Building Services Supply Chain effective?	<i>"there were a lot of good people involved in the project. A lot of collaborative working. There was a very good team spirit on the project. There obviously issues but I think in the main it was good example of collaborative work."</i> <i>"I think the Consultants probably were keen to engage, We didn't engage with them as quickly as we should have because of the procurement issue that when we did engage, I felt it went really well".</i>
6	
N/A	N/A
General Comments provided by respondents	
On trust	<i>"on the whole I'm in favour of collaboration and I think the key here was trust."</i> <i>"Trust can mean a lot to different people but there needs to be a collaborative way in which trust can be encouraged and developed and perhaps there needs to be a bit more of a shift in the way information is delivered to make collaboration more effective"</i>
On Factors of Success	<i>"key factors of success... that we all had the same common goal for the good of the project. It was certainly a success for us and the partners we worked with."</i>

Table C.1 : Direct Quotations from actors within Case Study 0 - SJPS

Case Study 1 - BPS	Additional comments
1. Trust and project delivery	
Q1.1 - In general, what is your view on trust and the role it plays in project delivery?	<i>"It's critical by and large... But projects can be delivered without trust, just becomes harder. On that basis it is fairly key but not paramount. To deliver effectively it is fairly fundamental."</i>
Q1.2 - Specifically for this project, how do you think the level of trust between the actors had an impact on Delivery?	no additional comments
Q1.3 - Specifically for this project, what level of trust do you think was active between the actors?	<i>"It varied and depended on the individuals. There have been some cliques developed and these haven't really been eroded. I don't get the feeling that trust is there."</i>
2. Trust and knowledge transfer	
Q2.1 - In general, what is your view on the role of trust in the transfer of Project knowledge?	<i>"A high level of trust is required, and a high degree of communication stems from that."</i>
Q2.2 - Specifically for this project, how do you think the level of trust between the actors had an impact on the transfer of key knowledge?	<p><i>"Previous relationships had an impact on those levels of trust and that had an effect on how we transferred key information."</i></p> <p><i>"when issues arose you could tell that there was potentially limited trust in some areas, and this meant there was some reticence in resolving issues effectively"</i></p>
Q2.3 - Specifically for this project, how effective was the transfer of key knowledge?	no additional comments
3. Differing inter-actor perception of trust	
Q3.1 - In general, what is your view on the perception of differing levels of trust between construction project actors, and how this affects inter-project relationships?	<p><i>"There is always some level of cynicism in our industry and that will undoubtedly affect relationships."</i></p> <p><i>"If there is that imbalance in trust there is going to be an imbalance in how that relationship works for the benefit of the project, in regards communication and the like. One will give/receive at a higher level than others etc and that's not going to help."</i></p>
Q3.2 - Specifically for this project, what is your view on how different perceptions of the levels of trust between actors affected relationships?	<i>"Some actors certainly had lower perceptions of the levels of trust between some members of the team. It was affected by delivery and transfer of knowledge, understanding of responsibilities, and the imbalance of expectations that arose from a lack of clarity in some areas."</i>

<p>Q3.3 - Specifically for this project, to what level do you think any disparity in trust levels affected the outcomes of the Project Delivery?</p>	<p><i>“There are differing relationships throughout the team. And it may be that we have made some decisions based on the source of change. Which means that the disparity in trust levels IS having an effect. Its factional and it shouldn’t be. Different people have different levels of trust across the network and so they respond differently dependent on the individual relationship. Its personal, and it shouldn’t be.”</i></p>
<p>4. Client definition of objectives</p>	
<p>Q4.1 - In general, what is your view on how the Client defining their key value objectives affects performance delivery?</p>	<p><i>“No “committee review” of the brief after early stages, and let the professionals take over.”</i></p> <p><i>“This needs to be fixed early. Clear Brief essential.”</i></p>
<p>Q4.2 - For this project, what were the Client's value objectives and how were they defined?</p>	<p><i>“My view is that initially the main driver was COST, then it was COST and Quality... I’m not sure PROGRAMME was ever the main priority!”</i></p> <p><i>“It was confused and at times it wasn’t clear what the main objective was. COST? PROGRAMME? It seemed to change.”</i></p> <p><i>“These projects in particular haven't had the Correct Client requirements implemented in terms of the Authorities Requirements, which I have never seen. The objectives were pretty much Undefined”.</i></p> <p><i>“Initially it seemed to be “we need it for that budget” and then it was “We need it for that programme.” What was missing for me was it didn't really take any view of the end user. It didn't seem to be any value put on what they were doing about the school and for kids to learn in. There's no value put on that. It seemed to be cost and programme, that was it.”</i></p>
<p>Q4.3 - Specifically for this project, what is your view on how the Client's communication of value objectives have affected the team delivery?</p>	<p>no additional comments</p>
<p>Q4.4 - Specifically for this project, how do you think the manner of Client's communication of value objectives has impacted on the approach to collaboration between the delivery team?</p>	<p><i>“Big impact because of the changing priorities. Makes it harder for the team to work on common goals and activities. However, what I would say is that the collaboration improved when we were ALL under pressure. Whilst that’s not necessarily to do with Client objectives it does show you that when common goals are clear, we can work together better”</i></p>

5. Collaboration and Building Services	
<p>Q5.1 - In general, what is your view on how collaborative procurement of building services affects project outcomes when measured against "Client defined value requirements"?</p>	<p><i>"Early engagement and being part of a team gives you confidence that you will be involved in the whole process. This then tends to keep you involved and engaged, so that means that better outcomes should follow".</i></p> <p><i>"MEP is always the biggest chunk of the work and comes with the most risk. It has the biggest opportunity to have an effect on cost and programme. So getting the supply chain in early certainly should have significant project benefits to delivering the requirements".</i></p> <p><i>"Bringing in MEP subcontractors brings expertise into the design process. They also provide expertise in construction and commissioning and then the designers can design these requirements in at an early stage which helps on a number of aspects. Things like programme, offsite manufacture, maintenance etc"</i></p>
<p>Q5.2 - Specifically for this project, how would you describe the approach to collaborative early engagement with the Building Services supply chain?</p>	<p><i>"It was a really good approach to be involved with. What we both came up with in regards ideas and VE meant that there was confidence in our input from Client and team. I think trust was enhanced by the way we did things. And I think that trust was in the small group involved for definite, but also wider, due to the outcomes."</i></p> <p><i>"I think we score about 4 out 5. A lot of that is to do with how the MEP designers in this case took to the early engagement. They were really open and progressive and worked well with all those involved. Really decent in how we did this and their "no secrets" approach really helped. A really professional approach throughout and equally from the others involved. Being enlightened enough to have two potential subcontractors involved in technical discussions at the same time is a really good way to engage the supply chain and get proper feedback. All those involved approached this really well"</i></p>
<p>Q5.3 - Specifically for this project, what effect did the approach to collaborative early engagement with the Building Services supply chain on delivering to Client defined value requirements?</p>	<p><i>"It meant the contractor was able to price beyond what was designed (and wait for final design) and that meant better programme delivery. Gave the project earlier certainty in the MEP area and trust played a big part in this. The trust between designer and supply chain had to be there for this."</i></p> <p><i>"It allowed us to take a better view on the items that were not fully designed, which means we are closer to meeting the Client requirements. If we hadn't have done what we did, we would have probably failed to meet any requirements in this regard."</i></p>

Q5.4 - Specifically for this project, in what way was the collaborative approach taken towards the Building Services Supply Chain effective?

"We got some savings through the collaborative approach, and we were able to set the cost envelope for that package which seemed to meet the requirements. Having 2 subcontractors in the room at the same time was particularly effective. That sharing of knowledge with all involved in the process was essential... and it went really well."

It was effective, and I think it started as soon as we got involved with them. Could we have had them in earlier? Yes, and if we had they may have been able to influence the building form and layout, which would have delivered efficiencies throughout."

"There have been some streamlined issues post contract in areas of MEP design because of that earlier engagement. Areas of redesign and the like not required because of earlier conversations."

"I think the value engineering bit, when we did have a problem that the approach with the two contractors, I think was particularly effective. To actually have two contractors sitting there giving away secrets!!! That is what they don't do."

"It was effective. It would have been better if the Designer had been a bit more advanced with their designs or had more time to work this up. Having the two MEP subcontractors being open and putting things on the table worked really well. There were really good trust levels in what went on. Timing wise; it could have been even better with even earlier involvement. Certainly not later. But then with the design where it was that may not have been as effective in this instance. Given the programme and the position of the design, I think going a traditional procurement route may not have worked for the Client. I'm not sure it would have been procured either in time or as required. Having the 3 schools together was really helpful too; with common requirements. That helped the process."

"It was upfront on Q&A's and design approach and key fundamentals. Meant we could look at VE early and understand what this meant to Client and designer's flexibilities and limits, and agreements, on product acceptability."

6. Collaborative Procurement Approach Effect	
<p>Q6.1 - In comparison to the pilot case study (SJPS) Project (or others if not involved in SJPS), in what way did the alternative procurement approach taken affect this project?</p>	<p><i>"I don't think it has benefited the project. I think it's given the contractor a bit too much leeway."</i></p> <p><i>"The collaborative approach does work if it is undertaken when those collaborating are able to have an influence on the design and at the right time. Everyone needs to be involved from the outset, so at an earlier RIBA stage."</i></p> <p><i>"This process was better than a purely traditional approach. It should have a positive impact on the project."</i></p> <p><i>"I think there has been a missed opportunity in what we did. It hasn't had as much of an impact as it could have. It was a good idea, but simply didn't work on this project."</i></p> <p><i>"The collaborative approach with a traditional contract I think has caused problems. Perhaps a D&B would have been more beneficial. The risk transfer is more appropriate, but that's costed. It wouldn't have been a more cost effective way of doing it at contract execution and would have been unlikely to meet the Client's cost threshold at that stage. But at one point programme was the fundamental driver and that route may have solved the issues. We are unlikely to know if this was the case however."</i></p>
<p>Q6.2 - How did the collaborative procurement approach advocated affect trust between project participants?</p>	<p><i>"Amongst the Client team, I don't think it made any difference. Other than it might have actually had a negative effect slightly in that people were then taking advantage of the fact that contractor was there to sort problems out. Between contractor and the Client team. We got to know them. I think elements of our team built up a trust with the contractor. Relationships were reasonably strong, but I think they end up getting tarnished at points."</i></p> <p><i>"I'm not sure it has made it any better. It has possibly made it worse and that is probably down to expectations. People expected it to be better and because it wasn't that caused issues which were potentially due to the way we set this up."</i></p>

<p>Q6.3 - How did the collaborative procurement approach advocated affect delivery to "Client defined value requirements"?</p>	<p><i>"I think we have probably not used the model to its full potential and because of that, but not just that, the project will not meet the Clients' requirements. I'm hopeful that this being the first of the 3 projects, that the 3rd one will be a better resolution due to lessons learned from this one."</i></p> <p><i>"It was the only way we could have delivered it. If we hadn't have done it this way, they wouldn't have been able to deliver to the initial programme. I think that's clear."</i></p> <p><i>"This is where it SHOULD have really been hitting the council targets. But the amount of people involved in the council and the timing of requirements being communicated did not align with what we were doing. The lack of full coordinated brief from multiple departments within the council means we were doomed before we started in reality."</i></p> <p><i>"...the amount of collaboration between Design Team and Contractor on the design at an early stage must have had a beneficial impact if not only on understanding what design requirements were outstanding."</i></p> <p><i>"I think the approach taken will deliver good value for the Client. What we are building is very robust, and the longevity of the building SHOULD be a Client value requirement. That's not just due to the collaborative approach but it has had an effect on it."</i></p>
<p>General Comments provided by respondents</p>	
<p>On trust</p>	<p><i>"Being involved in another project with a similar process I can comment on how that has been "night and day". I questioned what the difference on this was. I came to the conclusion that it's all about having the right people with the right attitudes; openness and trusting of other people's abilities and ideas. When you have Clients leading the way on trusting the team, that sets the scene of the trust required from all involved."</i></p>
<p>On Factors of Success</p>	<p><i>"The collaborative approach works generally, and the early engagement does provide benefits if it's done correctly."</i></p> <p><i>"The collaboration allowed the projects to happen, but the benefits we could have got from the approach have not been realised by all parties."</i></p>
<p>On early involvement and innovation</p>	<p><i>"It was good to be involved in the collaborative engagement. I think we benefitted from it, but I also think the Client ultimately will benefit from what we did. I think the Architecturally lead design, which is not unusual, has meant some inefficiencies in the building services."</i></p>

Table C.2 : Direct Quotations from actors within Case Study 1 - BPS

Case Study 2 - VPS	Additional comments
1. Trust and project delivery	
<p>Q1.1 - In general, what is your view on trust and the role it plays in project delivery?</p>	<p><i>“Some of this is also based on experience, knowing how things work best. Some people without the experience are less trusting and look to blame etc.”</i></p> <p><i>“Has to be Client, consultant and contractor all trusting one another.”</i></p>
<p>Q1.2 - Specifically for this project, how do you think the level of trust between the actors had an impact on Delivery?</p>	<p>“personalities are key to this relationship and some specific people in the contractors organisation are great in the trust relationship”.</p>
<p>Q1.3 - Specifically for this project, what level of trust do you think was active between the actors?</p>	<p>no additional comments</p>
2. Trust and knowledge transfer	
<p>Q2.1 - In general, what is your view on the role of trust in the transfer of Project knowledge?</p>	<p>no additional comments</p>
<p>Q2.2 - Specifically for this project, how do you think the level of trust between the actors had an impact on the transfer of key knowledge?</p>	<p>no additional comments</p>
<p>Q2.3 - Specifically for this project, how effective was the transfer of key knowledge?</p>	<p>no additional comments</p>
3. Differing inter-actor perception of trust	
<p>Q3.1 - In general, what is your view on the perception of differing levels of trust between construction project actors, and how this affects inter-project relationships?</p>	<p>no additional comments</p>
<p>Q3.2 - Specifically for this project, what is your view on how different perceptions of the levels of trust between actors affected relationships?</p>	<p>no additional comments</p>

Q3.3 - Specifically for this project, to what level do you think any disparity in trust levels affected the outcomes of the Project Delivery?	no additional comments
4. Client definition of objectives	
Q4.1 - In general, what is your view on how the Client defining their key value objectives affects performance delivery?	<i>"You need to know what their expectations are, and you need to know their key objectives clearly. Just so you know what you are trying to achieve."</i>
Q4.2 - For this project, what were the Client's value objectives and how were they defined?	no additional comments
Q4.3 - Specifically for this project, what is your view on how the Client's communication of value objectives have affected the team delivery?	no additional comments
Q4.4 - Specifically for this project, how do you think the manner of Client's communication of value objectives has impacted on the approach to collaboration between the delivery team?	no additional comments
5. Collaboration and Building Services	
Q5.1 - In general, what is your view on how collaborative procurement of building services affects project outcomes when measured against "Client defined value requirements"?	"Having the MEP supply chain involved as early as is possible on a project should give project benefits. The disconnect between the various phases of the project is then avoided if they are brought in early into the design team."
Q5.2 - Specifically for this project, how would you describe the approach to collaborative early engagement with the Building Services supply chain?	no additional comments
Q5.3 - Specifically for this project, what effect did the approach to collaborative early engagement with the Building Services supply chain on delivering to Client defined value requirements?	no additional comments
Q5.4 - Specifically for this project, in what way was the collaborative approach taken towards the Building Services Supply Chain effective?	no additional comments

6. Collaborative Procurement Approach Effect	
<p>Q6.1 - In comparison to the pilot case study (SJPS) Project (or others if not involved in SJPS), in what way did the alternative procurement approach taken affect this project?</p>	<p><i>"The collaboration we have had, commercially, should lead us to more cost certainty."</i></p> <p><i>"Compared to 2 stage D&B projects, the collaboration was more "gentle" here to assist in key areas; there was more back and forth, more discussion. Even if some of our recommendations were not taken forward. The engagement process helped overall, despite some issues within the development process."</i></p> <p><i>"I think the approach we have taken has been positive for the project. We were able to all agree the Clients MEP requirements at the right time for the project and the programme. The collective integration and implementation approach was definitely of benefit. Problems dealt with earlier in the process rather than when we are in the heat of constructing the building."</i></p>
<p>Q6.2 - How did the collaborative procurement approach advocated affect trust between project participants?</p>	<p><i>"The contractor/Client relationship may be up for debate. I think there was resistance to listen to or believe in what the Contractor was advocating in some areas. But this came down to individuals – the process should have worked. But I think that there has been some perception, from some of the team members, that the Contractor is out to fleece the Client. I think the relationships with the PM team and the commercial team will be proven better, but the Client relationship with the Contractor not so much."</i></p>
<p>Q6.3 - How did the collaborative procurement approach advocated affect delivery to "Client defined value requirements"?</p>	<p><i>"I would expect, hope, this to have a more positive than negative affect, but only time will tell as we get further into the build. An early strategy is key and hopefully this isn't eroded too much, because that will cause problems. I think sometimes that architects need to listen to MEP designers more. They are sometimes seen as the poor relation, and complicated projects are sometimes made more complex by having to squeeze MEP in to predetermined form/structure. This has an impact on delivery."</i></p> <p><i>"How has it developed value? I think budgetary wise it has assisted on areas of cost certainty. There have been some benefits in resolving design issues, and I know that the collaborative approach assisted with the programme. I think the final outcome is that the process has added value to what we have done, but the issues that have been encountered may overshadow this."</i></p>

General Comments provided by respondents	
On trust	<p><i>"We have been involved in some high profile projects recently which have, at the very centre of the process, required trust to be paramount for delivery (due to speed). At the heart of the relationships has been open-ness and collaboration, as well as trust and the contract has reflected this (NEC, option E). It took a number of leaps of faith for some of the parties, but it is massively paying off."</i></p>

Table C.3 : Direct Quotations from actors within Case Study 2 - VPS

Case Study 3 - CLPS	Additional comments
1. Trust and project delivery	
Q1.1 - In general, what is your view on trust and the role it plays in project delivery?	no additional comments
Q1.2 - Specifically for this project, how do you think the level of trust between the actors had an impact on Delivery?	no additional comments
Q1.3 - Specifically for this project, what level of trust do you think was active between the actors?	no additional comments
2. Trust and knowledge transfer	
Q2.1 - In general, what is your view on the role of trust in the transfer of Project knowledge?	no additional comments
Q2.2 - Specifically for this project, how do you think the level of trust between the actors had an impact on the transfer of key knowledge?	no additional comments

Q2.3 - Specifically for this project, how effective was the transfer of key knowledge?	no additional comments
3. Differing inter-actor perception of trust	
Q3.1 - In general, what is your view on the perception of differing levels of trust between construction project actors, and how this affects inter-project relationships?	no additional comments
Q3.2 - Specifically for this project, what is your view on how different perceptions of the levels of trust between actors affected relationships?	no additional comments
Q3.3 - Specifically for this project, to what level do you think any disparity in trust levels affected the outcomes of the Project Delivery?	no additional comments
4. Client definition of objectives	
Q4.1 - In general, what is your view on how the Client defining their key value objectives affects performance delivery?	no additional comments
Q4.2 - For this project, what were the Client's value objectives and how were they defined?	no additional comments
Q4.3 - Specifically for this project, what is your view on how the Client's communication of value objectives have affected the team delivery?	no additional comments
Q4.4 - Specifically for this project, how do you think the manner of Client's communication of value objectives has impacted on the approach to collaboration between the delivery team?	no additional comments

5. Collaboration and Building Services	
Q5.1 - In general, what is your view on how collaborative procurement of building services affects project outcomes when measured against "Client defined value requirements"?	no additional comments
Q5.2 - Specifically for this project, how would you describe the approach to collaborative early engagement with the Building Services supply chain?	no additional comments
Q5.3 - Specifically for this project, what effect did the approach to collaborative early engagement with the Building Services supply chain on delivering to Client defined value requirements?	no additional comments
Q5.4 - Specifically for this project, in what way was the collaborative approach taken towards the Building Services Supply Chain effective?	no additional comments
6. Collaborative Procurement Approach Effect	
Q6.1 - In comparison to the pilot case study (SJPS) Project (or others if not involved in SJPS), in what way did the alternative procurement approach taken affect this project?	no additional comments
Q6.2 - How did the collaborative procurement approach advocated affect trust between project participants?	no additional comments
Q6.3 - How did the collaborative procurement approach advocated affect delivery to "Client defined value requirements"?	no additional comments
General Comments provided by respondents	
	no additional comments

Table C.4 : Direct Quotations from actors within Case Study 3 - CLPS

**APPENDIX D – THE CASE STUDIES : SOCIAL NETWORK RESPONSE
(REFER TO VOLUME 2)**

