CHALMERS
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# Introducing Early Contractor Involvement in Infrastructure Projects

## A client perspective

Master's Thesis in the Master's Programme Design and Construction Project Management

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ABSTRACT

The complexibility and high risk profile of the construction industry requirespecialised professionals in both design and construction. However, traditional contracting practices usually separate the design and construction processes and therefore hinder the integration of construction knowledge into the design. This has led to a demand for alternative delivery methods. Early Contractor Involvement (ECI), a two-staged model where Stage One comprises the planning and conceptual design of the project and Stage Two the detailed design and construction works, is one of these new approaches. In ECI, the contractor is procured earlier than in a traditional approach and contributes with construction knowledge and experiences in design development in order to increase constructability and estimate a more accurate target cost. ECI is to be used by the Swedish Transport Administration (STA) in two subprojects of the upcoming West Link (WL) infrastructure project. The purpose of this master thesis is to, from the client's perspective, investigate the success factors in an ECI collaboration and also how a client should prepare its organisation for this relationship-based procurement approach. The focus is on the pre-contract phase, Stage Zero, and Stage One of the ECI approach, and the thesis evaluates which activities should be included and what role the client should take in the process. The thesis has been based on academic literature and handbooks regarding ECI and similar relationship-based approaches, as well as on interviews with representatives from the STA, international collaborative advisors and experienced actors from reference projects. The study suggests that a Core Group (CG), with representatives from the client and main contractor, should be appointed to stear the project team, focusing on financial aspects, performance evaluation, dispute resolution and team development. A best-for-project mindset, where project participants look to what is best for the project and not individual interests is undoubtedly a crucial success factor. Using already existing frameworks, like the BS11000 standard for Collaborative Business Relationship Management, can be beneficial for helping a client arrange a joint project organisation and create a foundation for collaboration. The study also shows that the appointment of both an internal (from the client organisation) and an external collaboration facilitator are important, as these will lead the work of engaging and coordinating the different parties towards collaboration. Finally, the ECI approach does not provide a standard solution for the client but must be developed and implemented in the client organisation to fit the specific circumstances of the project and organisation.

Key words: Collaboration, Early Contractor Involvement, ECI, infrastructure, relationship-based procurement, public client.

Early Contractor Involvement i Infrastrukturproject

Ett beställarperspektiv

Examensarbete inom Masterprogrammet Design and Construction Project Management

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## SAMMANFATTNING

Byggbranschen är med sin höga riskprofil och komplexitet känd för att kräva specialistkompetens inom både projektering och byggande. Dagens traditionella upphandlingsmetoder integrerar dock sällan dessa faser, vilket innebär att viktig produktionskompetens inte kommer projekteringen till godo. Behovet av att integrera projektering och produktion har lett till en efterfrågan på alternativa upphandlingsmetoder. Early Contractor Involvement (ECI) är en av dessa, och är en tvåstegsmodell där Fas 1 innefattar tidigare delar av projekteringen samt tid- och kostnadsplanering och Fas 2 detaljprojektering och produktion. Metoden skiljer sig från traditionella upphandlingar på så sätt att entreprenören upphandlas i ett tidigt skede för att kunna bidra med sin kompetens och erfarenhet i projekteringen, vilket även leder till att man kan räkna fram ett mer tillförlitligt och realistiskt riktpris för projektet. Trafikverket planerar att använda ECI i två delprojekt inom infrastrukturprojektet Västlänken. Syftet med detta examensarbete är därför att studera hur en beställare kan förbereda sin organisation för denna upphandlingsmodell samt vilka processer som bör ingå i Fas 0 (innan projektstart) och Fas 1 (planeringsfasen). Studien är baserad på vetenskaplig litteratur och handböcker som behandlar ECI och andra samverkansformer samt på intervjuer med representanter från Trafikverket, internationella samverkansrådgivare och erfarna aktörer från två referensprojekt. Studien har resulterat i tre huvudslutsatser. Dels visar studien att en styrgrupp innehållande representanter från både beställare och entreprenör bör tillsättas tidigt i projektet. Denna grupp guidar och leder projektteamet och bör framförallt fokusera på frågor gällande ekonomi, tidsplanering, konfliktlösning samt att sätta riktlinjer för och följa upp samverkansarbetet. Det har även visat sig viktigt att etablera en god projektkultur där deltagarna ser till projektets bästa framför egna intressen oavsett vilket företag eller organisation man representerar. Det framgår även att ECI är ett arbetsätt som kräver stort engagemang från beställaren, vilket måste etableras i hela organisationen. Hög kompetens inom samverkan är ytterligare en viktig framgångsfaktor i ECI-projekt och en beställare bör därför utse både en intern samverkansledarde samt externa samverkansexperter som tillsammans arbetar för att motivera och engagera projektmedlemmarna och vara drivande i samverkansfrågor. Slutligen är det viktigt för beställaren att veta att ECI inte är färdig paketlösning utan måste anpassas och implementeras för att passa omständigheterna för det påtänkta projektet och dess organisation.

Nyckelord: Early Contractor Involvement, ECI, infrastruktur, samverkan, upphandling.

# Contents

# Preface

First, we would like to thank our supervisor Anna Kadefors for the support and guidance throughout this master thesis. Thank you for your inspiring, motivating and honest opinions about the research process and thesis content. You simply made this research possible.

Second, a special thanks to our supervisor at the Swedish Transport Administration, Lillian Brunbäck, who has shown great interest and engagement in our research. We would also like to thank other employees at the Swedish Transport Administration who have participated in interviews and answered our questions.

We are particularly grateful to all interviewees who shared their views and experiences and took the time to be part of our research process. We have gathered valuable experiences, not only for this master thesis, but also for our future development as professinal engineers. Your competence and interest in our thesis have been highly valuable for the creation of this study.

Thank you all.

Gothenburg, March 2016
Sara Karlenäs & Caroline Sundström

# 1 Introduction

The introduction will present and describe the background and context of this master thesis. It will give the reader an overview of the study's relevance and, most importantly, present its purpose. Research questions are formulated and narrowed down by the thesis limitations. The section also comprises a brief introduction to the Swedish Transport Administration, which this thesis is performed in collaboration with, as well as a short methodology description.

## 1.1 Background

The complex construction industry is well known for requiring specialised professionals in design, procurement and construction performance (Song et al., 2009). Such specialisation has made it possible to deliver many of the more complex facilities, structures and civil works. However, infrastructure is a field where projects can be particularly complex and involve considerable uncertainty depending on location and environmental conditions. Such projects can therefore be difficult to procure with traditional measures. According to Bundgaard et al. (2011), the preparation of infrastructure projects often consumes an extraordinary amount of organisational resources, and Song et al. (2009) states that these projects are often not particularly effective.

Today, clients and consultants often make decisions about design and planning based on insufficient information and knowhow as to available technology, equipment and potential innovative solutions for the construction works (Bundgaard et al., 2011). In other words, experiences and important knowledge about the actual production phase is lacking, which can result in inefficient construction plans (Song et al., 2009). In an attempt to adjust this, a number of relationship-based procurement forms have been developed with the purpose of introducing the contractors' advice and expertise earlier in the project lifecycle and thereby create closer project relationships between the client, consultant and contractor (Walker & Lloyd-Walker, 2012; Rahman & Alhassan, 2013). Early Contractor Involvement (ECI), which will be further investigated in this thesis, is one of these. ECI can briefly be described as a construction delivery approach with a purpose to utilise a contractor's construction knowledge, experiences and expertise already in the project development phase in order to deliver best value for money and increase constructability (Song et al. 2009; Lenferink, 2012; Rahman & Alhassan, 2012).

The Swedish Transport Administration (STA) is one of the largest public clients in Sweden. They are continuously working with long-term planning of the national transport system, including building, operating and maintaining state-owned roads and railways (Trafikverket, 2013). The STA is currently undertaking the major West Link (WL) project, which is an eight kilometers double track railway route including around seven kilometers in a tunnel, planned to be built under the city of Gothenburg. Two of the sub-projects in the WL project will be procured under the ECI approach. This master thesis is produced in conjunction with the STA in order to provide input concerning the new ECI processes and how they as a client should prepare their organisation.

## 1.2 Purpose and research questions

The purpose of this master thesis is to investigate which activities the preconstruction stage of an ECI project comprises, and how a client should prepare its organisation for such a collaborative approach. The focus will be on the preparations before the ECI project is initiated, in this thesis referred to as Stage Zero, and the activities in the design and planning phase, referred to as Stage One. The thesis will explore what competence is required for a client to establish high levels of collaboration in these projects in order to realise maximum potential of ECI. In order to further concrete the purpose, three research questions have been formulated. Research question one is initially evaluated in order to provide a clear foundation and understanding of ECI processes and to be able to answer the remaining questions.

**RQ1:** Which are the key activities in Stage One of the ECI contract and what is the client's role during these?

**RQ2:** What kind of collaboration and facilitation competence is needed in the project organisation?

**RQ3**: How should the client prepare its own organisation before Stage One of the ECI contract?

## 1.3 Limitations

In this master thesis, ECI refers to the contractual arrangement ECI (comprising two stages) and not to the broader concept of involving contractors early, which can be achieved by various forms of procurement. The thesis focuses on the first stages of the ECI collaboration, namely the pre-contract phase (Stage Zero) and the planning and design phase (Stage One). The construction phase (Stage Two) will therefore be excluded. The focus will be from a client's perspective and the report will be aligned towards ECI in large infrastructure projects. Finally, the research will not evaluate potential financial benefits in regards to ECI but rather the processes that should be undertaken to successfully deliver a project.

## 1.4 Method

The thesis was performed in two parts: a literature review and an interview study. The literature review was made in order to describe ECI and other background data needed to answer the purpose and research questions. The focus was on previous work of researchers and institutions concerning ECI experiences. As studies of early, preparatory phases are scarce, handbooks and guides in the field of collaboration have been studied in addition to the academic literature. The empirical part of this research consists of information gathered from interviews with experienced construction actors from two reference projects where ECI or similar approaches has been used. In addition, collaborative advisors were interviewed in order to better understand the collaboration aspects in infrastructure projects. The interviewees included stakeholders from the Swedish Transport Administration, representatives from the reference projects High Speed 2 and the Norsborg depot, and actors involved in different stages of collaboration processes. See chapter 3 for more detailed descriptions of reference projects and interviewees.

# 2 Frame of reference

The frame of reference comprises a literature study of the relationship-based procurement method ECI. The chapter presents the origin of ECI, the different stages of the approach, and how a collaborative project environment (CPE) can be arranged. The chapter creates a foundation of knowledge needed to understand the empirical results from reference projects and collaborative advisors, and to create a theoretical framework which parts of the discussion will be structured after.

## 2.1 Early Contractor Involvement

ECI was introduced in the Engineering and Construction Contract in 1998 by the British Institution of Civil Engineering and was firstly adopted by the British Highways Agency (Rahmani, 2013b). The approach evolved as a reaction to the need for clients to place a large amount of resources to create high functioning collaborative teams, as well as to better understand and equitably allocate risks during construction (Rahmani, 2013b). In addition, traditional procurement routes, which separate design from construction, were shown to exclude the opportunities for contractors to influence design decision (Song et al., 2009). Furthermore, Mosey (2009) and Love et al. (2014) state that consultants and designers often struggle to develop comprehensive plans and innovative solutions when using traditional contracting. The ECI approach evolved to provide solutions to these shortcomings in, for instance, large and complex housing and/or in infrastructure projects (Lenferink et al., 2012). ECI is based on the notion that the client selects a contractor that offers the greatest economic value, supports performance outcomes by using efficient methods and equipment, and supports teamwork and open discussions, rather than considering price alone.

The overall purpose of ECI is to get the contractor's maximum contribution to improve design, costing and risk management (Mosey, 2014). By involving the contractor in the pre-construction phase, their experience and expertise are better reflected in design and building of the project and best value can be achieved in quality, options and incentives (IADC, 2013). However, there is not one generic “one way fits all” approach to ECI and the contractual design, including economic reimbursement and incentives, vary from case to case, making each project unique. In common is, however, a two staged process where Stage One involves the planning and design and Stage Two the performance of the construction works, see figure 1 (Mosey, 2009; IADC, 2011; Rahmani et al., 2013a; Love et al., 2014).

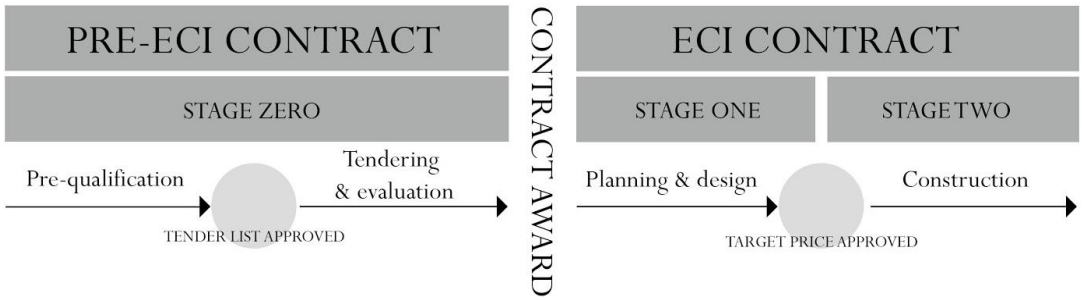



*Figure 1: Early Contractor Involvement*

The ECI process starts with a 'Pre-ECI contract' stage, usually involving pre-qualification of contractors and subsequently the procurement of a main contractor. Love et al. (2014) describes that the procurement of a main contractor is not solely based on price, but also qualitative criteria in for instance abilities to work in collaborative projects. The ECI approach therefore allows contractors to differentiate themselves from competitors based on experience, capability and expertise (Eadie et al., 2012). When a main contractor has been appointed the project proceeds into Stage One. This stage involves the main design and planning work, which is performed by an integrated project team. Stage One is usually governed by a professional consultancy agreement where the contractor is reimbursed on an hourly basis and possibly an additional percentage fee (Rahmani et al, 2013b). The overall goal of Stage One is to develop and agree on a target price for the construction works (Koncarevic, 2013). When the planning process has resulted in a target price and a construction offer is submitted, progression to Stage Two can be made. It is desirable that the same contractor performs both Stage One and Stage Two to fully benefit from the established relationships and competence (Rahman & Alhassan, 2012). However, depending on the performance and collaboration during Stage One, the construction works can be offered to another party if the client is not satisfied or if the parties cannot agree on a target price (Mosey, 2009).

Love et al. (2014) presents a research conducted with 30 project managers from various public clients in Australia who have experience in working with the ECI approach. The investigation shows that even if the respondents at first preferred traditional ways of procuring infrastructure projects and showed reluctance towards this new method, the use of ECI did result in better project outcomes including fewer disputes, better time and cost performance and higher project quality. In addition, a questionnaire by Rahman and Alhassan (2012), sent to 57 contractors in the UK construction industry, shows that ECI contributes with reduced risk exposure, increased opportunities for building better relationships and the ability to better reach innovative solutions.

**Many definitions – One concept**

Rahmani et al. (2013b) have investigated the differences of ECI in the US, Australia, and the UK where the collaborative approach has had its greatest breakthrough. The authors concluded that the concept is customised depending on the individual needs and circumstanses and may therefore vary between countries. However, all different approaches are referring to the same two-staged principle where focus is put on procuring the contractor early in the project. In the US, ECI is sometimes referred to as Integrated Supply Teams (American Institute of Architects, 2007; Rahmani et al.,

2013b), compared to the UK and Australia, where the approach is identified as Two-Stage Open Book (Mosey, 2014) or Integrated Project Delivery (Love et al., 2014). The UK and US utilises ECI as a two-staged approach, whereas the Transport Agency in New Zealand and Australia have structured the method around three separate stages where preparational works are added before the planning, design and final construction (Scheepbouwer & Humphries, 2007; Walker and Lloyd-Walker, 2012).

### 2.1.1 Stage Zero: Pre-ECI contract

ECI often represents a radical change from traditional business practices (Song et al., 2009) and there are several challenges and procedures for the client to consider before the planning phase starts. However, much of today's literature solely focus on Stage One and Two of the ECI contract but often forgets the phase before the procurement starts, sometimes referred to as Stage Zero (Department of Main Roads, 2009) or early project processes (Mosey, 2009). As a first step of Stage Zero, the Department of Main Roads (2009) highlights the requirements for the development and approval of a *management plan.* The management plan is to be used as a guiding document in the following stages and aims to:

- Clearly define the scope of the project
- Define all known project stakeholder requirements
- Outline works included in project, how they are likely to be completed and indicate personnel and times necessary for completion.
- Highlight key decisions in the procurement process

BSI (2011) states that applying a collaborative approach in projects might challenge the traditional ways of working. The efforts of working together could be a potential constraint if ignored or not handled correctly. An organisation that is new to working with a collaborative delivery approach might therefore benefit from using availiable tools and guidelines regarding how to arrange and adapt their organisational processes to fit a collaborative approach. The British Standard 11000 (BS 11000) Collaborative Business Relationship Management framework is a tool for establishing and implementing such collaborative relationships (BSI, 2015). The framework presents an eight stage approach within three phases to help an organisation of any size and sector to develop and manage their own ways of working more effectively with other organisations, see table 1 (ICW, 2015). It provides guidance on how to avoid the pitfalls of poor communication as well as for defining roles and responsibilities that supports collaborative decision-making. The three main areas that create the collaborative business relationships are: strategic components, engagement components and management components, with the purpose to certify client organisations to establish successful collaborative relationships (LRQA, 2015).

*Table 1: Collaborative business relationships*

| COLLABORATIVE BUSINESS RELATIONSHIPS, BS11000 | |
|---|---|
| STRATEGIC COMPONENTS<br>Designed to ensure that the organisation understands collaborative relationships and has the processes and policies in place to identify the organisational potential. | 1. Awareness<br>2. Knowledge<br>3. Internal assessment |
| ENGAGEMENT COMPONENTS<br>Focuses on the opportunities of collaboration and the relationships within to ensure that the client's selection and start-up processes is well structured. | 4. Partner selection<br>5. Working together<br>6. Value creation |
| MANAGEMENT COMPONENTS<br>Puts focus on optimising performance and managing the processes throughout the lifecycle of the relationship. | 7. Staying together<br>8. Exit strategy |

Another main activity taking place in Stage Zero is the procurement of a main contractor. The selection is usually based on both price and qualitative criteria (Love et al., 2012), but can in some cases be performed on a non-price basis only (Rahmani et al., 2013b). The tender evaluation is, in similarity to the ECI model, unique from case to case and it is up to the client to decide what criteria are evaluated and how they are weighted. The price criteria can include a contractor's profit margin, hourly rates, approach to risk pricing and other components that can be accurately priced (Ramani et al., 2013b; Department of Main Roads, 2009). The qualitative assessment is usually based on criteria such as the contractor's proposed construction method, their ability to handle risks, previous experience with similar projects (Love et al., 2012) and their understanding of the importance and quality of new ideas (Rahmani et al., 2013b).

The tender evaluation will not be further investigated in this thesis but the client should keep in mind that the selection process is not only a client process (Mosey, 2014). Contractors also have a choice in picking the clients that they would like to do business with (Morwood et al., 2008) and will identify clients and projects that are believed to be aligned with their business and strategic goals.

**The ECI contract(s)**

Parallel to the procurement process, a client has to decide on an appropriate contract structure. This can consist of a separate conditional contract for Stage One and an unconditional one for Stage Two, or one contract with two distinct stages (Rahmani et al, 2013b). Mosey (2009) suggests that an appropriate contract agreement not only protects rights and limits liabilities, but can act as a handbook for performance and to manage the early project processes and promote good practices. However, even if the early agreement can be freestanding, without a direct link to the construction phase, this

particular approach breaks the continuity of the contractual system. Mosey (2009) therefore concludes that the project may be less likely to be commercially attractive to contractors as their contribution in the preconstruction phase might be transferred to the client and tendered back to the market. Therefore, the conditional contact is important in order to establish a commercial justification for the contractor's contribution to the Stage One processes.

In the UK there are several different contracts developed to manage and govern partnering projects and support the collaborative procurement, while in Sweden there are no such specific contracts for collaborative project relationships. Instead, collaborative processes and arrangements are formulated in attachments to standard contracts or not at all. A commonly used contract in the UK is the New Engineering and Construction Contract, NEC3, which was launched in 2005 (NEC, 2014a). The contract promotes collaboration between clients and contractors and forces all parties to enter into the contract with a collaborative mindset (NEC, 2014b). Another UK contract is the multi-party Project Partnering Contract, PPC2000, published and introduced in 2000. It provides a single contract governing both the preconstruction and the construction phase and is aimed to establish increased contractor commitment to the contractual activities (Mosey, 2014). It aligns contractual project management with team-building and behavioural processes and allows all project members to "contract as a team" on identical terms (ACA, 2010). The contract includes a clear timetable for activities before and during construction, which helps to avoid delays and misunderstandings, and establishes a discipline for team members to be realistic in their time planning. In a report commissioned for the Office of Government Commerce, Arup Project Management (2008) compared PPC2000 with NEC3 and identified that the PPC2000 approach in ECI projects result in the client procuring its contractor "at the point in the process where his specialist construction and management skills can have a great impact on the project" and that it through its two stage process can focus on value at all material points.

### 2.1.2 Stage One: Planning and design

Stage One in an ECI contract starts with the establishment of a design team comprising personnel from each of the contracted parties, i.e. client, contractor and consultant, and sometimes also subcontractors and suppliers (Department of Main Roads, 2009). The main process of Stage One is the development and agreement of a target price for the project (Morwood et al., 2008). The design team defines and designs the project to the point where it can be somewhat accurately priced and a target cost can be developed (Mosey, 2009). This stage allows time to understand and plan for critical events of the project, which will result in a more accurate project programme. Furthermore, it allows the time to plan for recruitment of personnel for the construction stage. The following activities are found to be the key processes and deliveries of Stage One and the client should ensure that these are planned for and executed in order to successfully perform an ECI project (Morwood et al., 2008; Department of Main Roads, 2009; Australasia, AA, 2010):

- Establish clear goals, accountabilities and responsibilities at all levels
- Confirm scope and key objectives
- Develop and implement management systems, plans and procedure
- Prepare a high performance management plan and initiate team development
- Establish integrated project team and common office
- Develop, commit to and implement a collaboration charter with an agreed vision and principles for behaviour
- Develop design for cost estimation
- Complete risk and opportunity assessment and develop contingency strategy
- Ensure required approvals and permits
- Complete target cost

Morwood et al. (2008) highlights the importance of engaging with independent industry experts during Stage One in order to validate and ensure that a solid value for money proposition is being developed. It is also believed that ECI will contribute to increased opportunities for innovation in Stage One of the contract as the contractors will be given a higher level of freedom to test different scenarios and use their experiences and competence to its fullest (Song et al., 2009). Furthermore, the participants should have a clear understanding of which risks are borne by the contractor and which remain with the client since this may impact the cost estimation. A key feature of this stage is therefore open communication and a focus on enhancing the processes of collaboration (Mosey, 2009). Participants need to seek for an understanding of each other and work on establishing relationships within the project organisation.

## 2.2 The collaborative project environment

In order to evaluate ECI as a relationship-based procurement approach, it is useful to categorise the different activities that are desirable in an efficient collaboration. An example of how these features can be framed is presented by Walker and Lloyd-Walker (2015), who separate the platform fundamentals from the behavioural processes and the support functions. The collaborative project environment (CPE) presented here is developed and adapted from the model presented by Walker and Lloyd-Walker (2015). The framework comprises three broad categories (see figure 2) where the ECI organisation is the fundamental platform where the basic needs for a project are coordinated, such as governance and project management. The attitudes and behavioural factors constitutes the second category where human values such as trust and a shared project culture is created and, finally, the processes and support functions which comprises the processes and means needed for successfully performing and coordinating an ECI project.


*Figure 2: The collaborative project environment (adapted from Walker and Lloyd-Walker, 2015)*

### 2.2.1 The ECI organisation

The use of ECI contracts in infrastructure often requires the creation of large project organisations involving many representatives from several different companies. The alternatives for structuring the ECI organisation are therefore many. Walker & Lloyd-Walker (2015) point out that the organisation should be designed to suit the individual project and the delivery objectives. It is suggested that the ECI collaboration should be led by client officers, supported by representatives from the other teams in a so called Core Group (Song et al., 2009; Koncarevic, 2013; Mosey, 2014) or Core Team (Eadie et al., 2012). Walker and Lloyd-Walker (2015) refer to this group, which should be comprised of senior representatives from contracted participants, as the Alliance Leadership Team. Mosey (2009) suggests that duties of the Core Group are to provide mutual 'early warnings' of potential problems and to seek solutions to these and potential dispute. Additionally, Walker & Lloyd-Walker (2015) emphasize that the team should consist of management representatives that make high-level strategic decisions. The composition of this team is highly relevant as an effective team can make authoritative decisions that take immediate effect (Walker & Lloyd-Walker (2015). The members need training and support to ensure a clear and consistent understanding of the ECI processes. According to Mosey (2009), the contract should clarify which people are part of the leading team and their level of delegated authority, terms of reference, circumstances in which they meet, meeting procedures, means by which decisions are made and limits on replacement or substitute members. The contractural provisions and management plan should present who is authorised to do what, who in entitled to call meetings and what decision making power the project management team have as a group.

In addition to the core group, a management team, referred to by Walker & Lloyd-Walker (2015) as the Alliance Management Team, comprised by operational level executives from all project parties leads the operational processes, and downstream

from them an appropriate team hierarchy undertake the works. The project management function has an important role to play in welding the team together, and because of its authority to call and chair meetings and issue instructions; it also has a central role in the ECI project organisation (Mosey, 2009). The Department of Treasury and Finance (2011) emphasizes the importance of a hierarchical integration where leaders are inspiring and motivate employees by informally interacting with them in various levels of the organisation. A common project office could therefore be beneficial in order to promote direct communication, problem-solving and interaction, as well as to enable better monitoring of the collaboration (Mosey, 2009; Walker & Lloyd-Walker, 2015).

In addition to the governance and management structure, a clear communication strategy is considered important to support an efficient ECI organisation and to avoid misunderstandings, empower trust and support effective decision-making (Mosey, 2009). Decisions made must be communicated and spread to the rest of the organisation and, above all, to the right parties. It is therefore important to create common processes and systems through which project participants develop a shared understanding of the project language and terms of communication (Mosey, 2009; Song et al. 2009). Walker and Lloyd-Walker (2015) state that a common information and communication technology (ICT) platform can minimise risks of poor coordination, communication and misunderstandings between project participants and is an important addition to the governance system.

### 2.2.2 Project culture and attitudes

Both Eadie et al. (2014) and Koncarevic (2013) suggest that main problems concerning governance in an ECI project are reluctance from the client to embrace a cultural change and sharing vital information. Different organisations have different cultures and identities and Walker & Lloyd-Walker (2015) have seen this phenomenon in their research performed over several decades. They concluded that when a project team feels a sense of purpose about a project, they are reinforced with a strong sense of engagement and motivation, which helps a common project culture to grow. However, Mosey (2014) emphasizes that the client needs to take the lead in initiating and developing this culture and demonstrate complete commitment to the team.

Rahman and Alhassan (2012), Eadie et al. (2014), Love et al. (2014) and Perklev (2014) all stress the importance of creating a common "best-for-project mindset" within the organisations where the parties jointly and constantly work toward project success. Examples of how a collaborative culture can be encouraged are through organised workshops, co-location of staff to build mutual trust and to discourage opportunistic behaviour (Mosey, 2014). Additionally, in order to integrate all team members towards this mindset, Lloyd-Walker et al. (2014) argue for effective knowledge sharing, a no-blame culture and the establishment of a nurturing trust between the involved parties (Kadefors, 2004; Rahmani et al., 2013c; Walker & Lloyd-Walker, 2015).

### 2.2.3 Processes and support functions

The last category of the CPE includes processes and support functions. One of these is the project programme, which is a key tool for planning a project (Mosey, 2009). Smith et al. (2006) emphasise that the designers', contractors', suppliers' and manufacturers'

activities should be organised and integrated to meet the objectives set by the client and/or the contractor. According to Smith et al (2006) it is difficult to enforce a plan which is conceived in isolation, and it is therefore essential to involve the parties responsible for performing the activities in the development of the plan. The absence of a proper and agreed project programme will leave the project management without control over who does what and when, and the project team members might become ignorant of the expected timing of their own contributions (Mosey, 2009). The programme in Stage One of the ECI contract should include the activities that are preconditioned for proceeding to the construction stage. Mosey (2009) suggests that the programme should clearly state the following activities or requirements, the deadline for it and the party/parties responsible for it:

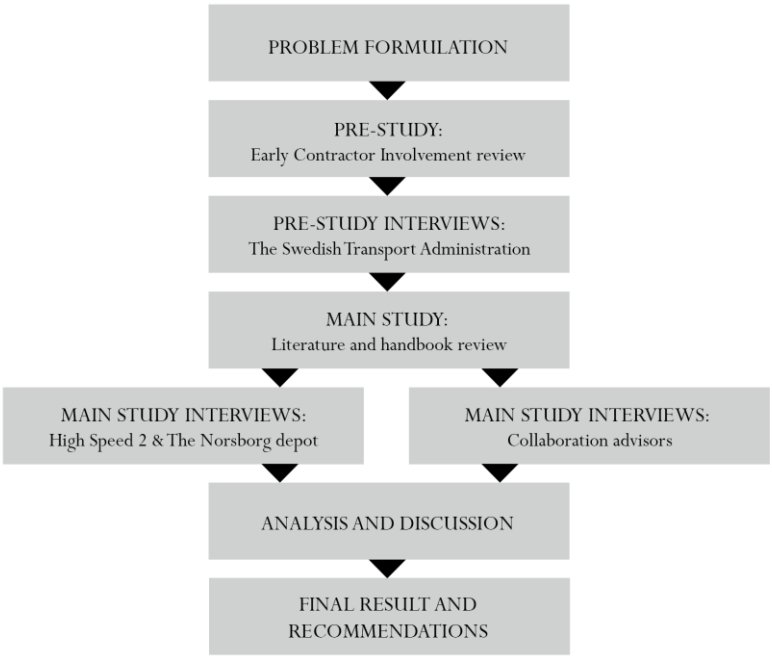
- Design development submissions
- Surveys and investigations
- Cost plan submission
- Value engineering and value management reviews
- Procurement processes for selection of subcontractors and suppliers
- Pricing Packages for all work and supply packages
- Risk management actions
- Client approval and comments in response to each submission and proposal
- Submission of applications for third party approvals
- Funding, land acquisition and other client preconditions to commencement of work
- Satisfaction of health and safety preconditions
- Satisfaction of insurance and security preconditions to commencement of work on site

ECI is often described as an approach where risks are distributed between the client and contractor in an efficient and fair way (Song et al. 2009; Rahman & Alhassan, 2012; Love et al., 2014). Therefore, the project programme should highlight the importance of developing appropriate risk responses in Stage One of the ECI contract and that the risk management planning should be performed jointly by the client, main contractor and consultant. The team should strive to jointly identify risks and agree what precautions can be taken to reduce or eliminate them (Mosey, 2014; Walker & Lloyd-Walker, 2015). A risk-sharing conversation should include discussions of who takes responsibility for any particular risk and plan for mitigation actions. It is important that the strategy is coherent to ensure that the risks are allocated to those best able to manage them in a way that aligns with the overall risk strategy and project objectives (Walker & Lloyd-Walker, 2015). According to Rahman and Alhassan (2012), risk management requires commitment of all project participants and Love et al. (2014) state that the main advantage of risk management in an ECI contract is the fact that it prevents contractors from being exposed to risks that they have little or no control over.

The need for coordinating and facilitating activities in the project programme in regards to collaboration has been shown to be important for client and contractor organisations to stay competitive (Mosey, 2014). Even so, much of available ECI literature fails to consider the importance of facilitation and collaboration competence and where this competence should origin from. However, California Department of Transportation (Caltrans, 2013) highlights the importance of a professional neutral facilitator in partnered projects for planning and directing the collaborative environment. Facilitation is based on the core principles that better utilise people and information by overcoming personal and group barriers such as mistrust and disputes. Thereby, tensions between parties with different cultures, values and working habits may be resolved (Bell and Morse, 2012). A facilitator is often an external party with specific competence in collaboration, and the inclusion of such a third party for merging organisations together is believed to have a significant impact on the overall success of the project (Bell & Morse, 2012). Caltrans (2013) stresses that a professional facilitator should be neutral in order to communicate effectively, build consensus, look ahead and prevent and resolve disputes. Experience in the construction industry is also highly desirable, as the facilitator has to expedite discussions and meetings between employees, so the ability to "speak their language" and understand construction policies and procedures will be important. In addition to a collaboration facilitator, organised facilitated workshops can be a good way of encouraging a collaborative culture and are preferably held in the project start-up (Mosey, 2014) with continuous follow-up sessions to ensure that high levels of collaboration are maintained (Caltrans, 2013).

# 3 Research strategy

The following chapter presents the research strategy of this thesis. A literature review, interviews and a final analysis have been performed in order to answer the thesis purpose and research questions. The research started with a pre-study, followed by the main study, which together lie as a foundation for the final discussions and the conclusion.




*Figur 3: Research strategy*

## 3.1 Pre-study

The research initially begun with a pre-study consisting of an ECI literature review and a set of explorative interviews. The purpose of the literature review was to explore the different experiences and available research in regards to ECI, and to understand the foundation of the concept before performing the interviews. In addition to academic literature, handbooks and guides in the field of ECI have been studied. These sometimes have a commercial interest, which the reader should take into consideration. As they reflect experiences in practice they are however believed to strengthen the study and provide a more complete frame of reference. The pre-study continued with five explorative interviews with representatives from the Swedish Transport Administration (STA) and the West Link (WL) project. Two procurement officers and three project managers were interviewed with questions based on the initial literature review and regarding the WL approach to ECI. The questions were formulated to cover the challenges, expectations and competence regarding ECI from the STA's point of view. In addition, two seminars were held with a professor from RMIT University in Melbourne, Australia regarding relationship-based procurement approaches in construction projects. The interviews and seminars were approximately around ½-3 hours and held at the STA's office and at Chalmers University of Technology. The interviews were structured around a few questions and themes including, but not limited

to, general knowledge concerning ECI, planned management and governance structures and expectations of the collaboration. The interviews gave the respondents an opportunity to discuss freely around the subject with little or no influence from the interviewers. This could place the interviews somewhere in between an unstructured and semi-structured interview technique (Bryman, 2012; Creswell, 2013) which contributed with insights and an understanding of the current level of knowledge concerning ECI and what areas were of particular interest for further studies.

## 3.2 Main study

With a clearer understanding of what the client organisation STA expects from the ECI collaboration, a main study followed with an additional and more thorough literature review. ECI was further investigated, as well as how to arrange projects where high levels of collaboration are desired. The collection of data was performed using scientific articles, handbooks from international infrastructure organisations, and other published literature. Electronic databases such as Google Scholar, ProQuest and Summon were used to find these articles and handbooks, together with literature from the university and public libraries.

In addition to the main study's literature review, interviews where performed with highly experienced professionals within construction performance, procurement and collaboration (see table 2). Two reference projects were found and investigated through interviews, with the purpose of getting a more thoroughgoing understanding of previous ECI and collaboration experiences. According to Bryman (2012), there are major advantages with comparing two or more reference cases as it creates a solid base to examine and improves the scientific result. All of the respondents have experience in procuring infrastructure projects and some of them possess more specific experiences concerning ECI. The time-span of each interview was 1-2 hours and were, compared to the interviews in the pre-study, performed more strictly with a semi-structured interview technique presented by Bryman (2012). It is a scheduled activity with open-ended questions that follows a script and covers a list of topics and is commonly used in situations when the interviewer only has one chance to interview someone (Russell, 2011). The questions force the respondent to give a verbal tour of something they know well and are beneficial since it gets respondents talking in a focused way (Leech, 2002). As a few of the respondents requested to be anonymous in the report, a choice was made to not mention the interviewees by name, but instead their profession.

### 3.2.1 Interviews: Collaboration advisors

The importance of dedicating substantial resources specifically for creating a collaborative environment in order to realise the maximum potential of ECI is highlighted in the literature. To further investigate how this is done in practice, a telephone interview was held with a US representative and founder of the International Partnering Institute (IPI). IPI is a non-profit construction organisation devoted to implement concepts such as collaborative partering in construction project settings**.** The respondent has worked as an external facilitator on more than 2500 project over 29 years and written books on construction partnering before launching IPI. The main topic of the interview concerned the role of a professional neutral partnering facilitator and the impact of bringing such a specialist into a project. Additionally, an interview was

held with a professor and legal advisor from King's College of London, UK, with extensive experiences in the field of ECI. The respondent is also the author of a comprehensive book on ECI based on case studies, and a co-creator of the British multiparty collaborative contract, PPC2000. The interview covered general questions about the client's involvement in ECI processes, how the contractural arrangements should be designed and how a client should prepare their project organisation in Stage Zero.

### 3.2.2 Interviews: Reference projects

In Sweden there are few infrastructure projects procured under the ECI approach and the experience of ECI is therefore limited. Because of this, High Speed 2 (HS2), a major infrastructure project located in the UK which is procured using the ECI approach was the first case to be investigated. It is a high-speed railway track, which is being built to connect London to the west midlands. It was chosen because of the experiences of using ECI in the UK and since the project is currently in the same stage as the STA and the WL project. The Head of Procurement and Head of Supply Chain Management of the client organisation High Speed 2 Limited was interviewed concerning organisational and collaborative arrangements when using ECI and how this is applied in the HS2 project. The questions posed mainly concerned what knowledge is required by the client to perform a project with ECI and how the client should work in Stage One to ensure collaboration, increase motivation and support innovation. The respondents were asked to elaborate around the advantages and disadvantages of a collaborational facilitator, if ECI has resulted in any challenges for the client organisation compared to traditionally procured projects and how they prepared for the project in Stage Zero.

The second case, the Norsborg depot, located in Stockholm, Sweden, was investigated because of their positive experiences of collaboration by involving the contractor in an early stage of the project. The project has been highly successful in its use of a collaboration facilitator and can therefore contribute with valuable knowledge and experiences to the STA. Three representatives from the project were interviewed: the Project Executive Officer from the client organisation SLL, the core group representative from the main contractor NCC and an external Collaboration Facilitator from Human Challenge. The questions concerned their use of the collaborative advisor in the project execution process and how the client and contractor organisation worked in conjunction with this external advisor to establish a well-functioning collaborative environment.

The reference projects selected do have shortcomings regarding the suitability for this study. Firstly, the Norsborg depot is not an actual ECI project and has not utilised the two-staged approach. The project therefore mainly provided valuable knowledge concerning collaboration and the creation of a best-for-project mindset. Secondly, recommendations and experiences from the HS2 project were limited due to the early stage the project is currently in. Consequently, little practical experience could be gathered and the research therefore primarily relies on handbook literature and guidance and input from the collaboration specialists. Even if the literature provided a solid support for the adoption of ECI, it would have been beneficial to explore completed ECI projects and extract experiences from these.

## 3.3 Analysis

Bryman (2012) suggests that researchers should answer and analyse how believable the findings are, if they apply to other contexts and if they are likely to apply at other times in order to confirm the validity of the found information. Additionally, Boeije (2010) discusses that data analyses occur in two steps, namely *segmenting* the information into parts and *reassembling* the parts again into a coherent whole. Jorgensen (1989) and Boeije (2010) define an analysis as breaking up, separating or disassembling research material into elements, which the researcher then sorts and searches for classes, processes and patterns. Furthermore, Boeije (2010) adds describes the reassembling where the researcher searches for relationships between the distinguished parts and explanations for what is observed. The segmentation of data in this report was done after the first explorative interviews were held and categories to describe the client's expectations could be distinguished. The results have been analysed and compared to the theories in the literature framework and structures according to the research questions presented in section 1.3.

**Reliability and credibility**

As the major part of this master thesis was conducted through a qualitative research approach there is a need for analysing the findings in regards to how trustworthy the information is and if it can be applied to the research in focus. Bryman (2012) identifies three criteria: reliability, credibility and transferability, which are important when analysing whether the information is reliable and valid or not. There are often many possible versions of the research arguments, and therefore the credibility determines how acceptable the information is. Both Yin (2003) and Bryman (2012) suggest that a triangulation may be applicable which means more than one source of data is used to ensure the credibility of the information. In the field of research, transferability means if the findings are applicable within other contexts. As a qualitative research is aimed at capturing many possible views of individual groups, the findings tend to be unique and significant to the subject of study (Yin, 2003; Bryman, 2012). The use of transferability is particularly important in this investigation as the concept of ECI is becoming increasingly popular and every infrastructure project and client is unique.

# 4 Results

The result chapter contains the empirical responses from interviews made with clients, contractors and advisors representing different companies and projects. The chapter starts with findings from the explorative interviews describing STA's current knowledge about ECI and what expectations exist within the client organisation. This is followed by interviews made with collaboration advisors and finally, findings from the studied reference projects.

## 4.1 Pre-study: The STA and WL

The STA has recently begun to reinforce the railway system in the west of Sweden, where the Central Station in Gothenburg is the hub. This is mainly because the capacity issue in and around Gothenburg has grown and the Central Station is already used to its maximum with current railway traffic (Trafikverket, 2014c). The West Link (WL) is a part of the West Swedish Package and is to be built between 2018 and 2026 (Trafikverket, 2014b). The project is a part of the public infrastructure plan 2010-2021 and the estimated cost is approximately SEK 20 billion, (monetary value 2009). The project is an eight-kilometer long double track through the central parts of Gothenburg of which six kilometers in a tunnel (Trafikverket, 2014b). With three new underground stations at Gothenburg Central Station, Haga and Korsvägen the accessibility will increase and will facilitate easier travelling in the central parts of Gothenburg (Trafikverket, 2014c).


*Figure 4: The West Link (ECI-contracts in color)*

### 4.1.1 The ECI initiation

The WL project is divided into six contracts where five contracts cover the different geographical areas, plus one BEST contract for the whole distance, including tracks, electricity, signals and telecom works, see figure 4 (Trafikverket, 2014b). Depending on the conditions in the different areas, the STA has chosen to procure the parts in different ways. The station Olskroken is not formally a part of the WL but has separated funding and is a project on its own. However, it is run by the same managing organisation, which is why it is often presented as included in the WL package.

Because of the complicated prerequisites that the stations Olskroken and Central Station comprise, the procurement form ECI has been chosen for these contracts. Using traditional contracts was believed to consume more resources and also to impede on construction efficiency. The circumstances and ground conditions in the areas are complicated and complex and would be too difficult to fully specify. According to a project manager, the STA wants to work in "smart ways" and go beyond the level of collaboration in their traditional partnering projects. In discussions with international contractors and clients concerning new and innovative contracts, ECI came up as a suggestion. An evaluation of earlier projects using this form of collaborating was made and ECI seemed to be the most suitable way of working for two of the WL contracts.

For the contract Olskroken, the main contactor will be contracted for Stage One and if reaching an agreement regarding the target price and implementation, this opens up the option of a contract for the construction stage, Stage Two. The duration of Stage One is estimated to twenty months and is planned to commence in the beginning of 2016. The procedure for Centralen will be similar but Stage One is instead estimated to 18 months. Stage Two of both these projects is governed by a design and construct contract. When this thesis was written the detailed contract arrangements, including models for reimbursement and incentives, had not yet been determined or published. However, in the procurement strategy, Trafikverket (2014b) presents ECI as the main risk for the project, besides lack of experience from large projects and risks concerning communication with foreign contractors. This is mainly due to the current lack of experience of the ECI method and how to perform an ECI project in the best way possible. The consequence description explains that ECI may affect both time, cost and quality of the project as it is a new and unexplored way of working (Trafikverket, 2014b).

### 4.1.2 Client expectations

The expectations of the STA representatives concerning the ECI collaboration are overall positive. All respondents agreed that a closer collaboration during Stage One would improve productivity and make it easier to follow the time plan. A contractor's knowledge early in the project is considered invaluable because of the complex conditions that the WL entails, and some respondents believe that the STA should perhaps have brought in the contractors even earlier than what is planned today. A project manager stated three factors that hopefully will be improved compared to the traditional way of procuring infrastructure projects. Firstly, the respondent believed that ECI would help the project to find innovative ways to plan the project that are better suited to production and will therefore increase creativity. Secondly, ECI could be

beneficial concerning risk exposure and risk treatment by distributing the uncertainties between those who can handle them best. Finally, a working environment with closer collaboration between client, contractor and consultant would increase profitability for all parties involved and create long-term relationships.

### 4.1.3 Perceived ECI challenges

All of the interviewees from the STA stated that the main challenge with ECI would be to create a collaborative environment where all project members are dedicated to working closely together by having a "best for the project"-mindset. However, all respondents agreed that the ECI approach cannot be used if the client does not dedicate the whole organisation towards high collaboration and let go of the traditional control. The same applies to the contractors and consultants and one respondent stated that "...motivation to collaborate is essential for the success of the project...". Many of the interviewees believed that it would be difficult for the STA to simply let go of the controls and show faith in other parties. One project manager said that the STA must work hard towards increasing trust and creating total transparency between all parties in order to make this ECI collaboration work. Another respondent stated the importance of imagining all parties as a unity where there are no "I" and "you", but simply "we". The respondents agreed that a core group must be created with representatives from all parties which are completely committed to the project in order to reach success. The question about efficient communication was also seen by most respondents to be a main challenge. Since the ECI approach encourages openness and transparency, the communication flow is more important than ever. It was considered important that the contract specifies responsibilties. One interviewee stated that communication is the key to innovation, but that lack of knowledge of how the ECI process actually works makes it hard to answer how it should be done.

### 4.1.4 ECI competence and knowledge management

Most interviewees believed that different individuals within the client organisation have embraced the news of using ECI differently. As of now, no extensive information has reached all employees, which has resulted in a few sceptical employees who prefer working in traditional ways. Other employees might feel insecure due to limited information provided and are therefore becoming reluctant towards the way of working. However, all respondents agreed that the benefits of working together in an ECI contract would be greater than the challenges and risks of not collaborating closely. It is therefore a shared belief amongst the respondents that the STA must work harder to spread the knowledge throughout the project office and thereby improve their knowledge management. One interviewee suggested short breakfast meetings and informal seminars where the procurement managers explain the project status, how the ECI contract should be performed, what the organisation can expect from it and also make room for questions that arise within the organisation.

Some respondents believed that most competence needed for an ECI collaboration already existed within STA's organisation and that there is no need for hiring external experts. The most obvious competences within the client organisation are those of managing large projects and building large project organisations. Many interviewees discussed the possibilities of transferring collaboration issues to an external expert who

will be responsible for welding the organisations together, but some employees believe that this can be handled within the project organisation itself.

### 4.1.5 Collaboration processes

All of the interviewed representatives from the client organisation believed that agreements, rules and processes for efficient collaboration must be put in writing in the contract. It must be explained why the project will benefit from openness and transparency and that some sort of core group must ensure that these statements are followed. It is important that the client organisation is fully informed and works as a role model within collaborative questions. One respondent was doubtful towards the contractor's abilities to work transparently and said that the contract must have penalties for not collaborating. Another project manager discussed the importance of having a physically co-located project office with common offices and lunchrooms, for creating a good project culture where all parties work as a united unity. The overall belief is however that the core group should make a collaboration plan at the beginning of Stage One and set the rules and standards for what not to do and organise workshops and a kick-off where the project teams have the opportunity to get to know each other.

## 4.2 Main study Part One: Collaboration advisors

In the following section the interviews with a Professor and Legal Advisor from the UK and the CEO and Founder of the International Partnering Institite, USA, are presented.

### 4.2.1 The collaborative client

The US respondent, with many years of experience from serving as a professional partnering facilitator, highlighted the risk of an inexperienced client, particularly when it comes to ECI procurement methods. The respondent shared that working in relationship-based projects will be different compared to traditional, adversarial, ones and a client must realise that the processes are going to change from how they are used to work. Some people in the organisation might have to rethink how to do their job and it is therefore important to ensure that people within the client organisation are actually ready for the ECI collaboration. Appropriate training for the organisation, prior to the project start, is a way of helping the client employees understand what they are trying to achieve by a collaborative approach and why. Getting people to accept and embrace the new way of working is key for the organisation and something the management will have to work on. The respondent recommends initial partnering orientation training to make individuals see that it will be worth the effort to change their behaviour. The respondent further said that an organisation can put all the structures in place to make a collaboration work, but if it is unable to get the people who are actually building the project to accept the new paradigm, it makes it a lot more difficult.

According to the UK respondent, all collaborative projects are comparable. In his view, a large national project is not so different from a housing project in terms of ECI processes. It is therefore important for a client organisation to investigate experiences from using this kind of model in earlier projects. The respondent stressed the importance of talking to people who have been through this kind of process before. The

first thing a client must consider is *why* they want to use ECI as a procurement model. The method will not provide a solution on its own, but rather a set of principles that, if conducted rigorously, will produce shared information on how to perform a successful project. According to the respondent, clients in some cases try to conceal certain data from the contractor. Such behaviour must be eliminated. For example, the client may sometimes hide financial factors for a "safety reason" so that they can change and manipulate the numbers if something goes wrong. This is often the biggest issue, which results in claims and disputes and will inhibit trust. If there instead exists a shared set of information this will be a stable basis on which to seek improvement in design, cost, acceleration of project programme or a better risk position. The client must simply take the position as the "collaborative client" and set the standard for the rest of the project organisation. The UK respondent further said that the key to success is the implementation of a new project culture where transparency is the foundation. He claimed that culture comes from actions, not words, and if people are distrustful, nervous and conservative, they need clear guidance in a specific way.

> [..."We have in construction a religious notion of how we can be collaborative and trusting and operating in good faith without doing the work necessary to earn that. We talk about disputes and dysfunctional relationships and the Nirvana of collaboration as if something mystical; as if it is a philosophical concept of what is needed. I do not think that is true. People are distrustful because they do not have complete data, they are nervous because they are trained in a particular way and conservative because there is so much risk involved in construction. And to tackle this, you need to change specific things in a specific way, not in a mystical manner. Culture comes from actions, not words."...]

He strongly stressed that a successful collaboration requires a person within the client organisation who understands the nature of collaboration. According to his experience from ECI contracts, one inspiring person in the client organisation is often sufficient to establish an efficient collaboration. As stated by the respondent, "...leadership is simply the key to a successful collaboration. Find someone who is lively and active and they can pick this up over night."

### 4.2.2 Collaboration facilitators

In the United States, the partnering agreement exists outside the actual contract agreement. As a result, the US respondent highlighted the importance of using a professional *neutral* partnering facilitator working together with the rest of the team. Typically in US partnering, there are partnering champions (an Executive Team) of leaders from the client, the contractor, the Designer, and other key team members who are champions for the process. The partnering facilitator helps the partnering champions promote partnering throughout the project and they all work together. The reason for having a neutral facilitator is that these is an inherent power imbalance in projects where the owner (client) writes the contract, controls the funds as well as the design, holds all of the decision-making power and owns the risk within the project. In order to balance the power, it is essential that the facilitator is neutral and the respondent claims that a facilitator from the client organisation will therefore definitively not work. The role of

the facilitator is to help meld the project participants into one project team focused on the success of the project, and this cannot happen if the power imbalance is not neutralised. Understanding how to be a professional neutral and being able to tell people the truth are capabilities that are important for the facilitator to possess. Further, in US construction partnering, the neutral facilitator is also important in dispute resolution where the role is to prevent issues from lingering and damaging the internal relationship within the project organisation. In other words, the facilitator holds the team accountable for when decisions need to be made and by whom.

The UK respondent stated that the use of an external collaboration facilitator, who leads kick-off workshops and measures the overall collaboration regularly, could be beneficial. He emphasised that an external facilitator often understands the human nature, but has to be combined with a dedicated client representative.

Thus, the views of the role and importance of collaboration facilitators differed between the respondents. However, it should be noted that facilitators are used for different purposes in the US versus the UK. In the US, facilitators frequently are required to have construction experience. In the UK and Europe, facilitators are more typicaly focused on team building. Furthermore, ECI projects are supported by collaboration-oriented contracts and payment which is not the case in most US partnering projects.

### 4.2.3 The partnering lifecycle

The US respondent shared that in a large project with many packages (sub-projects) there should be an overall partnering programme. A programme level executive team comprised of senior employees from each contract, as well as the owner and contractor, will formulate the programme and be in charge of steering the project towards success. For each package there will also be an executive team and a core group. During design the core group and executive team should meet every month and the programme level executive team meets quarterly. The overall goals and values for the project are set by the programme level executive team and are then passed down to each package to make sure that the goals for each contract are consistent with the overall project goal. The values of an organization are embedded in their policies and procedures. If a project team has a value of collaboration, but the client has policies in place that go against that collaboration, the team will have problems, see figure 5.


*Figure 5: Shaping behaviours (Caltrans, 2013)*

The US respondent discussed that partnering is not a one-time activity but that it must last throughout the project. The *"partnering lifecycle"* starts with the kick-off workshop, continues with follow-up partnering sessions and ends with a close-out workshop. The respondent further shared that project teams who get the best results meet with the core group every month in order to create accountability to the team. In a large project, many things are going on at once and in the monthly sessions people

and teams can be held accountable for what they committed to do during the previous session. The partnering process is also monitored by a monthly evaluation called a scorecard. The scorecard is a way of measuring how the project is progressing concerning the project goals and the level of collaboration within the team. Both the overall goals, and the commitment made in the partnering sessions are scored on a 1-5 Likert scale. The scorecard is revised after every partnering session and is web-based. The resulting report shows the team whether they have positive or negative momentum. In addition, the scorecard can be related to a reward/recognition process where individuals can nominate a partnering champion of the month to further promote collaboration. The respondent shared that besides these processes it is important to incorporate partnering into the team's daily work and encourage the managers to use creativity in pursuing the goal to keep the team members working together.

### 4.2.4 Contract arrangements

According to the UK respondent, the way the contract is formulated is a key to success in an ECI project. The client needs a contract system that works and includes both Stage One and Two. The client also needs a conditional contract system with a clear set of timetabled activities where the terms of collaboration are stated. He thought that the ECI approach provides a wonderful set of opportunities provided that there is a formal early appointment of the contractor against a timetable of agreed activities and with a clear basis of how this translated into the construction phase, as Stage Two will be the biggest incentive for the contractor. The conditional activities might include design- and programming reviews and site investigation undertaken by the contractor. The respondent states that in the preconstruction phase conditional appointments can be attached to a typical Swedish form contract. This way, everybody knows the rules by which they are working and what is expected from them.

> [..."The essence of what makes a difference are above all three things: a formal conditional early appointment, means of connecting the contractor, the consultant and the subcontractors through mutual agreement for key deadlines for activities and finally the governance systems saying: here is how this group of people is going to meet, this is what they are going to do and this has to be done contractually."...]

Concerning how to reach innovation in design, the UK respondent discussed that even the most sophisticated collaborative client seems to put far too much faith in pain/gain share in target cost contracts. The respondent stresses that innovation will not come from the main contractor alone but through conversations with subcontractors, suppliers and manufacturers. These parties have all sorts of knowledge to offer so the interesting things come when there is a three way or a four-way conversation. Because of this, it is important for the client to have the machinery and structure in place to keep the subcontractors connected to the client and consultants to stay on top on the innovation process.

## 4.3 Main study Part Two: Reference projects

The following section presents the findings from interviews performed with representatives from two reference projects. The first is a major infrastructure project in the UK called High Speed 2, similar in some aspects to the WL project. Second, the Norsborg depot located in Stockholm, Sweden, has been investigated due to their successfully performed collaboration.

### 4.3.1 High Speed 2

The railway system in the UK has been increasingly busy and the demand for a long distance railway track has emerged in the last 15 years. Therefore, the project High Speed 2 (HS2) has been developed with the purpose of provide new capacity between eight of UK's ten largest cities with better connectivity and quicker journeys (UK Government, 2013). HS2 will be built in two stages and the whole project is expected to start running in 2033. ECI is used as the procurement approach and the project is currently entering into Stage One of the collaboration (HS2, 2014b). The case is based on interviews with the Head of Procurement and Head of Supply Chain Management of the HS2 client organisation and a summary of information provided by these.

**Project management and governance**
An executive team shapes the governance and organisational structure at HS2. There are three delivery units - development, operations and infrastructure who works closely in the project start-up with the development of a project programme and delivery strategy. However, the organisation required in this major project is difficult to apply in other contexts and the respondents said that it is impossible in the current situation to describe the organisational chart and hierarchy for HS2. The Head of Procurement and Head of Supply Chain Management implied that the Executive Team must develop a clear delivery strategy in Stage Zero, which in the end will result in a clear procurement strategy. The respondents stated that a client organisation must ask themselves what they want to get out of the ECI collaboration and review specific strategic business cases of successful earlier projects. A recommendation is to look globally, as ECI is more commonly used internationally. The client organisation at HS2 has conducted a gap analysis and a skills and labour forecast to understand the demand and competence needed for the project. The respondents proposed the use of balanced scorecards to describe the value-for-money criteria across the procurement, which are based on a number of strategic goals for the project. The developement of a skilled workforce is considered as one of these goals and the HS2 organisation has monitored the performance in the construction areas from previous ECI projects to fill these competence gaps.

**Best-for-project mindset and collaborative culture**
At HS2, the collaborative environment will be based on the principles stated in the British Standard 11000 called Collaborative Business Relationships. The whole approach to procurement of the project will be evaluated considering this standard and the interviewees expect to see good evidence from the arrangement. A collaborative culture will be developed through performance mechanisms which will require suppliers to collaborate both vertically with the different parties in the supply chain, and horizontally with other contractors and suppliers at a similar level. Additionally,

sharing and explaining information wherever it is possible is crucial to the HS2 project in order to create a transparent environment and an efficient collaborative culture. The head of procurement at HS2 stresses that innovation will be critical to the success of the HS2 project. The client organisation will encourage innovation at an early stage and it is believed that the use of ECI contract will help to facilitate this. The involvement of the client in design processes, the enhanced collaborative culture, and the practical approach to risk management and engagement of many different programmes and industries is believed to create an innovative environment.

**Collaboration facilitator**
It has not been decided whether or not to appoint an external collaborative facilitator in the HS2 project. The representatives stated that if the client organisation recognises problems that cannot be solved internally the use of an external collaboration facilitator becomes necessary. The respondents believe that if a facilitator is appointed, it is important that this person knows construction and infrastructure and acts as a neutral third party in solving conflicts and disputes. They believe that a person from within one of the organisations involved often tends to be biased towards one or more parties and create suspiciousness and a reluctant project composition, which is why it is important to bring on a neutral person to the team.

**Contract and project programme**
The contractors, which are procured at HS2 for Stage One, will be evaluated on the basis of a two-stage process that allows for the development, design and construction planning and which follows by the construction works (Stage Two) and the same contractor undertaking both phases will be the default arrangement. However, the representatives from the project implied that there will be a potential break point between the two stages, and that the progression into the construction phase will depend on satisfactory performance during the first phase. The project is governed by the NEC3 contract. The HS2 organisation will adopt an Enterprise Risk Management Framework to support the client organisation, the main contractor and other third parties in identifying, analysing and managing risks identified the project delivery. It will be a shared expectation that all participants take ownership of the risks that they could possibly create for anyone downstream from them. The respondents believe that openness and trust will be critical to enable parties to come together to prevent possible risks.

### 4.3.2 The Norsborg depot

The Norsborg depot is a tunnel depot and an underground railway carriage garage located in Stockholm, Sweden. The project planning started in 2010, and it is estimated to 2 billion SEK (SLL, 2015). The principal of Stockholms Local Traffic (SL) have undertaken the works in a collaborative contract with NCC with a planned completion in 2016. The initial purpose of the project is to expand the traffic situation in Stockholm and to be able to invest in new, more comfortable carriages. To do this, there is a need for a garage to store these vehicles, and hence the Norsborg depot is being built (SLL, 2015). The project is procured as a design-bid-build contract with a high level of collaboration between the client (SL) and the contractor (NCC). The reference case is based on interviews with one representative from the client organisation SLL, one from

the main contractor NCC and an external collaboration facilitator from Human Challenge.

**Project management and governance**

The client at the Norsborg depot claimed that the core group in the project should trust the contractors regarding technical problems and instead focus on economy, time, conflicts and team development. The core group should be composed of an equal number of members from the client and contractor, preferably two from each organisation. The respondent representing the contractor said that it is desirable that the core group includes representatives with authority to make decisions to facilitate an effective decition-making process. Accordingly, both individuals "out in the project" and the people "in the office" should comprise the core group. It was also considered important to involve the customer's customer, i.e. the public, in the planning process, especially in controversial project such as the WL. Recommendations to the STA are that the client must be highly involved in Stage One of the ECI project in order to manage the project efficiently. It is not enough just to be a part of meetings and govern the project, but the client has to take time with the contractors and consultants. Personal connection is the key to efficient governance where the client participates in coffee breaks, afterworks and lunch gatherings. The communication at the Norsborg depot has been organised in a simple way with regular workshops, breakfast meetings and a newsletter from both the client and the contractor.

**Best-for-project mindset and collaborative culture**

The reason for choosing a collaborative process of working at the Norsborg depot was mainly due to the complexity of the project. According to the client and collaborative advisor of the project, the construction is taking place in a neighbourhood with high density and is therefore dependent on progression in a timely manner. A gathering of both contractors and suppliers early in the project was believed to increase the efficiency and cut costs and both the representative from the client and the main contractor beleived that having an open and hounest environment best does this. The contractor argued that as long as there are no secrets in the project, collaboration will run smoothly. The collaboration facilitator highlighted the importance of the core group getting together initially to get to know each other and jointly agree what collaboration is to them. The conditions for collaboration and project values have to start from this small group of people and then be spread downstreams to the management team, the team of civil workers and desirably to craftsmen. As the project has progressed, information meetings with the intention to introduce and unite new co-workers have been held regularly to ensure a united vision of the project goals and values. The collaborative environment has been continuously monitored and assessed through a Partnering Performance Index (PPI).

**Commitment, motivation and innovation**

All interviewees at the Norsborg depot agreed that a common project vision is the key to increased commitment and innovative solutions. High level of engagement from key individuals is seen as an important success factor especially by the collaboration facilitator. In order to utilise resources to its fullest, it is important to find a common driving force in the project. This common goal is often to earn money but it is essential that the different parties understand each other's roles in the project, where a contractor

works as a contractor and a client as a client. It is hard to transform the roles into something new, but it is easy to motivate each other across role boundaries.

**Collaboration facilitator**

Both the client and the contractor see the use of a collaboration facilitator at the Norsborg depot project as a success factor. According to the client, it is not necessary to involve a third neutral party, as long as there exists a person with high competence and experience from collaboration. The contractor believes that such a person should not be an engineer or technician, but a social scientist that can focus on the collaborative issues without being distracted by technical difficulties and discussions. The use of workshops at the Norsborg depot has, according to both the client and contractor, facilitated a smooth running project and increased the collaboration between the involved parties. The solution is to have workshops at different levels in the project organisation. At the Norsborg depot, workshops have been held at both the project management level, production level and block levels. A series of workshops, planning meetings and follow-up sessions are being held 5-10 times a year. Additional workshops with different themes, with the purpose of developing group dynamics, leadership and collaboration, are also being held 1-4 times every year for the management team.

# 5 Discussion and analysis

This chapter contains a discussion and analysis regarding the research findings. The chapter compares the findings from the explorative interviews and the main study with the theories found in the frame of reference. The discussion is divided into three sections, structured according to the research questions presented in the introduction chapter.

## 5.1 RQ1: Stage One activities and implications for a client

The activities found necessary in Stage One of the ECI contract are here presented under the three collaborative areas from the collaborative project environment (CPE) structure presented in chapter 2.3. An analysis and discussion regarding the activities feasibility and the client's involvement is made with the theoretical framework and empirical result in mind. The chapter will finally be concluded with a list of key activities that Stage One should contain.

### 5.1.1 The ECI organisation

There is a shared belief that representatives from client, contractor and consultant organisations should jointly govern an ECI project. This group is labelled quite differently in the academic literature, where Eadie et al. (2012) refers to it as the Core Team and Walker and Lloyd-Walker (2015) as the Alliance Leadership Team. However, the most common definition stated by Song et al. (2009), Koncarevic (2013) and Mosey (2014) is the term Core Group (CG). This definition is the one which hereafter will be used and the group's purpose is to manage the project towards full collaboration. The executive team at HS2 where divided into three delivery units who together develop and ensure the implementation of a delivery strategy**.** The respondents at the Norsborg depot highlighted that the CG should be comprised by an equal distribution of representatives from the client and contractor to get a neutral power balance. The US respondent however pointed out that it is more important that the level and authority of people in the Core Group are similar than that the number of people are the same. The research has shown that academic writers and interview respondents agree that the CG needs training and team building activities/workshops to ensure a consistent understanding of the ECI processes and what different organisational strengths and weaknesses there are within the different organisations. According to Mosey (2009) a CG works more efficiently if they are obliged to perform under a contract. This implies that a CG agreement is created, signed and attached to the project contract so that the role, authority and responsibilities are clear from the outset.

Schein (2004), Mosey (2009) and Walker and Lloyd-Walker (2015) all discuss the importance of working closely together in an ECI project and conclude that an agreement of common key objectives in the initiation of Stage One is essential for project success. At the Norsborg depot this work has been initiated in the CG and the overall values and goals have been joinly agreed on and then passed on and applied in the rest of the organisation. The CG has the responsibility to perform a skill and labour forecast within all organisations to determine not only the workforce for Stage Two, but also the overall involvement and coordination of key functions from the

participating organisations. The WL project will require both time and resourses to forecast the competences needed for the project phases as well as how to coordinate employees from the different organisations. In addition, Mosey (2009), the Department of Treasury and Finance (2011), Perklev, (2014) and Walker & Lloyd-Walker, (2015) all emphasize that the establishment of a common project office, where both professional and personal relationships can be enhanced, is essential in an ECI project. According to the respondents at the Norsborg depot personal connection is key to efficient governance and is established partly through coffee breaks, afterworks and lunch gatherings that are more easily facilitated in an integrated project office. Providing the project team with opportunities for informal and actual face-to-face interaction through a common project office is therefore believed to promote quicker communication and helps establish a common project culture. Again, the magnitude of the WL project may aggravate the chance of co-locating the different organisations. However, the CG must ensure that even if all professions cannot be merged, opportunities must be created where as many people as possible get the chance to interact.

### 5.1.2 Project culture and attitudes

When working in an ECI project it is highly desirable to establish a best-for-project mindset (Schein, 2004; Mosey, 2009) where all participants look to the best of the project rather than own interests (Perklev, 2014; Walker & Lloyd-Walker, 2015). The key to create this shared view is effective knowledge sharing, a no-blame culture (Lloyd-Walker et al. 2014; Mosey, 2014) and established trust and transparency (Kadefors, 2004; Rahmani et al., 2013c; Walker & Lloyd-Walker, 2015). However, the creation of a joint project organisation where all participants are co-located cannot provide these features alone. It is important to provide the employees with activities, such as workshops under supervision, where sharing of experiences are encouraged. In addition, holding the project team members accountable for commitments they have made will help develop a culture of collaboration and predictability so that what is said actually gets done (Caltrans, 2008).

The aim of these workshops is often to, initially, get to know new co-workers, discuss each other's strengths and weaknesses and agree on common project goals and guidelines (Schein, 2004; Mosey, 2009; Perklev, 2014; Walker & Lloyd-Walker, 2015). The use of these team-building activities at the Norsborg depot has, according to both the client and the contractor, resulted in both professional and personal relationships. The client's active participation has increased the overall efficiency and contributed with strong engagement amongst the employees, which helps to build a positive project culture. The respondent from the contractor organisation believed that the project, which is both ahead of schedule and under budget, have succeeded because of the initial workshop activities, which indicates that such activities early in the project can have very positive effects on the project. Since the pre-study shows that one of the expected challenges in the WL project is to create an efficient collaborative environment where parties have agreed upon the common project goals, it is desirable that the organisations work hard to ensure an early implementation of a joint project scope. The CG, and especially the client, should set the standard in this collaboration by creating a shared view on how the project should be executed before communicating it to the rest of the organisation. To illustrate, it can be desirable to perform workshops

activities within the CG where project goals and scope are decided and what different key objectives there are. It is important to know that different parties have different goals, and the client must be able to understand this and coordinate the project accordingly.

### 5.1.3 Processes and support functions

In this section the processes and support functions from the collaborative project environment are discussed. The processes and support functions within the CPE are aimed to enhance and support the ECI project and include workshops, training, risk- and planning processes and the use of internal and external collaboration facilitators.

The project programme is a key tool for planning a project where all activities required for finalising the project and agreeing on a target price is included (Smith et al., 2006; Mosey, 2009). This is believed to be a key activity in any construction project, not just in the ECI approach. However, even if many processes and activities in the project programme can be considered general and not that different from a project procured with traditional measures, there are differences when using ECI. Firstly, Smith et al. (2006) argue for the importance of jointly planning the project programme where the CG, in conjunction with management representatives, develop the plan with open minds and leave room for collaboration and team enhancement. These team enhancing processes should not be regarded as one-time activities in the beginning of the partnership, but should take place continuously throughout the project. Secondly, developing the programme is an important process in itself for getting the different parties to obtain insight and appreciation of processes and activities performed by other parties and how these might affect the activities of their own. Smith et al. (2006) claim that a construction and preconstruction programme conceived in isolation by the client will be difficult to enforce and it is therefore essential that all parties take an active part in developing the programme. To exemplify, the respondents from the HS2 project stated that a vertical and horizontal interaction would help develop transparency in the organisation and naturally foster a collaborative environment. This process will be a forum for open discussions on how to organise the activities to assure the best possible "flow" in the project and that activities take place in the most natural and efficient order. It is believed that parties will take a bigger responsibility for the programme if being given the opportunity to influence their own performance in it and therefor they must be invited to take an active part in developing it.

Risk and opportunity assessment and the development of a contingency strategy are parts included in the project programme. These processes differ in ECI projects compared to traditional contracts in that way that the risks are shared to a greater extent between both client and contractor. Rahman and Alhassan (2012) state that the client must ensure that all parties are participating in a risk-sharing conversation where risks are allocated to those best able to manage that particular risk. This way of performing risk management processes is described similarly in both literature, guidances and in the interviews with representatives for the reference projects. An example can be extracted from the HS2 project where a shared expectation that all participants take ownership of the risks that they create for anyone downstream from them is created and agreed upon. This mindset might be recommended to adopt when planning for the risk-

sharing conversation, as it will generate an understanding of the effect the risks may have on other parties involved.

Mosey (2009), Song et al. (2009) and Walker and Lloyd-Walker (2015) emphasize that the implementation of a well functioning communication system is an essential process in the initial ECI stage. This is to ensure an efficient project progression and effective decision-making. ECI requires a strong commitment to the new working procedures and it is the client who should set the standard concerning open communication in the project. Walker and Lloyd-Walker (2015) further suggest that a joint communication plan should be developed to decrease misunderstandings and support trust.

ECI is often associated with opportunities for contractors to use their experiences to an extent where high level of innovation can be incorporated into the design. Morwood et al. (2008) highlight the importance of engaging contractors with industry expertise early and give these the right amount of freedom to come up with innovative solutions for Stage Two, the construction of the project. It is important to empower and motivate the main contractor to work more independently and encourage continuous construction improvement (Walker & Lloyd-Walker, 2015). This all comes down to the governance and management of the project processes, and the CG must trust the contractors and let them do what they do best, withinprevailing time and cost constraints. In addition, the UK academic professor suggests that the client should create a structure for how to connect with subcontractors, suppliers and manufacturers to ensure three or fourway conversations around innovation. This will increase the possibility of reaching the highest level of innovation as possible as a forum will be created for all parties to contribute with what they know best.

Caltrans (2013) states that monitoring the collaboration process is important to maintain high levels of collaboration. The US respondent further said that following up on the partnering process through a monthly evaluation called a scorecard is a very effective way of finding out how the collaboration process is progressing. It can also be a related to a reward/recognition process to further promote desired behaviour in the project team. At the Norsborg depot follow-ups were performed through regular follow-up sessions (workshops) and through a Partnering Performance Index, which is similar to the monthly scorecard presented by the US respondent. Regular follow-ups on the collaboration process gives the project management indications of how the team is doing. Such feedback gives the possibility to take actions in time if the process is not going in the desired direction, and also to ensure a united vision for the project. It is therefore an important part of the collaborative process.

### 5.1.4 List of Stage One activities

The activities included in Stage One of the ECI contracts differ depending on project complexity, surrounding circumstances and the nature of collaborating in different organisations. It is therefore important to understand that the summarised activities listed below are found to be essential in some cases but may differ if applicated in other contexts.

Apart from the continuous work of planning and designing the project and perform cost estimations it has been found that ECI encompasses a few additional activities that

should be performed during Stage One. By summarising and analysing the Stage One processes from the frame of reference identified by Morwood et al., (2008), Department of Main Roads, (2009), Mosey (2009) and Australasia, AA, (2010), and experiences from the different reference projects and the collaboration advisors, key activities to be performed during Stage One includes, but are not limited to:

- Establish a contractually binding core group
- Discuss and confirm goals, scope and key objectives for the project
- Establish accountabilities and responsibilities at all levels
- Establish and confirm project programme
- Establish integrated project office
- Establish agreed communication plan and system
- Establish structure for client connection with subcontractors
- Complete risk and opportunity assessment
- Develop contingency strategy
- Perform workshops to ensure a common project culture
- Create a collaboration agreement and a collaboration charter
- Develop design for cost estimation
- Perform skill and labour forecast
- Ensure required approvals and permits
- Complete target cost

## 5.2 RQ2: Collaboration and facilitation competence

The literature claims that the role of the facilitator is not to provide technical support but rather to guide the team to find the appropriate solutions and determine the timeline in which they should be implemented (Caltrans, 2013). The facilitator should provide a team structure, resolve group barriers and ensure creation of a shared project culture, shared values and a common project language (Bell & Morse, 2012; Caltrans, 2013; Mosey, 2014).

The US respondent clearly stated that the best way of monitoring collaboration in a large project is to employ an external collaborative professional with experience from construction industry. This person will guide the team's dialogue and help neutralise the power imbalance between the involved parties, which otherwise is characterised by a strong position of the client. The respondents at HS2 also believed that it might be easier for other project parties to accept and commit to routines put in place by a third party, as he or she is unbiased and will not put the interest of one party above the others'. The respondents from the Norsborg depot stressed that a project needs someone who monitors the internal relationships and stays alert to early signs of frustration and distrust that might go unnoticed by others. This person should look out for where issues

are emerging and bring people to talk to each other before it becomes a problem. They however believed that a facilitator does not need construction knowledge, as the rest of the project team possesses this, but rather should be a person with an understanding of the psychological aspects of people working together. The UK collaborative and legal advisor stated that the use of an external collaboration facilitator, who facilitates kick-off workshops and measures the overall collaboration regularly, could be beneficial. However, the respondent more strongly emphasised that a client organisation needs an internal collaboration champion with competence regarding relationship building. This person should accompany and support the project from within the client organisation. The respondent claimed that if there is no such person, the organisation must find someone and educate this person by letting him or her meet and talk to highly experienced people and inspiring collaboration professionals from previous projects in order to understand collaboration in construction. The essence is to become a motivating and encouraging "collaboration motor" in the project team. One respondent from the Norsborg depot said that one of their success factors has been a high level of engagement from key individuals in the project, which further highlights the importance of inspirational and motivating leadership.

Thus, when it comes to utilising an external facilitator, and whether this/these person(s) should have knowledge of and experiences from construction, the opinions and emphasis differ somewhat among the interviewees. It is likely that there are geographical (and contractual) differences that have to be taken into consideration in this discussion. For example, ECI-projects are contractually different from the partnering projects referred to by the US partnering advisor. Further, in Sweden the experiences of collaboration projects, and especially within infrastructure, are rather limited compared to the United Kingdom and the US where many of the interviewees are operating. This naturally means that the development of collaboration facilitators and similar professions has not progressed in Sweden. There are very few specialists of the type represented by the US respondent from IPI, with both behavioural science and construction competence. There should be much to be learned from countries where this profession is highly developed and has been proven to contribute to the success of construction projects.

## 5.3 RQ3: Preparing for ECI

For an inexperienced client organisation, regarding the use ECI or other relationship-based procurement forms, it is essential to put a large proportion of resources for preparing for the new collaborative environment. However, it is important to acknowledge the fact stated in the interview with the UK professor that ECI does not provide a complete solution that can be applied in every project to solve inefficiency. Similarly, IADC, (2011), Rahmani et al., (2013a) and Love et al., (2014) all agree that there is not one generic "one way fits all" approach and that every ECI project is unique. Further, as outlined in Chapter 2. 1, there are many different definitionsof the term, where ECI in the US is referred to as Integrated Supply Teams (American Institute of Architects, 2007; Rahmani et al., 2013b) and in the UK and Australia as Two-Stage Open Book (Mosey, 2014) or Integrated Project Delivery (Love et al., 2014). ECI may therefore be seen as a concept, more than a strict approach that can be implemented to

solve problems with project inefficiency. Ultimately, it is a set of principles that can be developed and adapted according to the client's objectives and to support both the integrity of an organisation as well as the re-arrangement of processes, resources and people.

### 5.3.1 Organisational preparation

Respondents from all reference projects, including the collaborative advisors, have described the importance of discussing why it is necessary to procure the contractor at an early stage, and what the main achievements and goals for that particular project will be. Song et al. (2009) highligh that ECI often represents a radical change from traditional business practices and that it can therefore be concluded that the client needs to be fully dedicated to the ECI approach in order to successfully create an efficient collaboration. All respondents from the STA believed that communication is crucial for the client organisation in order to reach success with ECI. However, at the point in time when the interviews were performed, many of the respondents elaborated around the issue of the limited information about ECI in the organisation. As a result, a few people within STA had not fully accepted ECI, as the benefits of the method have not been presented. This shows that there are important areas of improvement concerning communication within the client organisation.

The STA's main expectations of the ECI approach can be summarised in three focus areas: increased innovation, better risk treatment and closer collaboration between the different parties. For these reasons, it could be a good idea to acknowledge these initial beliefs and expectations and by this point start forming the ECI standard for the WL project. However, important to notice and consider is the statement by the UK collaboration advisor who said that ECI does not provide the right conditions if only partly agreed upon and implemented in the whole organisation. The Department of Main Roads (2009) states that clients who have chosen the ECI approach should prepare their organisation by initiating a management plan where the scope and goals with ECI and the project are clearly defined and agreed upon. All known stakeholder requirements, as well as key decisions in the procurement process are important to include in the management plan.

As noted in chapter 5.2, in the discussion concerning facilitators/consultants, there are limitations and needs for development in the Swedish industry in general. In the US, a professional partnering facilitor has both behavioural and construction competence, and the US respondent presented examples of projects which have succeeded as a result of this integration. In the short run, a Swedish client has to focus on how to make the best of the current situation with the facilitation competence and tools already existing on the market. One such tool, used in the High Speed 2 project, is the collaborative business relationship (BS 11000) framework. This framework enables organisations of any size to maximise the use of organisational relationships by applying an eight-step approach and combine these with the internal organisational principles.

The *strategic components* in BS 11000 highlight the importance of creating an internal awareness of how the collaboration is designed and spread the knowledge throughout the organisation. One of the biggest concerns within the STA was regarding the insufficient sharing of information of how the collaboration would affect the

organisation and the employees within. It is therefore important for an inexperienced client to prepare an internal assessment of how ready the organisation is for an ECI collaboration. Song et al. (2009) as well as interviewees from both the UK and US emphasize the importance for a client to evaluate *why* ECI is beneficial for the project and *why* it should be used. In order to do this, the respondents from High Speed 2 recommended looking globally and investigating the reasons for using ECI in similar projects and exploring the different varieties of the approach. The internal assessment could also contain listening to possible opponents within the client organisation and embrace their opinions and concerns with the approach. By involving everyone within an organisation in early discussions and evaluations, the foundation of the best-for-project mindset is created which by Rahman and Alhassan (2012), Eadie et al. (2014), Love et al. (2014) and Perklev (2014) is believed to be one of the key aspects in a collaboration project. Further, the UK collaboration advisor interviewed focused especially on the importance of inspirational leadership by the senior levels of the client organisation. He saw such inspiration, together with knowledge, as the key for an organisation where there are differences of opinions regarding new and innovative ways of procuring construction projects to succeed.

When the strategic components from the relationship framework, BS 11000, are in place it is important to prepare the *engagement components* where the selection of the right partners is central. It is important to remember that the WL project is not only about providing the cheapest construction processes, but also about creating value for the involved organisations and above all, to the end users, the public. However, Morwood et al. (2008) makes a relevant statement concerning the fact that contractors also have a choice in picking clients that they like to do business with. Thus, contractors might identify clients and projects that are believed to be aligned with their strategic values. It is therefore important for a client to acknowledge that various parties have different internal goals and aim to be perceived as an attractive client, who has the ability to interconnect different opinions of value towards a best-for- project approach. The last step in the relationship framework is the *management components*, which aims to optimise the performance with efficient management and ensure that the parties are staying together throughout the project lifecycle. The management representatives and the CG should ensure that the best-for-project mindset is maintained and constantly improved in order to create sustained efficiency in the project.

### 5.3.2 Preparing the contract

Another tool for preparing an organisation for ECI and for establishing an appropriate collaboration structure in the project is the contract. The contract is also self-evidently important as a governing document and to set the conditions for reimbursement. According to Mosey (2014) the contractor's main focus will always be on economic profit, and he claims that it is important that a client accepts this and that the contract creates an appropriate structure. Otherwise the project risks having an unsatisfied contractor that will look for alternative ways of increasing its profit. In the UK, there are several contracts that function as a guiding and managing document. Contracts specifically for relationship-based procurement forms, such as NEC3 and PPC2000, have been developed and used with good results. PPC2000, for example, provides a contract structure where certain activities and/or deliveries are included and accurately scheduled in the contract, and without completing these on the contractor is denied to

progress in the project. The UK collaborative advisor claims that these principles could easily be attached to any form of Swedish standard contracts and that a client and STA in particular could look to these UK contracts for inspiration and guidance when setting out their own contract structure. Further, the respondent states that the construction phase is the biggest incentive for the contractor. It could therefore be argued to be more commercially attractive to tender for the entire project. Better conditions for mutual trust, collaboration and outstanding design and innovation performance are established if the contractor have security about progressing to Stage Two.

# 6 Conclusion

Early contractor involvement is a procurement approach that can, if well planned for, ensure innovation and strengthened professional relationships, and result in efficient planning and construction processes. Ultimately, it is a set of principles that can be developed and adapted according to the client's objectives to guide the re-arrangement of processes, resources and people. Based on a literature review, interviews and case studies, it can be concluded that a client must prepare the ECI-organisation in Stage Zero by clearly evaluating the goals of using this collaborative approach and elaborating how these can be achieved by internal value adding activities. A strong commitment and best-for-project mindset has been shown to be undoubtedly important for realising the full potential of ECI, and this commitment and beliefs should be communicated, implemented and accepted within the whole client organisation.

The standard BS 11000 for collaborative business relationship management can, together with a joint communication system, provide a clear structure in the process of rearranging a traditional client organisation. The standard will help an inexperienced client to prepare their organisation for enhanced relationships based on joint trust and to choose appropriate partners. If possible, the contract should be structured with conditional activities to ensure Stage One progression in a timely manner and within the project scope. It should further support collaboration between project participants and provide the conditions in which client, contractor and consultants benefits from the project and are allowed to reach both their individual objectives and, above all, the joint project goals.

In addition, the research indicates that inspirational leadership from the client organisation is essential for the project to succeed. In order to create a shared belief of the potential benefits of ECI, it is concluded that there is a need for an internal and empowered champion, who by motivation and experience can lead the client towards a collaborative project environment. If an appropriate person does not exist in-house, someone who will be permanently responsible for driving the project towards full collaboration should be appointed. It is also crucial to ensure that behavioural competence to facilitate relationship-building workshops exists in the project organisation who both monitor and evaluate the collaboration progression. Sometimes, partnering facilitators are found in-house. However, an external neutral party is often preferable, since the joint organisation may benefit from unbiased opinions in handling collaboration failures and dispute resolution. However, to perform effectively in this role, a facilitator needs to posses both behavioural and construction competence, a combination that is rare in the Swedish context.

The investigation has shown that a core group should be established at the initiation of the project in order to proceed with the Stage One activities, presented in section 5.1. The group consists of senior representatives of the contracted parties who meet regularly to evaluate and agree on joint project goals and ensure that all parties benefit from the collaboration. The client should develop a project programme where conditional activities are merged with the Stage One schedule and key deadlines. Exceptional performance regarding programme activities may be rewarded. The client needs to be highly involved in project planning, design and costing and act as a role model who emphasises transparent Stage One activities and an open-book approach. In

order to reach a high level of innovation and create efficient construction solutions, not only the main contractors but also subcontractors, design consultants and suppliers should be involved to contribute with experience and knowledge to the planning processes. A common project office facilitates informal interaction that can complement formalized workshop activities.

To summarise, it is important for a client to understand that ECI does not provide a clear and concise solution that can be easily implemented. All ECI projects are different depending on size, complexity and the individual organisations' abilities to find innovative solutions and desire to explore new methods. Further, available competence and contracts as well as cultural aspects differ between countries. Altogether, this indicates that is is essential for a client to develop their own profound notion of how they wish to adopt this collaborative approach. This may require a large amount of time and resources, and above all, a commitment and openness towards changes. However, if performed with an innovative and best-for-project mindset, ECI may provide an exceptional opportunity to increase value in the finished product by promoting trust, cooperation and creative thinking in all stages of the project lifecycle.

# 7 Recommendations

This chapter summarises the findings from the study in the form of recommendations. The first sections provide recommendations to the organisation at the Swedish Transport Administration (STA) and the second sections give recommendations for further ECI research.

## 7.1 Recommendations to the STA

As the STA and the WL project is currently in Stage Zero of the ECI contract, a few recommendations are given here to aid the stages ahead. These recommendations aim to inspire and assist the client's preparational work as well as to provide suggestions for processes taking place in the planning and design phase, Stage One. Several of the points brought forward are already acknowledged in the discussion and conclusion but are here directed towards the STA. The section is intended to provide an overview of what the thesis has resulted in and consequently, the following summarised recommendations has been made.

- **Find your own way.** As there is not one correct way to perform an ECI project, the STA must find the way that is the most profitable for the client organisation as well as for contractors and consultants. ECI can provide an organisation with principles of how to arrange and merge organisations together, but the collaborative aspects are something that must evolve through investigation and constant evaluation.
- **BS 11000.** The use of the BS 11000 stanadrd for collaborative business relationship management has been shown to help organisations facilitate collaboration and ECI projects. The STA could use this framework to, perhaps in the future, be a certified client with high collaboration abilities but also for inspiration on how to arrange their collaboration with chosen partners.
- **Find and appoint an inspirational leader.** An inspiring champion within the client organisation who can motivate people to think and work together, and overall strengthen the collaboration environment, is a very important resource in a collaborative project. It is suggested that the STA should find someone who is a strong leader in this sense and provide this person with appropriate training.
- **Appoint external collaboration facilitator.** To support the inspirational leader, an external facilitator could ensure that workshops actually contribute to enhanced collaboration. This person can moreover act as a neutral part in conflicts and dispute resolution and help neutralise the power imbalance within the project organisation.
- **Be an attractive client.** Even if ECI promotes the creation of common goals and values, a client should accept and understand that the contractor, as a basic condition, need to deliver financial profit. To be an attractive client means to be open towards the different roles' general requirements and fundamental business goals. If not, chances are that contractors will be creative in finding alternative ways of making money, which really contradicts the core principles of collaboration and ECI.
- **Appoint Core Group.** A core group consisting of senior representatives of the contracted parties should be established. Discussions and establishment of management plans where all parties agree on project scope, goals and objectives are shown to be of great importance in an ECI project. The core group should

set the standard in collaboration by showing a strong commitment towards ECI and constantly ensure that the project team follows the project programme with the same best-for-project mindset. The group shióuld meet regulary, preferably monthly, and the client should take the lead in this process.

- **Conditional contracts.** According to UK experience, conditional activities included in the contract ensure that the projects stays on schedule and that the team delivers what is expected from them. It could be considered to make key activities and deadlines formed in the project programme contractually binding for increased commitment.
- **Learn to let go of control.** Perform relationship-enhancing activities and ensure that trust and transparency is implemented in the whole project organisation. This means that the client has to trust that the partners have been selected for a reason. They are the experts in their area and should therefor be allowed a certain degree of freedom to perform at their best.
- **Engage industry experts and subcontractors.** The client should ensure that the project organisation has a clear structure for connecting and communicating with subcontractors and industry experts. With their specific knowledge and experiences in their own areas, they can be a very important source as innovation and smart solutions are initiated and also in the development of project programme.
- **Collaboration enhancing activities.** Apart from the joint project office, which is desirable in an ECI project, workshops and social gatherings is an additional way of creating higher levels of collaboration. Focus should not only be on creating professional relationships, but on informal interactions between employees that will help develop an attractive workplace and will enhance commitment to the project team and the project.
- **Communication system.** It could be recommended to provide an ECI organisation with weekly newsletters about project status, upcoming deadlines and team building activities. A shared home page and database with a common project language could be created where clear means of communication are emphasised.
- **Monitor and evaluate performance.** To ensure that the collaboration process is on track and going in the desired direction follow-ups should be done on the process. This helps to ensure a united vision for the project by the project team and should be done regularly throughout the project lifecycle.

## 7.2 Recommendations for further research

The Swedish infrastructure industry often uses traditional ways of procuring projects, which implies that reseatch on and experiences of performing ECI are limited. This resulted in an expanded research with global investigations where international authors have been the main source of ECI theories and experiences. As rules, regulations and, most importantly, corporate cultures and behaviours may differ between different cultures in different countries, the experiences and working procedures may be more or less applicable in other contexts.

This thesis introduces the client perspective to an ECI procurement approach. However, due to the complexity and many different aspect of the topic, the capacity and requirements for further research to be conducted are extensive. A limitation in this

thesis was to not include the tendering evaluation process in the study. This is an area of high interest in regards to this thesis as it give the possibilities, to ensure procurement of the right partner before the collaboration actually starts. Depending on how the tender specifications are formulated and how tenders are being evaluated, the client has a greater possibility to contract an appropriate partner. Similarly, the project contract itself is an area to further study as it is believed by the authors to hold a lot of potential, not just as a governing document, but as a guiding one and a document that can set the right conditions for a collaboration environment and include appropriate incentives depending on the contract structure. Especially possibilities to merge items from international partnering contracts with the Swedish standard contracts are interesting to explore.

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# Appendices

## Appendix 1: Activity checklist – Stage Zero

**Develop and confirm management plan**

- Define the scope of the project
- Define all known project stakeholder requirements
- Outline works included in project. How they are likely to be completed and indicate personnel and time necessary for completion
- Highlight key decisions in the procurement process

**Appoint core group representative(s) from client organisation**

- Prepare and confirm internal goals and values

**Appoint "inspirational leader"**

- Provide appropriate education if needed
- Study previous collaboration projects
- Study reference projects and their successfactors – talk to the people who has done it before
- Plan for involvement in Stage One (and Two)

**Define and confirm conditional activities (as part of contract)**

- Define activities and what requirements should be fulfilled
- When should they take place?

**Prepare collaboration (here according to BS 11000)**

- Strategic components
    - Awareness
    - Knowledge
    - Internal assessment
- Engagement components
    - Partner selection
    - Working together
    - Value creation
- Management components
    - Staying together
    - Exit strategy

**Spread knowledge and information in client organisation**

- Benefits with ECI and why it is chosen
- Potential organisational rearrangements
- Internal organisational goals
- Provide Q&A sessions

## Appendix 2: Activity checklist – Stage One

**Establish contractually bound core group and clearly state:**

- Level of delegated authority
- Circumstances in which they will meet
- Meeting procedures
- By which means decisions are made (e g consensus decisions)
- Discuss and confirm joint goals, scope and key objectives for the project
- Core group agreement and signatures
- Routines and limits for replacement and substitiue members

**Establish and communicate responsibilities and accountabilities**

**Develop and confirm project programme including:**

- Develop and implement management plan
- Design development submissions
- Surveys and investigations
- Cost plan submission
- Value engineering and value management reviews
- Procurement processes for selection of subcontractors and suppliers
- Pricing for all work and supply packages
- Risk management actions
- Client approval and comments in response to each submission and proposal
- Submission of applications for third party approvals
- Funding, land acquisition and other client preconditions to commencement of work

**Establish integrated project team and office**

- Opportunities for Activity Based Workplaces (ABW)
- Joint common areas e.g lunch rooms

**Decide and establish agreed communication system**

- ICT (Information Communication Technology)
- Ensure communication with subcontractors

**Complete risk and opportunity assessment**

- Develop contingency strategy

**Perform skills and labour forecast**

**Develop collaboration and team development plan**

- Engage external facilitator + client participaten by “Inspirational leader”
- Workshop plan + Kick-off workshop
- Monthly evaluation
- Follow-up sessions
- Facilitated dispute resolution sessions

## Appendix 3: Interviews

Client: Head of Procurement, High Speed 2 (2015) [Interview]
(Personal Communication, 20th April 2015)

Client: Head of Supply Chain Management, High Speed 2 [Interview]
(Personal Communication, 20th April 2015)

Client: Procurement Officer, The Swedish Transport Administration (2015).
[Interview] (Personal Communication, 26th March 2015)

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