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To cite this article: Pertti Lahdenperä (2012) Making sense of the multi-party contractual arrangements of project partnering, project alliancing and integrated project delivery, Construction Management and Economics, 30:1, 57-79, DOI: [10.1080/01446193.2011.648947](https://doi.org/10.1080/01446193.2011.648947)

To link to this article: <https://doi.org/10.1080/01446193.2011.648947>



Published online: 06 Feb 2012.



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Making sense of the multi-party contractual arrangements of project partnering, project alliancing and integrated project delivery

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Received 29 March 2011; accepted 8 December 2011

Collaborative construction project arrangements have been the subject of many development efforts owing to the frustration felt toward the opportunism inherent in traditional contracting. Globally, three approaches have stood out: project partnering, project alliancing and integrated project delivery. These so-called relational project delivery arrangements have much in common. This study aims to clarify the similarities and differences between the arrangements by examining their key concepts and features one by one and in relation to each other; the motivation behind each is also examined. Early involvement of key parties, transparent financials, shared risk and reward, joint decision-making, and a collaborative multi-party agreement are some of the features incorporated in all the arrangements to a varying degree. Beyond the numerous details, divergent applications and constant evolution presented, the study also recognizes project alliancing as a project delivery system in its own right due to its contractual structure that integrated project delivery aims to imitate while introducing some management approaches not included in project alliancing. Project partnering, although developed in leaps and bounds since its introduction, takes a more conservative approach to work scope and liabilities. Similarly, project alliancing takes relational contracting to the extreme compared to the current forms of integrated project delivery and, especially, project partnering.

Keywords: Partnering, alliancing, integrated project delivery, relational contracting, comparison.

Introduction

Fragmentation of the construction process and the resulting adversarial relationships between the parties involved have been a constant topic of critical writings for decades and still burden the current process in most cases. Yet a lot has been done since the early days of frustration at the beginning. Increasingly collaborative forms of project delivery have been and are being developed under various themes and titles during the serious examination and experimentation with the problem in various parts of the world.

The initial reason for the frustration seems to be the separated design and construction, or disintegration of the construction project process in general (e.g. Latham, 1994), where the low bid syndrome can

be recognized as a major determinant behind the customary adversarial behaviour (Nicholson, 1991; Weston and Gibson, 1993; Loraine, 1994; Stehbins *et al.*, 1999; Scott, 2001). Studies aimed at fostering innovation in construction also stress the need for closer integration and improved collaboration (Blayse and Manley, 2004; Holmen *et al.*, 2005; Rutten *et al.*, 2009). Moreover, performance in demanding, risky projects could obviously be improved by joint risk management (Rahman and Kumaraswamy, 2002; Pishdad and Beliveau, 2010).

While relational contracting has been offered as a solution to these challenges, it is also called for by the change that has taken place within the modus operandi of the industry and its clients. The owners of built assets have increasingly regarded them as strategic means to improve the performance of their

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core operations (e.g. Krumm, 2001). Correspondingly, they have in many cases started buying business solutions, not just construction capacity, which, moreover, requires employing relational contracting practices (Roehrich and Lewis, 2010). In general, there are various forces driving towards further servitization of construction (Leiringer and Bröchner, 2010). Servitization, which means integration of additional services, knowledge and support to the supplier's core product offerings, also puts the firm face-to-face with its customers (Vandermerwe and Rada, 1988) increasing thereby the importance of the relational mechanisms that supplement the contract (Hartmann *et al.*, 2010). Thus, there is a need to understand the relational contracting arrangement alternatives better to be able to rise to these challenges.

In response to that need, this study looks for existing, comprehensive production arrangements for improving construction project delivery through collaboration and integration of the project team. The actual objective is to compare the parallel production arrangements to each other and facilitate the definition of these arrangements within the more customary project delivery concepts. The comparison is made by examining the concrete procedural and organizational components of the arrangement, including underlying motives and premises, and by clarifying their mutual interplay in a project in a way that provides a holistic understanding of the functioning of a relational production arrangement. However, ranking order, efficiency and appropriate application of relational project delivery arrangements are beyond the scope of this study.

The paper proceeds as follows. First, it gives an overview of the emergence of the three existing collaborative arrangements, the motivation behind them and an application of each. Then, after presenting the analysis framework and method in more detail, the paper reviews the arrangements based on their key characteristics. The focus is on their diverse procedural and organizational means of fostering collaboration and integration of the project team for the benefit of the project. This is done with the understanding that none of the arrangements is a clearly defined operational model that cannot be modified. For this reason, the actual analysis starts with a compilation of the results of studies that have made a fundamental conceptual analysis of one of the arrangements and then goes deeper by discussing the key concepts in relation to other sources of data. Finally, after an additional pair-wise comparison for more in-depth understanding, more general conclusions are drawn.

In search of existing relational arrangements

A survey of construction literature, in terms of both science and practice, on collaborative forms of project delivery based on criteria to be explained in more detail below discovered the following three comprehensive approaches based on multi-party contracting practice: *project alliancing* (PA), *project partnering* (PP) and *integrated project delivery* (IPD). The following authoritative examples are among the numerous definitions for the approaches:

- (Project) partnering is (a single project application of) a management approach used by two or more organizations to achieve specific business objectives ... and based on mutual objectives, an agreed method of problem resolution and an active search for continuous improvements (Bennett and Jayes, 1995).
- Project alliancing is a method of delivering major capital assets where the owner and non-owner participants work together as an integrated, collaborative team in good faith, acting with integrity and making unanimous, best-for-project decisions, managing all risks of project delivery jointly, and sharing the outcome of the project (after Department of Treasury and Finance, 2010d).
- Integrated project delivery is a project delivery method distinguished by a contractual agreement between a minimum of the owner, design professional and builder, where risk and reward are shared and stakeholder success is dependent on project success (Cohen, 2010).

These definitions do not reveal the actual procedural practices or any possible differences between them. That is not surprising since, first, the definitions of an individual arrangement vary widely with different practices. For instance, Bresnen (2010) concludes that PP in any context is likely to be a highly specific combination of tools, techniques, processes and practices, manifesting itself in different ways which makes it hard to generalize it into a universally applicable model. Secondly, even the different arrangements are mixed up especially in older texts. 'Partnering' is often used to describe the collaborative building project practice in general—even PA is considered a form of it. For instance, Broom (2002) speaks about a general spectrum of partnering which also covers project alliance. Scott (2001) also deals with one form of partnering termed 'alliancing' as noted in the report. Bresnen and Marshall (2000) are adherents of the same school thereby justifying the study at hand for their part.

For the purposes of this study, the listed approaches are jointly called *relational project delivery arrangements* (RPDAs). This is due to the fact that a contract, whose effect is based upon a relationship of trust between the parties, and in which responsibilities and benefits are apportioned fairly and transparently, is called 'relational' as opposed to 'transactional'. Without getting into a theoretical discussion, it may be noted that this kind of duality can be traced back to the relational theory of contract (e.g. Macneil and Campbell, 2001). In practice, relational and contractual mechanisms are complementary parts of the governance continuum of a project (Hartmann *et al.*, 2010; Roehrich and Lewis, 2010). While explicit contracts are needed to reduce uncertainty and minimize opportunism, they can only cover foreseeable contingencies—specifying everything would increase transaction costs and prevent a flexible and quick response to unforeseen events. Here the relational part, with its socially complex routines, comes into play in inter-organizational relationships.

In the construction process context, 'relational contracting' has been used to refer to and describe the aforementioned approaches as follows: PP: Rahman and Kumaraswamy (2002), Rowlinson and Cheung (2004), Colledge (2005), Cheung *et al.* (2006); PA: Rahman and Kumaraswamy (2002), Rowlinson and Cheung (2004), Sakal (2005), Cheung *et al.* (2006), National Association of State Facilities (2010); and IPD: Matthews and Howell (2005), Lichtig (2006), Cohen (2010), National Association of State Facilities (2010).

Moreover, relational contracting has also been discussed in reference to public-private partnership (PPP; e.g. Parker and Hartley, 2003; Kumaraswamy *et al.*, 2005; Zheng *et al.*, 2008) which, however, refers to more comprehensive long-term arrangements like design-build-(finance-)operate that extend the suppliers' involvement to the maintenance period of the facility with clearly allocated (transferred) risks and scope of liabilities (e.g. Akintoye *et al.*, 2001; Ng and Loosemore, 2007) while the named three RPDAs exclude maintenance from the arrangement and move towards joint risk-sharing and liability. The massive design effort required by competitive selection and the actual bilateral commissioning contract between the public body and a project company customary in PPP (e.g. Alfen, 2009) also prove that PPP is not closely comparable to other RPDAs, and that its inclusion would prevent the study from delving into the details of other RPDAs. Clifton and Duffield (2006) make an interesting opening by claiming that PPP could benefit from the principles of one of the RPDAs. The claim supports the existence of different views (making PPP more a 'system' than an 'arrangement' on the terms of the next paragraph).

The latter part of the RPDA composite term, 'project delivery arrangement', ensues from the fact that, first, the contract is to be entered into for delivering an entire project and, secondly, the arrangement involves all the major/key parties required for the delivery. This means that other types of relational contract need to be excluded from the review, since they cover partial arrangements only. Moreover, the term 'arrangement' does not refer just to (an) agreement(s) but encompasses a more comprehensive production philosophy involving various views and protocols guiding the implementation, for instance, prior to entering into the contract. The term 'arrangement' is also being used instead of 'system' (or 'method') since the latter (in connection with a project delivery system) has a relatively established meaning referring to the determination of the division of labour and contractual and operational relations between the major players of a project (cf. e.g. Konchar and Sanvido, 1998; Mahdi and Alreshaid, 2005; Lahdenperä and Koppinen, 2009). Whether the RPDAs really are project delivery systems according to established conceptual understanding will be discussed later in the paper.

Relational project delivery arrangements

In the following, the RPDAs and their emergence will be presented one by one. Then the section summarizes their traced mutual influences.

Project partnering (PP)

PP has the longest traceable history of the RPDAs included in the review. It is a derivative of long-term 'strategic partnering' which extends collaboration over a series of projects while PP adapts similar ideas for use on a project-by-project basis. The first PP projects date back to 1988 when PP was launched by the US Army Corps of Engineers in pursuit of avoiding construction disputes, and was based on joint workshop practice; it was a voluntary arrangement between the owner and the contractor and was applied only after the low-bid selection of the contractor to the project (Weston, 1992; Weston and Gibson, 1993; Loraine, 1994). Since then the PP approach has gained popularity not only in the USA (e.g. Larson, 1995; McIntyre, 1995) but also around the globe with a huge mass of projects benefiting from it.

As to PP, the UK soon followed the US example with numerous projects—the first ones launched in 1995 (Construction Industry Board, 1997; Hellard, 2002; Thompson, 2010)—and guidelines (e.g. Bennett and Jayes, 1995; Construction Industry

Board, 1997). Although the PP practice was originally a management approach applied in projects based on traditional contractual frameworks (e.g. Walker *et al.*, 2002; Ross, 2004) such as design-bid-build or design-build, the practice has evolved and a new contractual practice has developed (e.g. Bennett and Baird, 2001) making the PP concept more blurred in general. Yet, only the project partnering contract (PPC) family (The Association of Consultant Architects, 2008b, 2008c) is based on the multi-party approach (which is said to be the only way to integrate the team; Mosey, 2003; Saunders and Mosey, 2005) that is the focus of this review; it also seems to be the only contract where the partnering principles are taken into the agreement itself and are not only optional or in an additional agreement (Arup, 2008; Stradia, 2009). Thus, the designer also gets involved so that the owner and contractor are not the only partners as generally in the early days of partnering. The contracting approach seems to be applied especially to building construction (Mosey, 2010) and has repeatedly been said to be based on the seminal work by Latham (1994).

While trust and commitment have always been at the core of the philosophy, tools like the partnering charter and the decision ladder were important elements of the early PP approach in improving cooperation and minimizing the likelihood of detrimental disagreements. The former is a document signed by the partnering parties stating the agreed main principles of cooperation (and, thus, defining and establishing the 'relational mechanism'), but it is not a legally binding document. The latter describes the decision-making levels of the project, the time an unsolved issue can be allowed to remain at a certain level, and, moreover, the representatives of the parties allocated to each level. Other key components were continuous feedback/evaluation (using forms and grades) and improvement.

Project alliancing (PA)

PA has its roots in industries other than construction. In 1992 British Petroleum launched a collaboration process for an oil project in the North Sea (Knott, 1996) which is generally considered the start of the PA evolution. At the time, the arrangement was still based on parallel, individual, relatively standard commercial contracts with well-defined scopes of work and the alliance agreement was separate from the works contract (Knott, 1996; Barlow, 2000; Walker and Hampson, 2003). Yet the risk and gain-share principle was involved in response to the need to discover an economically more efficient practice for the risky project which was then new. As a result of the positive experiences, the model

was introduced in oil and gas projects in Australia in 1994 (KPMG, 1998; Australian Constructors Association, 1999; Sakal, 2005; Thomsen, 2006; Morwood *et al.*, 2008). The diffusion of awareness continued and the model was widely adopted on the continent soon thereafter (see Manley, 2002; Ross, 2006) and the first PA construction project started in 1997 (KPMG, 1998; Ross, 2006; Morwood *et al.*, 2008). Naturally, the active use of PP (e.g. Manley, 2002) also contributed to the favourable attitude towards PA in Australia, where PP was introduced as a result of US influence (Stehbens *et al.*, 1999), before its launch in the UK (Tyler and Matthews, 1996; Hellard, 2002).

Although the first few construction projects were realized in the late 1990s and the flow of PA projects was continuous, the actual breakthrough took place only in the second half of the 2000s (Department of Treasury and Finance, 2009a). To date, hundreds of projects have been implemented by the PA system while the arrangement has developed substantially and is based on a multi-party contract with joint liability (Department of Treasury and Finance, 2010c). With relatively few exceptions, the projects have been road, rail and water infrastructure projects. An exception was one of the very first projects which was made an alliance project in 1998 and involved construction of a uniquely demanding building (see e.g. Walker and Hampson, 2003; Hauck *et al.*, 2004).

The PA practice evolved from the need to improve the implementation of demanding and risky investment projects. In a project involving much uncertainty due to, for instance, new technology and project conditions or interfaces, the risk premiums and/or adversarial behaviour characteristics of traditional contracting would lead to an uneconomical result from the viewpoint of the owner. On the other hand, the alignment of the parties' objectives by joint risk-sharing in a PA arrangement, supplemented by a joint organization and joint decision-making, is supposed to improve performance. A multi-party contract has been part of the PA approach for a while, but the first general model was published only recently (Department of Treasury and Finance, 2010c). Other recent reforms include the introduction of so-called partial-price team selection (Department of Treasury and Finance, 2010d; Department of Infrastructure and Transport, 2011) while earlier mainly non-price selection or, occasionally, full-price selection was used, referred to by various names (Ross, 2006; Greenham, 2007).

Integrated project delivery (IPD)

IPD is a relatively recent addition to the building process practice. It seems to have emerged initially with

that name in 2003 when a group of complementary enterprises bound themselves jointly and severally to each other and to the fulfilment of the contract to the owner (Matthews and Howell, 2005). Although that arrangement was closer to a design-build contract for the construction of utilities with one of the enterprises from the owner's viewpoint (thereby not meeting current IPD criteria), it also involved adhering to the early involvement practice so that the price was set later and the companies were to share the financial gain or pain from the project.

Early involvement and integration of versatile expertise, systems and business practices for the best of the project are, in fact, at the core of IPD according to existing general guidelines (e.g. American Institute of Architecture, 2007, 2009a). Yet, IPD can be considered either a 'philosophy' or a 'project delivery system' as distinguished by the National Association of State Facilities (2010). While the latter is the focus of this study and the key features used in later analysis are drawn from sources dealing with IPD in its pure form (Cohen, 2010; National Association of State Facilities, 2010), the former approach also—when used alongside other (traditional) project delivery systems—is said to be conducive to trustful, cooperative and intense early design between the key parties as an 'integrated practice' (cf. Pressman, 2007). The earliest publication on IPD that came up in connection with the American Institute of Architecture (AIA) framework is also relatively fresh (American Institute of Architecture, 2006).

Cohen (2010) and Cheng *et al.* (2011) introduce projects that have utilized IPD showing that it has been applied in building construction, especially in the construction of healthcare facilities and hospitals. In fact, the project launched by Sutter Health in 2005 has often been said to have started the IPD era although it obviously was not 'pure' IPD (Cohen, 2010). The approach has been described in more detail by Lichtig (2005) and Mauck *et al.* (2009). According to anecdotal information, the contributors heard about the practices and experiences from PP and PA experts, as well as those related to the above-described IPD 'utility case' (cf. Ballard and Howell, 2005) prior to drawing up the contract. Thus, it was at least partly a question of adapting foreign formulations to US culture as expressed in their articles by Post (2008) and Carbasho (2008). Anyway, this line of development led to the creation of a model contract document (ConsensusDOCS, 2007) for which alternatives also exist (e.g. American Institute of Architecture, 2009b). All in all, the IPD practice seems to merge and exploit beneficial features and ideas from various sources and earlier experiences.

Mutual influence

The above review shed light on the interplay of the RPDAs. It showed that although parallel arrangements are largely geographically determined, they adopt practices from each other, and evolve over time. For instance, PP has paved the way for PA, but has also adopted features from (early) PA while PA, again, has evolved further from traditional PP. And both of these RPDAs have also clearly influenced IPD. Understanding of mutual influences and evolution is critical for later evaluation of literature from different years and is therefore looked into. An outline of the interplay is given in Figure 1.

The fact that the development of partnering is generally considered to be based on practices originating from Japan was not dealt with above (see Construction Industry Institute, 1991; Loraine, 1994; Liu and Fellows, 2001; Naoum, 2003). Initially, the development built on the adoption of quality management principles and strategic partnering as well as the lean management concept, emphasized more recently especially in the IPD context, which also has Japanese roots. Yet, some bellwethers may also have played a role in introducing Japanese practices and 'Gentlemanly Principles' in the West (see e.g. Bennett *et al.*, 1987; Levy, 1990) for which Liu and Fellows (2001) give a more formal cultural explanation.

In addition to the main interactions between the RPDAs, Figure 1 recaps their emergence in the primary target countries of the study (excluding others). The year signals the first one-off project mainly responsible for giving life to the RPDA which is generally acknowledged in the above references. Yet, reasonable caution should be exercised in interpretation since the RPDAs' development is often continuous evolution: the early experiments are not similar to today's practices and some RPDA elements may well have been in use prior to the projects first identified with the RPDAs although the older experiences generally are related to 'strategic partnering', etc. (cf. e.g. Bennett and Jayes, 1995; Barlow *et al.*, 1997; Stehbins *et al.*, 1999). Moreover, the projects in italics are off-shore projects central to the development of the RPDA applied in infrastructure construction soon thereafter.

The study method

The study paradigm recognizes the multidimensional issue of implementing a project and designing a project delivery arrangement in accordance with the view of Ackoff (1974), who states that decision makers deal with messes, not problems: a problem is an ultimate element abstracted from a mess, and

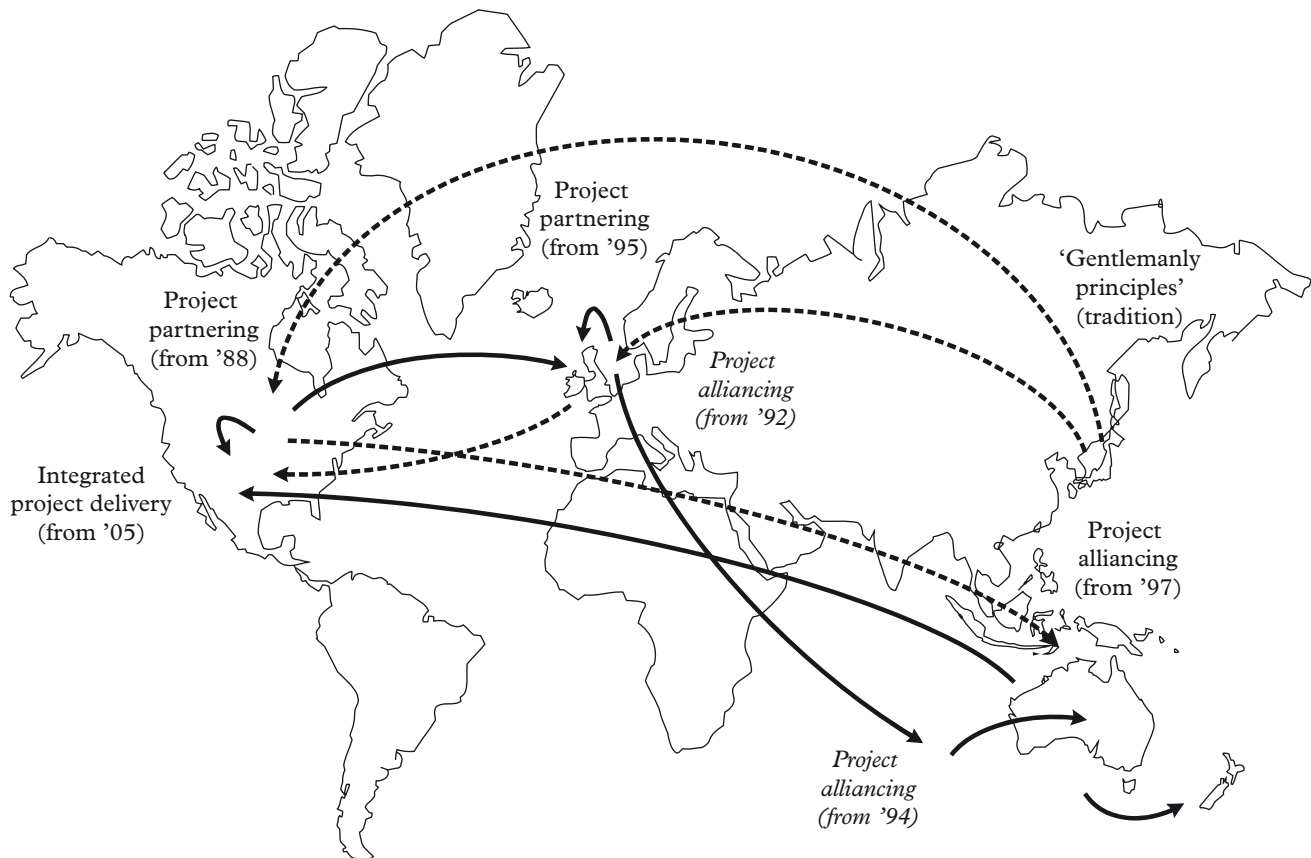


Figure 1 Emergence, dissemination and interaction of different RPDAs

Note: Non-construction applications in italics.

no mess can be solved by solving each of its component problems independently of the others, because no mess can be decomposed into independent problems. Therefore the analysis digs into the manifold RPDA features and their interoperability instead of just concentrating on the most evident ideas and differences.

The study stage following the above survey involved constructing a framework (or foundation) for the analysis, which includes features recognized as critical for any RPDA. In the construction of the framework, two primary/baseline sources of information per RPDA were carefully selected to include comprehensive views that were sure to carry sufficient weight as (initial) evidence due to their conclusive, synthesizing nature (i.e. PP: Nyström, 2005; Eriksson, 2010; PA: Yeung *et al.*, 2007; Department of Treasury and Finance, 2010d; IPD: Cohen, 2010; National Association of State Facilities, 2010).

The sources were based, as far as possible, on studies which analysed the key characteristics of the RPDA in question on the basis of numerous

other sources (Nyström, 2005, Yeung *et al.*, 2007; Eriksson, 2010). Yet, such scientific reviews of all the RPDAs do not seem to exist, obviously due to their relatively recent emergence. In such cases the study focused, as a primary source, on other recognized publications by authoritative organizations which in all cases presented results based on wide cooperation between industrial actors and associations (Cohen, 2010; Department of Treasury and Finance, 2010d; National Association of State Facilities, 2010).

All six primary source documents selected for the framework construction were to present the key characteristics of the RPDA in question as relatively unambiguous, itemized lists. This enabled straightforward listing of the features and comparison of the RPDAs as an initial solution. However, it is true that the wording, viewpoints and thematic combinations of various documents do not match exactly so that some judgements were made on the basis of the similarity of the features as part of a deeper examination at a later stage. The approach followed also recognizes the difference between 'mandatory' and

‘optional’ features of any key characteristics according to the primary sources, and the separation was taken into account in the subsequent comparison and conclusions.

This approach of starting the investigation by building a framework based on a few source documents was selected to provide a systematic study method and to improve the traceability and transparency of the study to satisfy scientific criteria. Its justification is that significance based on resemblance and recurrence is generally accepted in scientific circles; the source documents of this study prove that (Nyström, 2005; Yeung *et al.*, 2007; Eriksson, 2010).

The initial review and related alignment of the RPDAs’ key characteristics led to the identification of almost 20 criteria or *key integration features* (KIFs) though not all of them apply to all RPDAs. This intermediate result of the initial review formed the basis for the subsequent examination which looked critically at the KIFs in the light of all available studies and documents describing and guiding the use of the RPDAs. At this stage, the utilization and existence of a few more KIFs were identified as central for the functioning of a certain RPDA. Some other statements of the primary sources were also questioned. Furthermore, for the purposes of the subsequent synthesis, the KIFs were classified under seven *thematic viewpoints* (TVs) identified as a result of the close relationships between KIFs.

At this stage, the source documents included a wide number of practical guidelines and contract documents, etc. in addition to scientific works. That was unavoidable because of the generally narrow scope and overall and conclusive nature of science articles. They do not allow digging into practical procedures in as much detail as the subjects of study would require. The scientific approach is ensured by the extensive material as well as the dialogue concerning the scientific and practical documents.

The focus was on RPDA-specific documents—earlier studies comparing RPDAs were not included in the examination at this stage, but were dealt with only in later discussion. In fact, the discussion took the form of pair-wise comparison and considered earlier studies in more detail to increase understanding of the underlying issues and to verify and bring out findings. Final conclusions were drawn on the basis of the understanding gained, considering that the main contribution of the study is descriptive by nature. After all, we are dealing with literature research and conceptual, qualitative content analysis.

Key features of the arrangements

This section focuses on the feature- (or KIF)-wise differences between, and similarities of, the RPDAs. For the sake of clarity, each KIF is italicized in the body of the text presenting TVs as subheadings. The starting point for the examination was the itemized key characteristics of the RPDAs as presented in Table 1 based on the initial review of the primary sources. Table 2 presents the modified characteristics resulting from the analysis presented in this section, which digs critically into the RPDA features on the basis of tens of other documents in addition to the very few selected for framework construction.

More precisely, Table 2 presents the characteristics of Table 1 after a rearrangement that aligned similar features of the independent RPDAs under common labels, or KIFs, presented on the left. The KIFs, again, are arranged under the seven TVs. Table 2 also includes the KIFs identified by the actual analysis. These are indicated by an exclamation mark in the table. None of the items of Table 1 were left out of Table 2, but an item no longer considered valid has been placed in square brackets. Therefore, Table 2 represents the view of this study and is based on the following discussion and argumentation.

Cooperative culture

As is obvious from the definition of relational practice, all the RPDAs are developed to generate a cooperative and trustful climate for implementation for the best of the project. Such a relationship requires honest and open communication. Only then can the parties respect each other and establish a trustful relationship. Other key elements include commitment to collaboration targeted at continuous improvement. Such an approach requires also that the individuals selected for the project have a positive attitude towards teamwork, etc. In general, much the same issues have been brought up in connection with all RPDAs. Only Eriksson (2010) omits these issues, and the reason is clear: the aim of his review is to focus on the procedural aspects of PP instead of these, basically philosophical, aspects. While the survey at hand has the same scope, cultural features are not dealt with in the same way or in any detail. All in all, since the cooperative culture is more an aim than a means, but is very central to any RPDA, it is placed in the centre of Figure 2 (to be discussed later) as a reminder of its significance.

Team formation

Early involvement of key participants refers especially to the early involvement of the contractor who, in the traditional process, joins the team relatively late. In the case of PP joining occurs later than in PA, and especially IPD. Moreover, IPD emphasizes the early involvement of a broader group of subcontractors (and subconsultants) as essential to project success (American Institute of Architecture, 2007) which obviously has also been the case in practice (Khemlani, 2009; Cohen, 2010). Naturally, the aim is to integrate versatile expertise in the critical design phase. PP, again, takes the opposite view on subcontractor selection: subcontractors are mainly selected competitively after design has progressed far enough with the input from the main contractor (The Association of Consultant Architects, 2008a; Mosey, 2009). The role of subcontractors in the PA context has not been discussed widely, probably due to the fact that PA is mainly used for infrastructure where the role of subcontracting is not as critical as in building construction.

It is clear that early involvement cannot be based on price (alone) and various qualitative selection criteria are (also) always used. This has resulted in *approach-oriented participant selection* since it is a question not only of the references and properties of candidates but also of their approach, understanding and attitude to the project (cf. Construction Industry Council, 2005b; Ross, 2006; Kadefors *et al.*, 2007). Yet the price component is usually also included. As a standard solution for PP, The Association of Consultant Architects (2008a) and Mosey (2009) introduce a process where contractor selection is based also on fee and possibly unit prices. They seem to be used also in IPD to complete the prevailing negotiated selection (American Institute of Architecture, 2009a; Gehrig, 2009; Cohen, 2010; Darrington and Lichtig, 2010). While PA resorts to both approaches, it also utilizes design-build type full price competitive selection between two teams contracted for the development stage (but initially selected on a non-price basis). Although the earlier practice tended to favour non-price selection (Ross, 2006; Department of Treasury and Finance, 2009a), which creates the right psychological environment for cooperation (Ross, 2008), the current guidelines tend to recommend partial or full price selection in order to increase the competitive tension of the selection (Department of Treasury and Finance, 2009a, 2010d).

When considering the participants' selection, the PA source documents point out the significance of whether the parties are selected separately or as a team (that is why the feature is included in KIFs

although not itemized in the sources of the initial analysis). The former practice is sometimes justified as a means of finding the best players of a category, but it may lead to a situation where the owner does not get the best team. Therefore, the de facto standard in the PA context has been *selection as a team* (including both designers and constructors) starting in the non-price selection era (e.g. Ross, 2006) and culminating today (Department of Treasury and Finance, 2010d) although this was not exactly the case in the beginning (Walker and Hampson, 2003). The same practice is often also followed in IPD (American Institute of Architecture, 2007). In PP, the code of practice is instead to select the designers first and then bring the contractor in only after the owner's designers have produced a schematic design for review and possible quoting of unit prices (Mosey, 2003, 2009).

Administrational consistency

Yeung *et al.* (2007) highlight the *equality of key participants* of a project largely by referring to the equitable risk-reward balance that aligns the commercial interests of the parties and results in a win-win situation. While this might give the impression that we are not dealing with a separate principle, National Association of State Facilities (2010) points out that a contractually defined relationship establishing all key IPD participants as equals supports collaboration and consensus-based decisions. Yet, in practice, the PA joint implementation organization including the owner, and the related joint liability (Department of Treasury and Finance, 2010d), tend to make PA more equitable than the other RPDA, especially PP, where the parties remain more clearly within their agreed roles, expertise and responsibilities imitating traditional practice.

When the parties to an RPDA contract are equal, they also have a say on issues that would be out of their reach in traditional projects. In practice, this leads to collaborative, *joint decision-making* in projects by various management bodies including representatives of each collaborating party. In PP, the selection of subcontractors is made jointly (Mosey, 2009; Eriksson, 2010) whereas the roles of the joint management bodies are broader in IPD and PA. Especially in the latter, the owner reserves relatively few powers to itself (Department of Treasury and Finance, 2010c). In general, the requirement for unanimous decision-making is also presented, although consensus may not always be reached; the parties may have to submit to the results of a majority vote.

Table 1 Characteristics of various RPDAs based on unaltered key references

Project partnering			Project alliancing		Integrated project delivery	
Eriksson (2010)	Nyström (2005)	Department of Treasury and Finance (2010d)	Yeung <i>et al.</i> (2007)	Cohen (2010)	National Association of State Facilities (2010)	
<p>Mandatory core procedures</p> <ul style="list-style-type: none"> • Bid evaluation based on soft parameters • Compensation form based on open books • Usage of core collaborative tools: <ul style="list-style-type: none"> – start-up workshop – joint objectives – follow-up workshops – teambuilding – conflict resolution techniques <p>Complementary optional procedures</p> <ul style="list-style-type: none"> • Early involvement of contractors in concurrent engineering • Limited bid invitation • Joint selection and involvement of subcontractors in broad partnering team • Collaborative contractual clauses • Compensation form including incentives based on group performance <p>(to be continued at bottom of the next column)</p>	<p>Necessary components</p> <ul style="list-style-type: none"> • Trust • Mutual understanding <p><i>Other (overlapping) components</i></p> <ul style="list-style-type: none"> • Predetermined dispute resolution method • Economic incentive contracts • Facilitator • Openness • Continuous and structured meetings • Choosing working partners • Relationship building activities 	<p>Key features</p> <ul style="list-style-type: none"> • Risk and opportunity sharing • Commitment to 'no disputes' • 'Best for project' unanimous decision-making processes • 'No fault—no blame' culture • 'Good faith' • Transparency expressed as open book documentation and reporting • A joint management structure 	<p>Hard/contractual elements</p> <ul style="list-style-type: none"> • Formal contract • Real gain-share/pain-share <p>Soft/relationship-based elements</p> <ul style="list-style-type: none"> • Trust • Long-term commitment • Cooperation and communication • Other elements <ul style="list-style-type: none"> • Win-win philosophy • Equity • Agreed problem resolution methods • Common goals and objectives • Continuous improvements • Alliancing workshops • Early selection of contractors 	<p>Fundamental characteristics</p> <ul style="list-style-type: none"> • Early involvement of key participants • Shared risk and reward • Multi-party contract • Collaborative decision-making and control • Liability waivers among key participants • Jointly developed and validated project goals <p><i>Highly desirable characteristics</i></p> <ul style="list-style-type: none"> • Mutual respect and trust among participants • Collaborative innovation • Intensified early planning • Open communication within the project team • Building information modelling (BIM) used by multiple parties • Lean principles of design, construction and operations • Co-location of teams ('big room') • Transparent financials (open books) 	<p>Contractual principles</p> <ul style="list-style-type: none"> • Key participants bound together as equals • Shared financial risk and reward based on project outcome • Liability waivers between key participants • Fiscal transparency between key participants • Early involvement of key participants • Intensified design • Jointly developed project target criteria • Collaborative decision-making <p>Behavioural principles</p> <ul style="list-style-type: none"> • Mutual respect and trust • Willingness to collaborate • Open communication • Catalysts for IPD <ul style="list-style-type: none"> • Multi-party agreement • Building information modelling • Lean design and construction • Co-location of team 	

Notes: Mandatory features are in normal text; italicized text denotes optional features.

Table 2 Characteristics of various RPDAs aligned by common key integration features

	Project partnering		Project alliance		Integrated project delivery	
	After: Eriksson (2010)	Nystrom (2005)	Department of Treasury and Finance (2010d)	Yeung <i>et al.</i> (2007)	Cohen (2010)	NASFA (2010)
Cooperative culture						
Mutual respect and good faith		Trust	‘Good faith’; ‘No fault—no blame’ culture	Trust; long-term commitment	<i>Mutual respect and trust among participants</i>	
Open and active communication		Mutual understanding		Cooperation and communication	<i>Open communication within the project team</i>	
Commitment to improvement		<i>Choosing working partners</i>		<i>Continuous improvements</i>	<i>Collaborative innovation</i>	Willingness to collaborate
Team formation						
Early involvement of key participants	<i>Early involvement of contractors in concurrent engineering</i>			<i>Early selection of contractors</i>	Early involvement of key participants	Early involvement of key participants
Approach-oriented participant selection	Bid evaluation based on soft parameters; <i>Limited bid invitation</i>			<i>Alliancing workshops</i>		
Selection as a team			Selection of the best team!		<i>Selection of core team!</i>	
Administrational consistency						
Equality of key participants				<i>Equity; Win-win philosophy</i>		Key participants bound together as equals
Joint decision-making	<i>Joint selection and involvement of subcontractors in broad partnering team</i>		A joint management structure; ‘Best for project’ unanimous decision-making processes Commitment to ‘no disputes’		Collaborative decision-making and control	Collaborative decision-making
Mutual liability waivers					Liability waivers among key participants	Liability waivers between key participants
Commercial unity						
Shared financial risk and reward	<i>Compensation form including incentives based on group performance</i>	<i>Economic incentive contracts</i>	Risk and opportunity sharing	Real gain-share/pain-share	Shared risk and reward	Shared financial risk and reward based on project outcome

Transparent financials	Compensation form based on open books	Openness	Transparency expressed as open book documentation and reporting	Transparent financials (open books)	Fiscal transparency between key participants
Collaborative multi-party agreement	<i>Collaborative contractual clauses</i>		Formal contract	Multi-party contract	<i>Multi-party agreement</i>
Planning emphasis					
Jointly developed project goals	Usage of core collaborative tools: • joint objectives			Jointly developed and validated project goals	Jointly developed project target criteria
Intensified early planning				<i>Intensified early planning</i>	Intensified design
Advanced information and communication tools	<i>Usage of optional collaborative tools:</i> • <i>joint IT tools</i>			<i>Building information modelling used by multiple parties</i>	<i>Building information modelling</i>
Teamwork premises					
Pre-agreed conflict resolution methods	Usage of core collaborative tools: • conflict resolution techniques	<i>Predetermined dispute resolution method</i>		<i>Common goals and objectives</i>	
Teambuilding activities	• teambuilding • <i>partnering</i> • <i>questionnaire</i>	<i>Relationship-building activities</i>			
External teambuilding expertise	• <i>facilitator</i>	<i>Facilitator</i>	<i>Coach/adviser!</i>		
Operational procedures					
Continuous workshopping	• start-up workshop • follow-up workshops	<i>Continuous and structured meetings</i>			
Co-location of team	• <i>joint project office</i>			<i>Co-location of teams ('big room')</i>	<i>Co-location of team</i>
Advanced management principles	<i>Increased focus on contractors' self-control coupled with limited end inspections</i> • <i>joint risk management</i>			<i>Lean principles of design, construction and operations</i>	<i>Lean design and construction</i>

Notes: Mandatory features are in normal text; italicized text denotes optional features.

Jointly made decisions, again, increase commitment to the no-dispute rule and, furthermore, to *mutual liability waivers* among the key participants. Parties to a PA arrangement take this to extremes by agreeing that, as a rule, there will be no litigation or arbitration between them (Department of Treasury and Finance, 2010d) and a failure does not entitle to reimbursement. IPD seems to follow much the same line but its alternative contractual options also enable the use of more traditional practices (Dal Gallo *et al.*, 2009). PP, on the other hand, does not adopt that feature as such: there the liabilities of the parties to the contract remain largely traditional, and, correspondingly, each team member is responsible for any error or omission it effects (The Association of Consultant Architects, 2008b).

Commercial unity

Adoption of the *shared financial risk and reward* principle is sensible for the parties owing to the integrated project organization and joint decision-making. The principle applies, first and foremost, to shared savings and overruns according to the realized cost performance of the project in relation to set target cost, although in many cases various qualitative key performance indicators are also included in the reward system and the values they show influence the payments made to the service providers. An approach where the key parties bear the risk jointly and service providers are rewarded based on the success of the overall project encourages the actors to consider each other's views and to cooperate effectively. The integration of know-how also creates a basis for innovation.

All of the above seems to be the norm in PA, where the introduction of qualitative incentives is also thoroughly dealt with in guidelines, the model agreement and project introductions (Morwood *et al.*, 2008; Department of Treasury and Finance, 2010c, 2010d). By narrowing the scope of force majeure clauses almost all project-related risks have also been allocated to the alliance in order to avoid divergences in interpretation of risk-sharing, but the practice is changing (Department of Treasury and Finance, 2010d). IPD adheres to the same principles but takes a more conservative approach to joint risk coverage and incentives in general; there practices clearly vary. PP may or may not involve the practice depending on the case and the degree of partnering, but the issues became more of a focus with the Association of Consultant Architects (2008b) compared to the edition of five years earlier. Eriksson (2010) and Nyström (2005) as well as others recognize

economic incentive and risk-sharing as optional features which their texts only refer to in passing.

A model where risks are borne jointly requires *transparent financials*, i.e. the costs of a party are known to all other key parties meaning they operate on an open-book basis. This applies to all the RPDAs as already shown by the initial analysis. At least in PA, this practice is further reinforced by third party auditing (Ross, 2006; Department of Treasury and Finance, 2010d) while PP resorts to competitive sub-contracting (The Association of Consultant Architects, 2008a). Considering the fact that at least the owner, the designer and the contractor are all involved in the arrangement, mutual coordination and joint commitment that can be best implemented by using a *collaborative multi-party agreement* (PA: Department of Treasury and Finance, 2010c; IPD: American Institute of Architecture, 2009b; ConsensusDOCS, 2007; PP: The Association of Consultant Architects, 2008b) is necessary which especially in the case of IPD, but also in PP, may also involve a larger team. The agreement also lays the foundation for the team approach as the partnering charter does in traditional PP applications where a multi-party agreement is not applied: collaborative principles are dealt with in all the agreements.

Planning emphasis

The *jointly developed project goals* feature is emphasized in all three RPDAs studied. In the case of IPD, the feature is stated to be mandatory while alternative practices have also been reported (Cohen, 2010). In PA it is listed as an optional feature, but practice has shown that the owner's will defined in the request for proposals (e.g. VicRoads, 2005) will be developed in cooperation into measurable objectives and indicators as part of the selection and joint development phases (Morwood *et al.*, 2008). The development of joint objectives has also been recognized as a main task of the PA joint leadership team, and the objectives seem to be comparatively versatile compared to those of the other RPDAs. As to PP, The Association of Consultant Architects (2008b) reserves the possibility of including various performance indicators in the contract but without reference to joint development; determination of target cost also seems more mechanical than in the other RPDAs. In general, the contemplation of joint objectives seems to refer to mutual understanding and respect for each other's interests (Nyström, 2005; Eriksson, 2010).

Intensified early planning, again, is clearly a core component of IPD intended to avoid the increased project costs due to later redesign as thoroughly

illustrated by the American Institute of Architecture (2007). Although the early involvement discussed elsewhere is a prerequisite for intensified planning, it is not enough for it to be a passive approach: increased investment in early design studies is now also a target with contributions from numerous experts. Despite the application of early involvement, a similar phenomenon was not seen in PA or PP, although in the case of the former, the competitive, early selection process with in-depth workshops and analysis of alternatives is estimated to serve the same purpose to some extent.

Early planning is intensified by exploiting the means offered by *advanced information and communication tools* (ICT) of which the building information model (BIM) is the key one that multiple parties can utilize. As a technology, BIM may not be a critical feature in terms of the project delivery system (division of labour, etc.), but it is important for increasing the smoothness and productivity of the process, i.e. fluency of the information flow and information availability in general (Autodesk, 2008; Khemlani, 2009; Tiwari *et al.*, 2009). It surely has an impact on IPD as an organizational solution, and therefore the feature remains on the list although none of the RPDAs specifies it as a mandatory feature. That does not mean that PA and PP projects will not utilize the technological possibilities offered by BIM: they were just developed before the actual BIM era and partly for different motives.

Teamwork premises

It is not surprising that PP emphasizes the use of *pre-agreed conflict resolution methods* since they are among the tangible components from which all started (e.g. Bennett and Jayes, 1995; McIntyre, 1995). An RPDA that has arisen from the need to avoid disputes and litigation between contracting parties considers a problem-solving hierarchy as one of the key means of moving towards a more collaborative project environment (The Association of Consultant Architects, 2008b). Yeung *et al.* (2007) also regard agreed problem solution methods as a key component of PA based on early-stage experiments, but a more recent mainstream guideline, Department of Treasury and Finance (2010d), states, indeed, that PA contracts have traditionally not included a formal dispute resolution procedure. Such a mechanism is not needed since joint risk-sharing and financial incentives make the parties solve their possible disagreements promptly. Rowlinson *et al.* (2006) suggest that a specific dispute resolution model might even keep the parties apart, decelerate the work, and operate against the best interests of the project in a PA framework.

Yet the multilayered management structures of PA and IPD have adopted the basic idea of the decision ladder of PP.

Separate relationships and *teambuilding activities* were initially intended for key personnel representing the contracting parties to get to know each other and strengthen the team spirit in a neutral location (Nyström, 2005); they date back to early applications of PP. Another key deliverable from the start-up workshop, besides the conflict resolution system dealt with above, should be a partnering charter that embodies the mutual objectives of the parties (Bennett and Jayes, 1995; McIntyre, 1995). The practice is still valid (Construction Industry Council, 2005a) although some of the general objectives typically listed in partnering charters have found their way into actual contracts (c.f. The Association of Consultant Architects, 2008b). In the case of PA and IPD, teaming is not discussed as a social activity, but team culture is very much in focus there as well (e.g. Morwood *et al.*, 2008). PA also recognizes an alliance charter (Department of Treasury and Finance, 2010d), and teambuilding takes place prior to and during team selection workshops.

External teambuilding expertise, or an independent facilitator, is commonly engaged for teambuilding activities. The idea of using an objective, neutral party to promote the amalgamation of the team was also incorporated already in the early rules of PP—and is still alive (Construction Industry Council, 2005a). In PA most organizations also engage a coach to help them through the team development process (Morwood *et al.*, 2008). Yet, although the development of a high performance team is emphasized, the facilitator's role seems to be combined with the roles of an alliance adviser and a behavioural assessor of the selection (Ross, 2006; Department of Treasury and Finance, 2010d) unlike in PP, where the roles of adviser and facilitator are clearly separated. In IPD literature the issue is not given the same attention.

Operational procedures

The idea of *continuous workshopping* throughout the project process derives from PP where it was initially needed to create and maintain trustful relationships between relatively independent organizations (Bennett and Jayes, 1995). Considering its characterization as a mandatory feature (cf. Eriksson, 2010) and the emphasis given to it by today's guidelines (Construction Industry Council, 2005a), it remains a valid feature of PP. In the other RPDAs, this kind of get-together activity is largely substituted by some other, possibly more comprehensive practices which is

why it can be said that the feature as such is not a key component of PA and IPD.

In IPD and PA, the concept of continuous workshopping has largely been superseded by the *co-location of team* principle. IPD tends to acknowledge this as a highly recommendable solution (Thomsen *et al.*, 2009; Cohen, 2010; National Association of State Facilities, 2010) closely interlinked with e.g. certain lean management practices and the use of BIM. In PA documents the importance of a separate integrated office is also emphasized, and practice seems to comply with the principle at least in some projects (e.g. Morwood *et al.*, 2008); even Department of Treasury and Finance (2010c) presumes literally that the participants provide a project office which in this context tends to refer to the co-location arrangement.

Advanced management principles are elicited and emphasized especially as an integral part of IPD. Lean design and construction principles are not only recognized by the primary documents, but are also thoroughly explained in the contracts which also deal with the communications protocol (ConsensusDOCS, 2007). The lean management principles to be used in IPD include methods such as target value design, pull-based planning and value stream mapping. Separate guidelines shed more light on these practices (e.g. Thomsen *et al.*, 2009). Although lean production and some other management philosophies are mentioned in the PP contract document (The Association of Consultant Architects, 2008b), no actual procedures are presented. In general, PP, and especially PA, tend not to establish management practices in advance but leave it to the team to find the best way to attain the objectives of the project.

A summary of the procedures

The properties of the RPDAs were analysed in the foregoing. They were found to consist of ideas and arrangements which may or may not be applied. And the ways and degrees of application also vary. Since the RPDAs are relatively more multifaceted than suggested by the initial analysis, it is clear that the result cannot be summarized straightforwardly. Figure 2 aims, however, to illustrate how different RPDAs weight different key integration features (KIFs): the further from the targeted core component of cooperative culture (in the middle) an RPDA lies, the more it exploits the KIF in question in extending the foundation of the collaborative relationship (i.e. the demarcated area). Naturally, the comparison is not to scale, but shows only their relative positions.

When determining the ranking of an RPDA in the 'project integration hex nut' of Figure 2, all the KIFs were broken down further and the sub-features were evaluated. Thus, the presented rankings sum up the evaluations naturally assigning mandatory features greater weight than optional ones—this way the ranking also includes other views than the ones squeezed into the above review. It must also be noted that even a single KIF could contain conflicting sub-solutions and that some similar KIFs are interchangeable and/or embeddable in practice. Thus, only a few general remarks can be justified.

First, the figure demonstrates that PP emphasizes especially the means presented on the left under *Teamwork premises* compared to the other RPDAs. These KIFs derive from traditional PP where they were initially launched to create and maintain a trustful relationship between relatively independent firms. This kind of get-together activity has largely been replaced by other more comprehensive, straightforward practices in the other RPDAs. For instance, in IPD the co-location of a team and certain management procedures are the means of bringing the parties together for collaboration. It seems like early involvement of the key parties and intensified early planning make the parties members of the same team, eliminating the need to put emphasis on ad hoc activities. Similarly, the early, non-price-based involvement of a wide range of sources of expertise for intensified planning utilizing the most advanced technologies and management approaches is the most striking property of IPD compared to the others. However, PP exploits many of the background ideas but seems to be more conservative in their delayed implementation by also keeping the process under the owner's strict control, especially price-wise.

In fact, maintaining a balance between early collaboration and competitive (or economic) tension tends to be a challenge in most cases due to the generally mutually exclusive nature of the two. As to the economic performance of a project, negotiated early selection and subsequent joint efforts may improve (e.g. Knott, 1996; Ballard and Reiser, 2004; Mosey, 2009) or impair it (cf. Department of Treasury and Finance, 2009a). Incentivization is further complicated by the different times of fixing the target cost of the contracts: the timing seems to vary even within an RPDA (e.g. IPD; Dal Gallo *et al.*, 2009), which affects the balance of contribution between the designer and the constructor (cf. Ashcraft, 2009). This poses a clear challenge to further development and careful consideration of price-

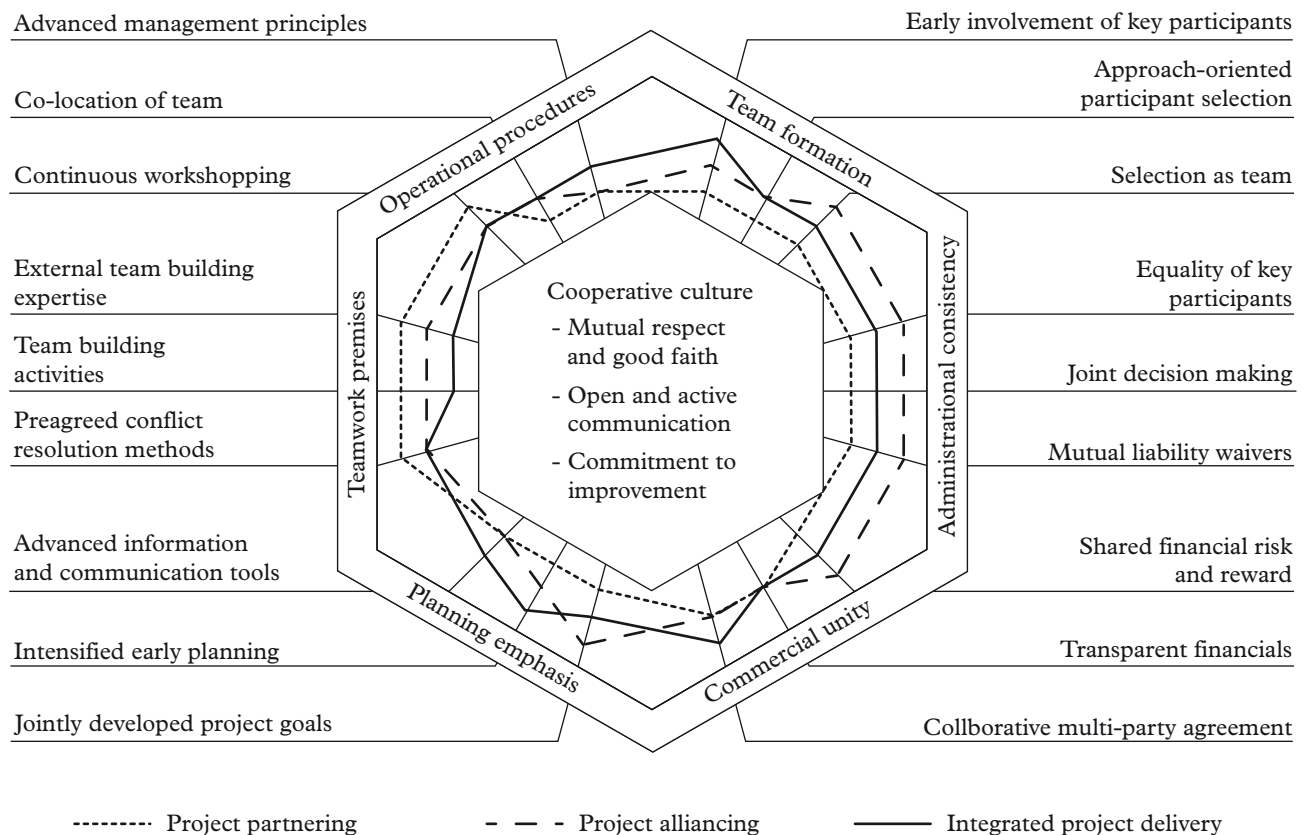


Figure 2 Different RPDAs pitted against each other

Note: Degree of exploitation of a KIF increases with distance from the centre.

ing issues in collaborative construction project delivery arrangements despite the fact that the contract conditions reserve to the owner the right to terminate unless satisfied with the result of the joint planning stage.

Secondly, the degrees of *Administrational consistency* signal major differences. It seems that PA goes much further in organizational integration, role confusion and risk-sharing than especially PP. Although the study aims to avoid highlighting individual contracts, in order to recognize general, targeted features of the paradigms, that fundamental issue is worth verifying and examining further based also on current model contracts as follows.

As to PP, The Association of Consultant Architects (2008b) requires the team members to work together and individually in a spirit of trust, fairness and mutual cooperation, yet within the scope of their agreed roles, expertise and responsibilities. Correspondingly, it defines that each team member shall be responsible for any error or omission it effects.

Department of Treasury and Finance (2010c), again, takes the contrary view on roles and liabilities: first, it binds all service providers jointly and severally to the project owner, and secondly, defines that a failure by a participant to perform any obligation does not give rise to any enforceable right or obligation at law or in equity. Thus, PA adheres strictly to the principle of joint liability and risk-sharing, clearly distinguishing it from PP.

Correspondingly, PA in its current form differs clearly also from the more common project delivery systems. As to the investment phase options, the variations are conventionally classified into traditional design-bid-build, management-type and design-construct-type methods at the most basic level of examination (e.g. Love *et al.*, 1998; Dorsey, 1997; Konchar and Sanvido, 1998; Mahdi and Alreshaid, 2005; Masterman, 1992). In all cases, clear scope of liabilities are contractually determined separately for the contracting parties, except in PA—or Alliance Contracting for clarity.

Although this distinction is repeatedly referred to in research (e.g. Hauck *et al.*, 2004; Le Masurier *et al.*, 2006; Laan *et al.*, 2011), only more thorough sets of owner guidelines (e.g. NSW Government, 2008; Queensland Department of Public Works, 2008; Department of Treasury and Finance, 2010b) and other reports (Koppinen and Lahdenperä, 2004; Thomsen, 2006; Pakkala *et al.*, 2007) make the effort to reveal the differences in detail and comprehensively. Correspondingly, the emergence and diffusion of Alliance Contracting presents the challenge of updating the type of research which aids the owner in the selection of an appropriate project delivery system for an individual project (e.g. Love *et al.*, 1998; Alhazmi and McCaffer, 2000; Mahdi and Alreshaid, 2005; Oyentunji and Anderson, 2006) since it involves only the three conventional systems.

The position of IPD, again, is not very clear. It takes steps towards PA by requesting the contracting parties to organize and integrate their respective roles, responsibilities and expertise and to define the target cost estimate as a sum that includes the owner's selected cost items (ConsensusDOCS, 2007). Yet the model contract recognizes the roles and corresponding liabilities of the parties who, for instance, are to decide whether each party shall be fully liable for its own negligence and breaches of contract or warranty, or whether they are to agree to release each other from any liability for any non-negligent act, omission, mistake or error, or error in judgement, whether negligent or not, to the extent that they are a result of project risks arising from jointly reached and mutually agreed-upon project decisions made by the management group. Considering the variation between different IPD applications (cf. Dal Gallo *et al.*, 2009), the 'tick box' options available in model agreements and their reported customized use (Cheng *et al.*, 2011), IPD may still be considered to constitute a loose framework within which a PA or PP-type solution can be applied.

It is also interesting to note that arrangements based on joint organization and risk-sharing have been invented on, at least partially, different grounds. PA was introduced to infrastructure construction to improve the performance of projects involving lot of uncertainty in terms of project solution and unpredictable implementation stage risks (Ross, 2006; Morwood *et al.*, 2008). As to IPD, a similar organization was suggested to allow application of effective management methods (Ballard and Howell, 2005) as well as to introduce BIM, since the originator of a given piece of information is easily lost track of in intensified joint

modelling and prompt exploitation of available data (Bernstein and Pittman, 2004). PP, again, has its roots in dispute minimization and the need to improve the economic performance of a multi-actor construction process in general. Thus, considering also the other drivers for the utilization of RPDAs (see Introduction), there seems to be a lot at stake for the industry. However, an RPDA is not the solution for small standard projects because of the requirement to invest in relationship and relational mechanisms.

Discussion

Project partnering (PP) vs. project alliancing (PA)

The traditional understanding of the differences between PP and PA is that 'partnering' focuses on improving cooperation but is based on traditional contractual frameworks (Scott, 2001; Walker and Hampson, 2003; Hauck *et al.*, 2004; Ross, 2004; Yeung *et al.*, 2007; Morwood *et al.*, 2008) such as traditional design-bid-build or design-build. The partnering charter signed by the parties is, however, said to be a deviation from traditional models. It basically lists the proper agreed main principles of cooperation but is not a legally binding document whereas in PA the collaborative arrangement is included in the contract. However, considering the current conditions of The Association of Consultant Architects (2008b) and its coverage of collaborative clauses, the issue of missing legal validity is no longer absolute in all cases.

Walker *et al.* (2002) also conclude that there are significant differences between PP and PA in the selection process, management structure and nature of the risk and reward incentives. The argument by Scott (2001) is almost identical: the key distinguishing features are the early selection of contractors, the joint financial incentive, and the creation of a single project team so that the owner is an integral and active member of the alliance. As to the early selection, the point made obviously used to be true. Yet, the development of PP towards early, soft selection (Construction Industry Council, 2005b; Kadefors *et al.*, 2007) together with the recent PA owners' withdrawal from it and their return to price-inclusive selection (Department of Treasury and Finance, 2010d; Love *et al.*, 2010) make these statements related to early selection questionable in general.

Walker *et al.* (2002) further define (see also Walker and Hampson, 2003) that in PP, partners

may reap rewards at the expense of other partners whereas in PA the economic result for all partners depends on the success of the overall project. In other words, in PP partners retain more independence and may individually suffer or gain from the relationship. It is very true that the incentivization in PP relies on strict roles and its only partially parallel payment conditions including fixed items (e.g. Mosey, 2003) cannot offer the same flexibility and incentive for trade-offs between efforts and costs of different parties as organizationally integrated PA, but today PP (i.e. The Association of Consultant Architects, 2008b) also exploits the shared savings (or pain/gain) arrangement. The shared savings arrangement can also be exploited, for instance, in design-build (cf. Tanner, 1998). Thus, it is not the shared underrun/overrun alone, but the organization, that determines the profoundness of its impact.

Therefore, although there are variations in how PP and PA apply the different principal features in practice, the only definitive discrepancy between them is the underlying PA joint organization consisting of the owner and others with no clear roles and liabilities unlike in PP (and in the early applications of PA). The evolution of PP over time (e.g. the application of early involvement and risk-sharing) has largely narrowed down the differences between early-stage PA and PP, while PA has evolved away from its early applications. And decade-old texts cannot fully describe that change.

Project alliancing (PA) vs. integrated project delivery (IPD)

The relationship of PA and IPD has been reviewed in a few trade magazines (e.g. Post, 2008; Carbasho, 2008; Khemlani, 2009), and the results show that IPD to some extent is influenced by, and aims for, the type of joint organization that is characteristic of PA. Numerous other sources of information also refer to PA solutions when they introduce IPD procedures and related arguments (e.g. Bernstein and Pittman, 2004; American Institute of Architecture, 2007; Pressman, 2007; O'Connor, 2009; Darrington and Lichtig, 2010; Parrott and Bomba, 2010).

More in-depth analyses on the RPDAs have been made by Heidemann and Gehbauer (2010), and Raisbeck *et al.* (2010). The former specify the inclusion of lean construction tools and BIM in IPD as the main difference although the involvement of numerous (sub)contractors in the IPD team on the same contract conditions is also identified as a discrepancy. On the other hand, the

limitation of legal recourse to instances of wilful default or insolvency, a well-defined team selection process and, obviously, involvement of financial auditors in the case of PA, are features not embedded in the IPD approach. Raisbeck *et al.* (2010) consider the two RPDAs similar as to governance and collaborative structures, but reintroduce the differences due to lean management, BIM and team selection, and state clearly that, if a project is put out to tender, it cannot be considered an IPD project.

As to team selection, there seems to be no standardized, formal process for selecting participants in IPD. Besides philosophical considerations, that may well also be due to different types of users: although IPD emphasizes the early involvement of extensive know-how more than the other RPDAs, it has been used especially by private sector owners (see Cheng *et al.*, 2011), in whose case there are no similar constraints on formal (price inclusive) competitive selection as in the case of public PA owners (see Department of Treasury and Finance, 2010d). The competitive selection process also largely explains the prevailing phased contracting practice in PA (where a separate agreement for the development phase (Department of Treasury and Finance, 2010a) precedes the actual alliance contract) while IPD (and PP) typically follows the single contract procedure (The Association of Consultant Architects, 2008b; Dal Gallo *et al.*, 2009; Department of Treasury and Finance, 2010c). Yet it must be noted that IPD is not used only by the private sector, and that non-cost criteria selection has prevailed in PA until quite recently (Ross, 2006; Department of Treasury and Finance, 2009a).

Another more profound reason for the stagewise variation in focal points between IPD and PA is their dissimilar fields of application. IPD has mostly been used for social infrastructure, or 'vertical' building construction, where the uncertainty is largely related to complex systems, their compatibility, functionality, and response to the owner's needs. There, the risk can be minimized by intensified, cooperative early planning where model-based collaboration and review can be of great benefit (e.g. Autodesk, 2008; Khemlani, 2009; Tiwari *et al.*, 2009). Since PA, again, is used mainly for transport and utility infrastructure—road, rail and water projects—the underlying risks are different. In the case of an extensive 'horizontal' project, stakeholder issues, construction-time traffic arrangements, site and subsurface conditions, etc. pose major risks that remain impending at least until the implementation stage of the project. Early planning does not represent the same potential, but incentives for efficient

solving of any forthcoming dilemmas have to be in existence.

Thus, from the philosophical standpoint, the joint organization in IPD is built early to free all the numerous experts to engage in intensified collaboration for the best project solution while in PA it serves more as a risk management tool to minimize the consequences from troubles met in the course of the process. In practice, both RPDAs naturally benefit from both aspects. The philosophical difference may, again, explain what Heidemann and Gehbauer (2010) also noted as the most distinctive difference between IPD and PA: the tools and management approaches incorporated in IPD that are missing from the PA fundamentals. PA creates an organizational framework that really incentivizes the parties to work for the best of the project as the team relationship is built and a relatively solid plan/design often already exists which makes it possible to let the team select the most appropriate means and methods for the work. In IPD, where the contract is entered into very early and without actual project-specific competition, the parties' common understanding of the applicable means and methods is wisely written into the agreement.

The dissimilar fields of application offer an explanation also for the obvious difference in subcontractor involvement. In building construction, the required expertise is scattered among different enterprises that need to be involved in the process to make it work appropriately. That does not necessarily apply to transport infrastructure projects where most of the value chain is under the control of the main parties so that only a few companies need to enter into a contract to proceed with the project. Thus, there may be no actual difference between IPD and PA. The history of building construction PA also illustrates cases where subcontractors have been allowed to join the team (Walker and Hampson, 2003).

Integrated project delivery (IPD) vs. project partnering (PP)

The literature does not seem to include any profound discussions on the similarities of IPD and PP. It merely notes differences, e.g. that the parties to PP sign a non-binding collaboration charter which is not the case in IPD (American Institute of Architecture, 2008); this indicates that the comparison is made to traditional partnering. Moreover, it mentions that PP does not change the basic contract and liability relationships in accordance with the above discussion. Thomsen *et al.* (2009) also

recognize PP as a prelude to IPD by concluding that IPD represents a logical evolution of PP where contractual structures have been joined to the spirit of partnering.

Another major difference not dealt with in the comments is related to the involvement of the constructor and suppliers, which in the case of IPD happens early in the process while PP takes a more conservative standpoint on that: the main contractor is selected as a result of competitive selection on the basis of the preliminary design by the owner's designers, and only after joint development of the design are subcontractors involved on the basis of the usual competitive procurements with the owner and consultant also wielding their influence (The Association of Consultant Architects, 2008a; Mosey, 2009).

This means that in applications using PP the uncertainties related to the construction solution are minimized compared to the early selection in IPD. The non-existence of plans in IPD requires taking steps towards PA-type joint liability in order to minimize the owner's risks and make the performance more efficient. Otherwise, the differences are those revealed by the above examination.

Conclusions

As quoted in connection with one of the RPDAs above, any application is likely to be a highly specific combination of practices, manifesting itself in different ways and making it hard to generalize. Based on the conducted analysis, the claim can be generalized to apply broadly to all RPDAs. The inference from that is that the differences discussed above are also, by and large, multifaceted and only few simplified conclusions can be drawn. Therefore, the main contribution of the study is that it sheds light on the general characteristics of RPDAs paving the way for any RPDA advocate to try and rationalize certain procedures.

Part of the challenge is due to the fact that any RPDA tends to evolve over time anyway while definitions of the concepts change. At the time PA emerged, its novelty was largely based on early involvement and the shared savings and overruns principles fostering closer cooperation. Soon, both these practices were incorporated in PP, but a difference still remains, since PA, which applied parallel contracts with well-defined scopes of works earlier, has progressed into a real joint-liability arrangement between the parties today. Although

this is an established, mandatory feature of PA, the recommendations for competitive practice and risk inclusion have nevertheless changed very recently. Similarly, IPD is changing from a cooperation philosophy towards a similar team effort although the short time perspective and relatively few projects implemented with it do not allow final conclusions to be drawn yet. All of this underlines the fact that any comparative study on RPDAs, like the one at hand, provides a view of the current situation at best.

One of the contextual implications of the study is related to how PA is identified as a form of collaboration. Based on this study, PA—or Alliance Contracting—should also be recognized as a project delivery system in its own right, i.e. a method comparable to design-bid-build, design-build and construction management, etc. This is justified by the fact that the contractual structure of PA differs from those traditional risk-allocating contractual frameworks. Therefore, the differences between RPDAs are not minor details of little importance or matters of opinion—they are so definitive that various RPDAs are undoubtedly applicable to different types of projects guided by different constraints and objectives.

PP, instead, although it has developed in leaps and bounds since its introduction, is still ‘merely’ a supplementary collaborative approach, since the roles and liabilities of the parties remain, by and large, the same as in the traditional system despite the strong team integration and openness introduced into the model. This may also concern IPD as far as we speak of the loose ‘IPD-ish’ philosophy (cf. National Association of State Facilities, 2010) instead of ‘true’ IPD which, again, aims to exploit the contractual structure of Alliance Contracting. Yet the current contract conditions do not generally deal with the integrity involved in PA contracts, and on top of that, most projects tend to eliminate certain aspects of liability and shared risk in practice (Cheng *et al.*, 2011). So far, IPD has fallen between PA and PP as to team integration.

The different degrees of integration are the major difference between the RPDAs. They are the outcome of differences in underlying project risks and uncertainties. Naturally, PP projects also carry risks, but they are mostly considered manageable by a certain party to whom they are therefore allocated. In the case of IPD applications, the earlier initial agreement and undefined project scope introduce uncertainty (in addition to ‘manageable risks’) related to scope definition and emerging technol-

ogy, and especially to the competence, performance and interaction of the parties themselves. An approach leaning more on joint liability is gaining popularity as it eliminates the machinations allowed by missing plans, for instance, but diminishing uncertainty along with the proceeding of design may, however, allow the scope of liabilities to be fixed correspondingly. In the case of PA applications, there seem to exist more uncertainties related not only to the parties, needs and technology, but also uncertainties external to the team, which remain unknowns until the end of the project. In such a case, pure joint liability and the resulting collaboration are well justified to avoid, for instance, later mutual quarrelling that would harm also the initiator.

Yet, IPD, especially, is a relatively new invention and it is uncertain which application wins out after the current obstacles have been removed. For instance (unlike in the case of PA: Department of Treasury and Finance, 2009b) there have been no insurance products available for joint liability projects (Post, 2010) until very recently (e.g. AIA Trust, 2010) and the launch of such products may redirect the practice. Post (2010) implies that contract conditions are to be changed whenever such products become available. The obvious conclusion is, therefore, that IPD will soon, also in practice, assume a form, which as a project delivery system represents alliance contracting, but includes also other characteristics that have not been incorporated into the current PA philosophy.

Wider coverage is a reasonable justification for the novel IPD concept in addition to cultural background: it is needed as a marketing vehicle for the advancement of the use of a new combination of nascent tools, techniques and procedures (BIM, lean, etc.) within a PA-type organization. While PP and PA are organizational and contractual frameworks incentivizing and enabling efficient implementation, IPD also emphasizes the means and methods to be used in the framework. This being the case, the other apparent differences between PA and IPD discussed above (i.e. team selection, subcontractor involvement, etc.) may not justify jumping to far-reaching conclusions based on the current applications, where the RPDAs are applied to mutually different areas. The study showed that the constraints have had an impact on the procedures. As the utilization of an RPDA extends to the field of a parallel RPDA, the practice may end up being the same. The theoretical premises are not that different.

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