

SUPER-CHARGING SUPPLY CHAINS – THROUGH 'RELATIONAL INTEGRATION' FOR 'OVERALL VALUE'

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Abstract

'Relational integration' means more than mere 'structural integration'; and is needed for generating 'genuine' and sustainable collaboration in construction. However, higher levels of integration can evidently not be reached without a specially formulated and consolidated set of focal points. Relational integration and convergent agendas can therefore be targeted through directing a common focus on the 'overall value' of the 'supply network'. To this end, 'Relationally Integrated Value Networks' (RIVANS) are conceptualised to engage and empower their members towards both short-term and long-term overall 'network value elements' that must be suitably structured and made explicit. These common network value elements and corresponding goals should then loom larger in project landscapes, but should also be designed to co-exist with each set of network member-specific value objectives. Whilst aligning the latter as much as possible towards the former, it is recognised that each organisation e.g. a sub-contractor or specialist supplier, will have some other ('extra-network' or 'beyond network') needs; and may indeed be part of other value networks. However, each network can benefit from healthy inputs from, and benchmarking against other networks. Secondly, the strengths of each network will be enhanced by the steady development of each of its members. The paper will explore the potential and pitfalls in developing such RIVANS, incorporating relevant outputs from two case studies of enlightened teamworking, and two subsequent Workshops deliberating RIVANS possibilities. The needs for, and potential impacts of the RIVANS initiative are heightened in the present major economic downturn, and indeed during other periodic troughs in industry and market cycles. Relationally integrated networks should be more resilient in withstanding such pressures, while achieving critical efficiencies for reaching necessarily higher performance levels in general.

Keywords: integration, relational, RIVANS, teamworking, value networks.

INTRODUCTION

In a recent up-date on 'Integrated Teamworking' Davis (2009) recounted relevant rhetoric in 'Re-thinking Construction' (Egan, 1998) – “the process and production team are then integrated to deliver value to the customer efficiently and eliminate waste in all its forms”; and reinforced this with the related 'business case' for integration e.g. for “... savings of up to £ 2.6 billion” as projected by the 2005 NAO Report on 'Improving Public Services through Construction' “... if good practices, including partnering and early development of a project team was applied across the public sector”. However, such savings, or indeed the 30% overall savings in project costs and durations deemed possible by Egan (1998) have not materialised. This can be traced to two shortfalls – in achieving 'integrated teams' and in 'delivering value' to the extents expected, despite being the key targets highlighted over 10 years ago, as in the opening rhetoric above. It is argued in this paper, that these shortfalls are mainly due to the 'disconnect' in approaching these targets independently.

More positively, this paper presents an alternative that has been proposed to approach these twin targets together, by developing 'Relationally Integrated Value Networks' (RIVANS). This is based on identifying common best value objectives of the entire team/ network (including the client, consultants, contractors and SMEs in the supply chain); and building better relationships – mostly by jointly focusing on, and working towards such common shared value. RIVANS envisions an ensuing spiral of improving value and strengthening relationships that continue to mutually reinforce and 'feed' one another. It draws on relevant success factors, while avoiding common barriers to partnering and alliancing, and aims to boost project performance in the long term. These success factors and barriers are admittedly different in Hong Kong, Australia and different parts of Europe, e.g. due to institutional and cultural differences, but the RIVANS framework anticipates and accommodates such differences, since each network is expected to identify and define its own target value system.

The process of articulating and consolidating hitherto ill-defined and conflicting goals and objectives, would itself accelerate integration, when for example, identifying shared values of enhancing reputation / recognition, mutual benefits in finishing faster and reducing disputes and waste, as well as in targeting the increasingly important triple bottom line of economic, environmental and social goals (or 'profit, planet and people'). Even if the priorities (between these '3P' targets) are different, increasingly strident stakeholders of each organisation ask for assurances, if not evidence, on how these targets are being addressed.

RIVANS envisages benefits beyond those expected from current longer-term arrangements such as in the 'framework agreements' of the UK National Health Service (NHS, 2009) where principal supply chain partners will be entrusted to deliver hospital projects; or the 'premier league' of the Hong Kong Housing Authority, where a small group of better performing contractors can be allotted enhanced entitlements e.g. to tender for more and bigger contracts than other registered contractors. Two case studies of partnered projects in Hong Kong (Kumaraswamy and Rahman, 2006; Kumaraswamy *et al.*, 2008), helped unveil critical components of teamworking that contributed to the conceptualisation of RIVANS frameworks. The latter were discussed and debated at two Workshops (CICID, 2007, 2008).

This paper initiates the next stage of RIVANS development, by identifying key points and refinements emerging from Workshop feedback, as well as by signposting higher level benefits to the entire industry, when networks benefit from cross-linkages to each other. For example, benefits can accrue from faster knowledge diffusion and 'virtual' or informal inter-network 'benchmarking' that can help counteract any tendencies towards lowered

productivity in members who become complacent about an ‘assured’ place in their network, which can in turn dampen member motivation and erode overall network competitiveness.

PROBING PRESENT SHORTFALLS IN SUPPLY CHAIN INTEGRATION

Shortfalls in Integrating Sub-contractors, Supplier and Consultants

In reviewing the implementation of the UK construction industry change agenda based on the Latham and Egan Reports of the 1990’s, Langford (2007) found that although a few clients may have benefited from ‘framework agreements’ and ‘Egan-compliant contractors’, ‘smaller firms further down the supply chain were still expected to behave according to the old model and compete on price’. He also saw the Singaporean, Australian and Hong Kong models as also ‘very Egan-like’ in aiming at integrated supply chains, but falling far short themselves. Specific shortfalls in failing to integrate key supply chain members such as sub-contractors and consultants in even basic project ‘partnering’ exercises have been highlighted in Hong Kong e.g. by Kumaraswamy and Dissanayaka (1997) and by Sze *et al.* (2003), based on case studies of a hospital project and a housing project, respectively.

Shortcomings in Structural Integration and the more elusive Relational Integration

Integrating functions such as ‘design’ and ‘construction’ is not easy but has been achieved in Design-Build ventures; while ‘finance’ and ‘operation & maintenance’ functions are also being embedded in one entity in Build-Operate-Transfer and other PPP type procurement. Even these generate interface management problems that although less visible, in the supposedly single-point responsibility scenario, often provide examples of mismatches and poor organisational/ functional integration. While such structural integration is necessary, it is not sufficient in achieving the deeper synergies envisaged by industry reform initiatives.

For example, the target set by the UK ‘Strategic Forum for Construction’ in September 2002, for ‘undertaking 50% of construction projects (by value) by integrated teams and supply chains by 2007’, appears to be revisited and revised in the ‘headline targets’ of the Strategic Forum (2009), arising from the 2012 Olympics procurement improvement initiative, but expanded to the ‘2012 Construction Commitments’ being ‘signed up’ for by many UK construction organisations, one of which pledges that: “different parts of the industry – clients, consultants, main contractors, specialist contractors, and product manufacturers and suppliers – to be engaged in supply chains on 30% of construction projects and for 40% of their work to be conducted through integrated project teams”. Indeed, the topmost of the ten barriers relating to clients in achieving the 2002 targets was identified in 2006 (Constructing Excellence, 2006) as ‘lack of clear brief, incomplete/ changeable brief and lack of understanding’. These shortfalls indicate a need for identifying common value targets at the outset, in order to overcome barriers to integration.

Difficulties in defining and agreeing desired ‘Value’

Identifying the important ‘individual’ value objectives within each organisation, and conveying them to those who must contribute to their achievement, has in itself proved difficult. So conveying and negotiating these across organisations in order to identify and highlight common network value elements is even more demanding. This perhaps explains why it is very rarely achieved, and why special strategies and efforts are needed to unveil, unravel and translate win-win ‘network value’ into viable overall value elements; and to thereafter design delivery systems that appropriately allocate the risks, roles and rewards. Indeed, one of the recent major thrusts of the CIB was for ‘revaluing construction’, specifically ‘the maximization of the value jointly created by the stakeholders to construction

and the equitable distribution of the resulting rewards” (Barrett, 2005). However, neither can all risks be exactly defined, nor can the type or extent of rewards be precisely known when negotiating the original contract, hence the need for truly integrated teams that trust each other to undertake joint management of certain types of risks and share the ensuing rewards, e.g. in a pre-determined gain-share pain-share basis for certain quantifiable components (Kumaraswamy and Rahman, 2006), or even in less tangible components such as knowledge and reputation (Allee, 2008).

DOUBLE-BARRELED TARGETING OF THE TRIPLE-BOTTOM-LINE

Conceptualisation and Development of RIVANS

The above shortfalls and their apparent causes reinforced the need for a combined assault on the twin-targets of best value and deep integration, since it was clear that neither could be achieved without the other. A progressively stepped-up ‘attack’ via a series of double-barrelled salvos seems necessary for advancing towards the broader value targets that must now incorporate elements of the increasingly important triple bottom line of economic, environmental and social goals, given wide-spread demands to take responsibility for human inputs, materials and methods used in production, and direct and indirect outputs generated. Value objectives also need to be wider than in the past to accommodate these growing multiple ‘dimensions of value’. It is clearly not easy to articulate and agree on common value objectives, which may explain the difficulties encountered in integrating teams, despite many good intentions in recent years.

Such thinking led to the conceptualisation of RIVANS as a platform for ‘relational’ integration of hitherto mutually suspicious project participants into cross-linked ‘value networks’. In consolidating multiple approaches as above, the development of RIVANS must necessarily draw on relevant components from various theories (e.g. from organisational, psychological and other social sciences), diverse disciplines (e.g. of project management and system dynamics) and related thrusts e.g. in supply chain management, value management, knowledge management and motivation, and key concepts (e.g. of social identity, economic exchange and organisational justice) in order to empower superior governance, value exchange, procurement and delivery through value-focused and relationally integrated teams. While the theoretical underpinnings are beyond the scope of this paper (and being reported elsewhere), the following sub-sections highlight the core building blocks.

Networks and Value Streams

A growing body of relevant research on networks is being tapped, e.g.: (1) from the perspective that ‘construction projects can be viewed as a networks of relationships that make up the project coalition’ (Pryke, 2006), leading to findings on ‘legal, contractual, communications and financial aspects of project governance’; (2) from the ‘project network’ and ‘social network model of construction’ that ‘integrates classic project management with social sciences variables’ to ‘enhance knowledge-sharing’ for ‘high performance teams’ (Chinowsky *et al.*, 2008); and (3) from wider (reaching beyond single projects) ‘value network approaches to value creation and analysis’, that ‘model organisations and business relationships as living networks of tangible and intangible value exchanges’ (Allee, 2002).

Normann and Ramirez (2000) said: ‘successful companies increasingly do not just add value, they reinvent it’; mainly by reconfiguring roles and relationships among a ‘constellation of supplier, partners and customers’. The development of value network analysis since 1993 (Allee, 2008), provide some examples and tools that may be adapted for RIVANS, for

example in assessing and negotiating the conversion of intangible assets such as knowledge, reputation and relationships into exchangeable value components. In, a specific example, that addressed the convergence and synergising of a series of ‘value streams’ flowing in from various specialist suppliers and sub-sub-contractors in infrastructure projects, Arbulu *et al.* (2003) modelled value stream maps that spanned organisational disciplines and straddled company boundaries in a case study of pipe supports in power plants.

PRECEDENTS AND PROSPECTS OF RIVANS

Progressive Precedents

In the UK, the ‘framework agreements’ of the British Airports Authority set out in the 1990’s, to keep ‘on call’ carefully selected supply chain partners such as consultants and contractors. These agreements aimed to reap mutual benefits e.g. from transactional efficiencies, economies of scale and higher quality assurances, special (client-specific) competencies development and resource rationalisations, including those based on confidence in continuity of work. Secondly, the National Health Service, ProCure21 provides for a partnering approach where an NHS Trust can select a ‘Principal Supply Chain Partner’ (PSCP) from the ProCure21 framework without having to go through a standard tendering process (NHS, 2009). The PSCP will offer a full range of services that will help the Trust plan, design, approve, and construct their scheme. Once a final design is agreed both parties agree a ‘Guaranteed Maximum Price’ before construction starts. This enables rapid mobilisation of supply-chains with relevant experience, as well as joint incentives, long-term relationships, performance measurement. Reportedly (NHS, 2009), over 200 NHS schemes were delivered through ProCure21’s £2.4bn programme. In 2006, 94% of schemes were delivered on time and 89% on budget, with no litigation.

In Hong Kong, the ‘premier league’ of the Housing Authority has apparently not yielded similar benefits and in any case was limited to major contractors, rather than the rest of the supply chain. This may be linked to limitations in operating under a Government Departmental mode. A less structured approach in the previously quasi-Government and now ‘privatised’ MTRC (Mass Transit Railway Corporation) has enabled it to establish deeper relationships. These in turn enable it to for example, mobilise valuable contractor expertise for value engineering and risk mitigation inputs into early stages of complex designs, and also to identify those who may have developed special competencies and maturities that are needed to ‘partner’ effectively in ‘target cost’ contracts, as in the first case study below.

Case Studies in Hong Kong

While relevant elements and findings are summarised below, the first case study is reported more fully by Kumaraswamy and Rahman (2006). The project was for major improvements and new connections to an existing underground railway station of the MTRC in one the busiest commercial spots in Hong Kong, if not worldwide. Complexities of the risk-intensive underground works were heightened by critical operational needs of the current station. A ‘beyond partnering’ relational approach was aimed at by the MTRC, having already benefited from savings in the then recently completed partnered project for the Tseung-Kwan-O extension. This led to a target cost contract tied to ‘gain-share pain-share’ formula. However, the relational approach reaped many pre-contract benefits as well, e.g. with multi-stage tendering, early involvement of contractor and thereby enhanced multi-stage value engineering and joint risk management. Risks were divided into three groups of clients, contractors and joint, and the resulting risk register was part of the bidding documents. The two tenderers who were finally chosen for the final stage conducted independent risk

mitigation and value engineering exercises with independent client representatives that led to a reduction of more than one third of the client's previous estimate.

Many post-award devices continued to enhanced 'best value' and 'deeper integration' such as through co-location (with shared offices and resources e.g. in draughtspersons and measurement teams), open book accounting and a common project bank account, back to back 'gain-share pain-share' arrangements with principal sub-contractors that incentivised key supply chain members, and periodic value engineering exercises. The project was completed ahead of schedule and with cost savings, leading this client to initiate similar arrangements on the more risk-intensive of their forthcoming projects. It reportedly would not use these across the board on all projects, given perceived limitations in numbers of potential supply chain partners with adequate competencies and mind-sets to make the most of target cost type arrangements. While flexibility is thus maintained, the need to upgrade industry competencies in general is noted, given the overall benefits that can accrue.

Key components and findings from the second case study are also summarised below, but reported more fully by Kumaraswamy *et al.* (2008). The project was for redeveloping a commercial complex by a major private developer in Hong Kong. A 'Guaranteed Maximum Price' procurement mode encouraged a search for savings and joint risk mitigation during the project. The deep relationship was perhaps easier, since although the contractor had to demonstrate competitiveness at each stage - pre-contract, as well as in sourcing and sharing savings from sub-contracts etc. – a common parent company held major ownership in each the client and contractor. Apart from the fact that both organisations had built up experience in partnering on previous projects, this contractor championed /promoted partnering and better relationships with other clients as well, on the premise/ promise of being able to deliver better value through cooperation.

However, Kumaraswamy *et al.* (2008) report how the formal mechanisms of traditional partnering, such as the partnering charter, workshops and periodic evaluations against stated partnering goals, were not important in this case. Instead, a dominant client culture drove the risk management and problem-solving through a strong in-house project management team. This also drew heavily on the perceived fairness of the client's decision-making processes and outcomes, evoking the importance of elements of 'organisational justice' that elicit more than can be explained by 'transaction cost' perspectives. Furthermore, many of the supply chain members had worked on previous projects of this client, demonstrating the enhanced value that can be harnessed by such short-cuts in usually long 'learning curves'/ slower development of 'trust' for 'relational integration', thereby releasing network energies earlier to focus on common value elements.

RIVANS Workshops I and II

Following conceptualisation and discussions on RIVANS frameworks and mechanisms as planned in a Hong Kong based research project, two Workshops on 1st December 2007 and 31st May 2008 proved valuable in enabling intense discussions and refinements of RIVANS following feedback received. Again conference paper length limitations preclude detailed descriptions herein, whereas these are available in CICID (2007, 2008), hence enabling the following focus on key outcomes relevant to this paper. In terms of general format both Workshops were similar in: starting with introductory presentations by the Hong Kong-based RIVANS research team and an Overseas Collaborator (Prof. Ron McCaffer and Prof Derek Walker, in the 1st and 2nd Workshops respectively), general discussions, brainstorming in four groups (each time) of experts under specified themes and recommended sub-themes,

followed by group presentations and a consolidation session. Attendees were experienced practitioners and experts from academia, with over 30 active participants in each Workshop.

Having recognised ‘value’ as a ‘difficult’ but critical component of RIVANS, the first group theme in the 1st Workshop was ‘Defining & Pursuing Value’ while this was developed in the 2nd Workshop under a group theme that sought brainstorming on ‘Value Objectives (Network Values)’. Initial outputs identified ‘stakeholder values’ while differing from one to the other, as including at a high level of abstraction, value for money, return on investment and reputation. Developing ‘network value’, therefore, entails aligning the stakeholder value dimensions. In practical terms, this requires aligning their ‘image elements’ in each specific project. These ‘image elements’ may include cost, time, safety & security, good governance (i.e., transparency, probity, accountability, diversity & inclusion), environmental impact, quality & function, legacy, profit, contribution margin, and enhanced business opportunities. The follow-up deliberations at the 2nd Workshop noted that that the concept of value changes with power structures, and also differs between an individual and organisational perspective. A public organisation sets out to ‘serve the community’ whereas a private organisation expects to ‘survive and prosper’. However, secondary level objectives of these apparently different missions, are not that different – e.g. corporate image, public support and acceptance, accountability to shareholders, effectiveness / efficiency, safety, environment and employee wellbeing, invoking images of the ‘triple bottom line’.

‘Network management’, ‘network learning’ and ‘network evaluation’ were the three other themes that were developed for the 2nd Workshop which focused on ‘Building RIVANS’, after useful groundwork in the 1st Workshop that had dealt with three basic themes of ‘Defining System Structures for RIVANS’, ‘Selecting and Sustaining RIVANS’, and ‘Motivating RIVANS’ – with outputs listed under ‘Network Sourcing and Strategic Alliances’, ‘Client Leadership’ and ‘Empowerment’ (CICID, 2007).

For example, ‘network management’ must build on the basics of networks as discussed earlier (Pryke, 2006; Chinowsky et al, 2008; Allee, 2008) to promote greater integration, as well as to draw and synergise stronger value streams from all network members. Trust was seen as key to a sustainable network, with client attitude and contractor performance being prerequisites to building trust. Other success factors such as competencies, profit margins for all; and features such as optimum network sizing and limited multilayer subcontracting were also signposted (CICID, 2008). In developing RIVANS further, such outputs are seen to be in line with lessons from international practice as well e.g. where subcontractors business relationships can be sources of risks in project networks (Arto *et al.*, 2007); whereas RIVANS would seek to drill into and draw from these well-springs of value as well.

Similarly the ‘network learning’ group deliberations at the 2nd Workshop benefited from Prof. Derek Walker’s key-note presentation on ‘Developing human capital value from relational procurement strategies - projects as learning organisations’ which in turn drew on useful previous findings e.g. in Maqsood *et al.* (2007). Specific outputs on ‘network learning’ e.g. on ‘knowledge sharing’ and on ‘network evaluation’ e.g. on hard and soft indicators are expanded upon in CICID (2008).

Basic RIVANS Structures

Figure 1 visualises a basic RIVAN initiated by a large construction client, who has a portfolio of ongoing projects. At the 1st RIVANS Workshop, the above scenario was extended to consider cases of ‘one-off’ clients e.g. of a medium-sized private company who wants to

build their own office building, and the cases of ‘on-off’ clients e.g. those who periodically build a new factory building or a factory extension. One-off and on-off clients would clearly have neither the needs nor capacities to develop RIVANS for themselves. It was therefore proposed that they may mobilise the RIVAN of a large consultant, or of a reputed contractor whom they may select for each project. An example of how such a client may tap into a contractor’s RIVAN is shown in Figure 2.

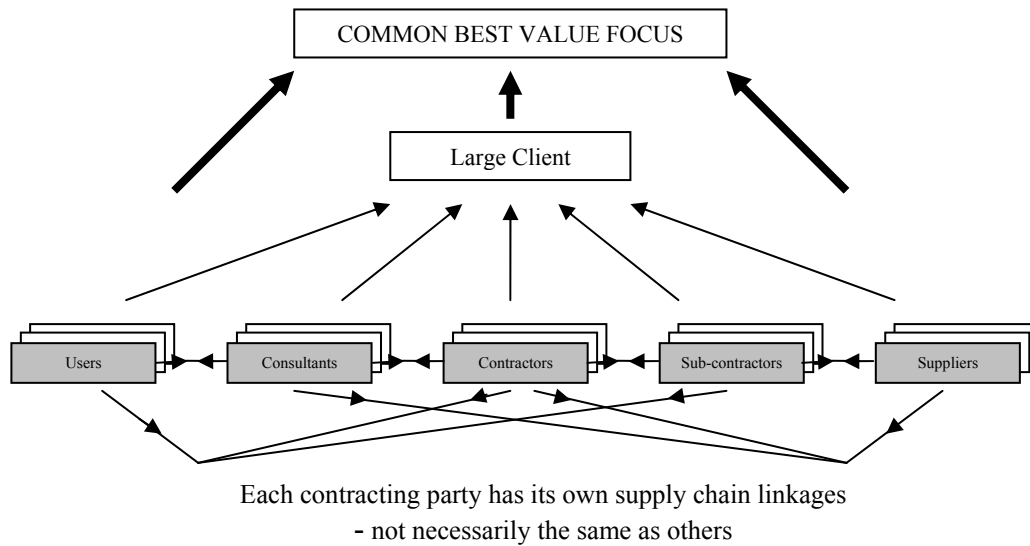


Figure 1: Conceptualising a ‘large’ (ongoing) client’s RIVAN

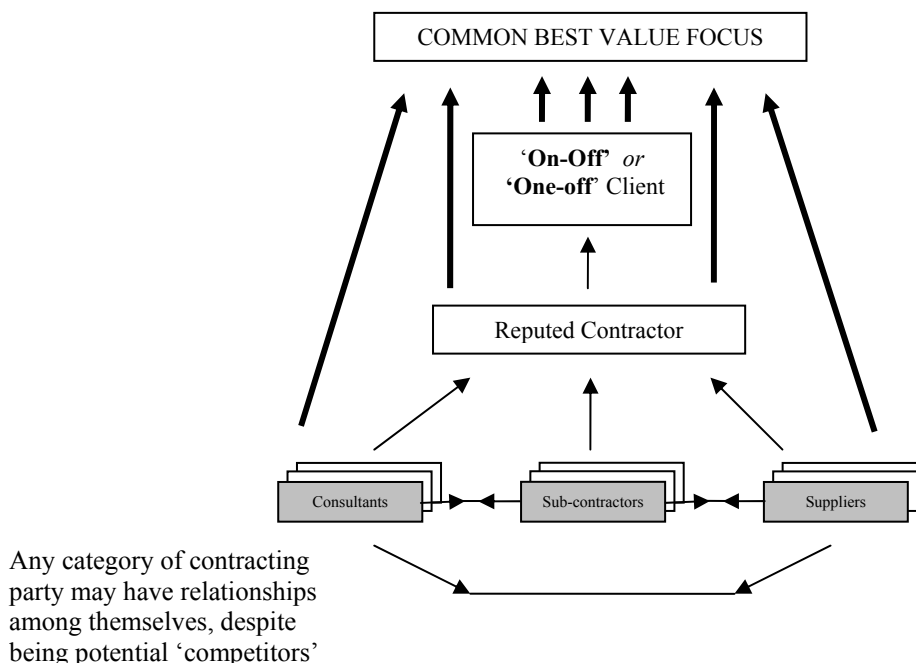


Figure 2: Mobilising a large contractor’s RIVAN for an ‘on-off’ or ‘one-off’ client

Figure 3 visualises the synergistic convergence of ‘Value Streams’ towards a desired ‘Value Focus’ and ultimate delivery to various end-users. The ‘visible’ arrows signify contributions to ‘overall value’ in terms of project objectives; while these contributions, together with other cross-network interactions also contribute to the ‘value growth’ of each partner organisation.

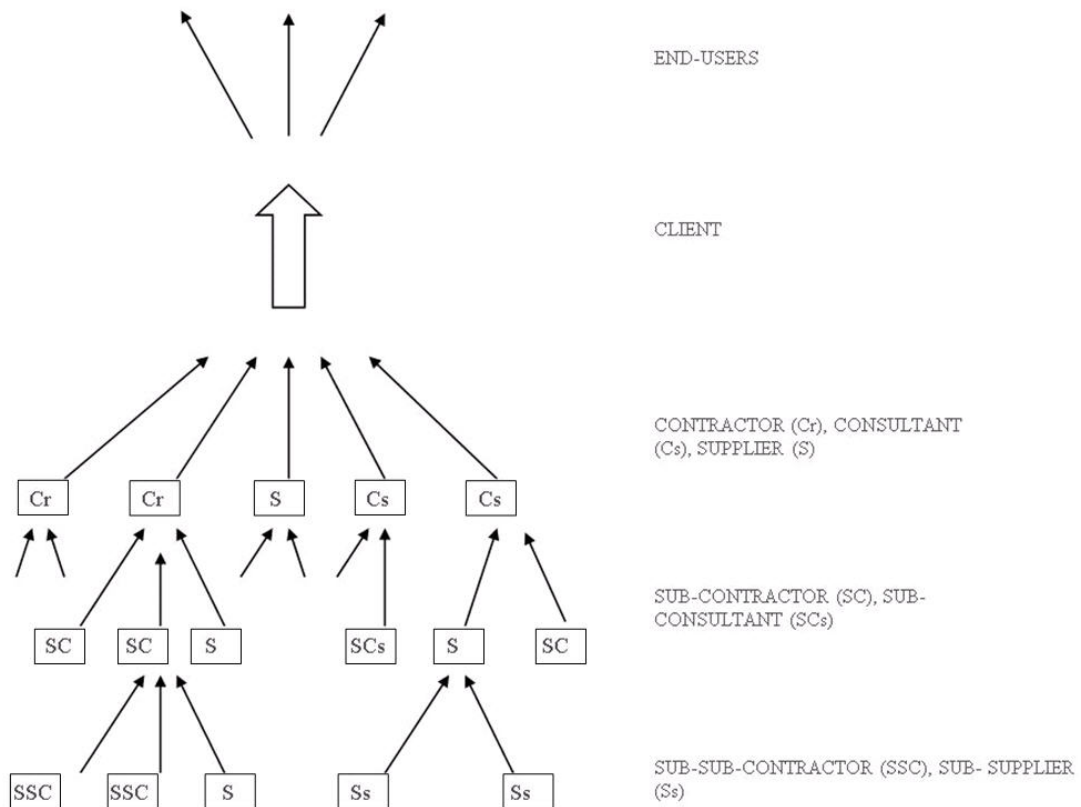


Figure 3: Focusing and synergising value streams in a RIVAN

CONCLUDING OBSERVATIONS AND VISUALISATIONS: FROM SUPER-CHARGED SUPPLY CHAINS TO TURBO-CHARGED VALUE NETWORKS

This paper merged relevant outputs from two case studies and Workshops to confirm the value of pursuing the development of RIVANS, in order to address persisting shortfalls in achieving overall value and integrated teams despite previous construction industry improvement initiatives. While the methodologies and details of the case studies and Workshops have been previously documented (and referenced here), the convergence of the findings, along with those from relevant literature (based on other parallel studies), are seen to point to ways for revisiting, re-engineering and ‘super-charging’ traditional supply chains, by transforming them into relationally integrated value networks (RIVANS).

Looking further, and in terms of continuous improvements in overall productivity levels, the imperatives for sustaining competitiveness alongside cooperation were also presented and developed at both Workshops. These include concepts of (a) ‘co-opetition’ within networks, as even possible between a few contractors who have basic ‘framework agreements’ with a client and (b) an analogy with ‘symbiosis’, or specifically ‘mutualism’ - where close and long-term interactions between biologically dissimilar species lead to mutual benefits; as

opposed to short-term ‘commensalism’ or worse ‘parasitism’, where one organism benefits, while the other does not, or is harmed.

Looking wider, Figure 4 illustrates how the above approaches and concepts can be logically extended to the broader industry, as different RIVANS would benefit from cross-links to each other, e.g. either between clients as in joint ventures of developers, or through members who are common to each network, such as sub-contractors. The ‘learning’ and knowledge should thus diffuse faster, along inter-RIVANS as well as intra-RIVANS paths. Furthermore, even informal benchmarking can incentivise competitiveness and heighten over-arching overall value at industry level. Informal benchmarking is suggested, because of industry reluctance to share sensitive data widely, in small groups of members in similar networks, who may trust each other enough to compare some data for mutual benefits. If this succeeds, it may build up in the long term, to a centralised databank maintained by a group of large clients, or even an independent central body, to gradually increase shared information and performance benchmarking.

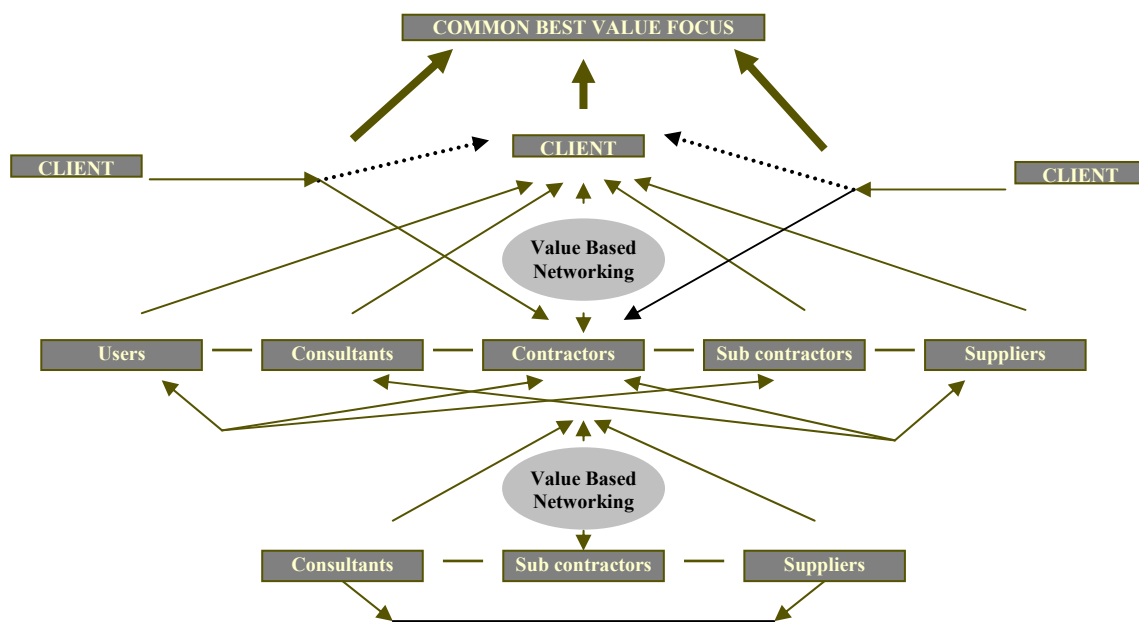


Figure 4: Extensions to industry-wide RIVANS

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