Interdependencies, trust and information in relationships, alliances and networks

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Abstract

The last decade has been characterised by the increased development of cross-company relationships, alliances and more complex business networks. This paper examines fundamental concepts that relate to the needs for information, including accounting information, in these interactive structures. It considers, initially, some consequences for accounting when planning and control is to be exercised across organisational boundaries, but the main thrust of the paper is to focus on the fact that all relationships depend to some extent on trust. The interaction between trust and information in personal relationships is explored to serve as a template against which to consider whether the information needs of inter-organisational relationships are similar. Having examined information needs of business relationships in general, the analysis is developed to consider the needs of different forms of corporate alliances and then wider business networks. This paper is an attempt to create a debate on new questions that seem to be fundamental to the design of information and accounting systems. It is not claimed to have provided definitive answers, but it is proposed that the lack of a well-developed theory of the interaction between trust and information has been a fundamental gap in our knowledge.

This paper is the result of setting out to consider how the growth of business alliances and networks impact upon business information, including accounting. Recent discussion of business alliances and networks implies a much closer relationship between different parties than is involved in occasional buying and selling. It recognises that even a regular pattern of trading creates social bonds between parties based upon mutual understanding and trust and, consequently, lower transactions costs. Moreover, the interactions between companies often develop much further into supply chain "partnerships" with an implied sense of sharing in knowledge, decision-making and the collective rewards. Furthermore, these alliances often exist within a wider network of business involvement that possesses within it a range of relationships of different type and intensity. It is recognised that what one means by the words 'alliance' or 'network' is not unproblematic. There is a considerable variation in types of alliances (as described later in this paper) as well as different emphases in understanding what business networks are. Debresson and Amesse (1991) and Tidd, Bessant and Pavitt (1997) argue, for example, that networks should not be defined simply as transaction 'webs' or 'clusters' of organisations and Castells (1996, pp. 157–163) discusses different forms of networks. Also Tidd et
al. use the term networking to apply specifically to
the development of long-term innovation networks
which they clearly distinguish from the various
other forms of alliances. These insights are valuable
for warning that one should not expect the infor-
mation needs for all alliances or all business net-
works to be the same. It was decided, however, to
leave this issue until later in the paper. It seemed
more useful first to:

(1) undertake a brief consideration of some
basic points relating to how accounting and
business information is used when trying to
master events1 across more than one organi-
sation and
(2) provide a more extensive consideration of
how the provision of information needs to
take into account the strength of social
bonds or trust that exist in an alliance.

These more fundamental issues need to be
examined first to provide a firmer basis for con-
sidering differences in information requirements
between types of alliances and networks.

1. Mastering events across organizational bound-
aries: some basic points

It is quite obvious, without any initial considera-
tion of social bonds or trust, that accounting ana-
lyses for alliances have to capture effects through at
least two organisations, rather than one. For exam-
ple, where two or more firms manufacture products
collaboratively, problems in understanding pro-
duct costs might arise over inconsistent bases of
overhead allocation. In fact overheads in one
organisation might drive overhead expenditure in
another such that activity based or feature costing
exercises could become more complex. In prin-
ciple, cost behaviour analyses and target costing
exercises will also have to take these cross-firm
effects into account. Nicolini, Tomkins, Holti,
Oldman and Smalley (2000) illustrate the problems
that can arise in attempting to develop target
costing across the supply chain in the construction
industry, while Barber, Graves, Hall, Sheath and
Tomkins (2000) refer to similar cross-organisa-
tional problems that can arise in undertaking cost
of quality exercises.

Responsibilities and budgets might also run
across organisational boundaries and capacity
limits in one firm could affect the other, giving rise
to the need to construct the inter-organisational
budget before the organisation’s own budgets can
be constructed. To facilitate collaborative budget-
ing on alliances, it might also help to move to an
increase in the use of projects as a basis for coding
expenditure and revenue in the regular budgeting
and accounting processes as well as in investment
appraisal.

Cost reduction activities might also switch
emphasis over time between organisations. A
comprehensive _kaizen_ approach to continuing
improvement might simply mean that all in both
organisations continually seek marginal improve-
ments. In contrast, preference for a theory of
constraints approach to efficiency improvement
(Goldratt, 1990; Tomkins, 1999) which focuses on
relaxing the dominant constraint at any point of
time might see that focus switching back and forth
across the partners to the alliance bringing, per-
haps, extra management issues to be addressed.

Financing issues such as financial gearing and
covenants on loans might also take on a multi-
organisational dimension, as would also investment
appraisal. If two firms are dependent on each other
to complete a project, both firms will be interested
that the other does not adopt too risky a position
with regard to _all_ its activities. The risk attached to
the other party with whom one is deeply involved
could impact upon one’s own financial risk as
perceived by the market and, hence the cost of
capital and ability to sustain debt levels. The col-
lapse of the other firm might also entail project
failure or at least significant reorganisation costs
and delays in finding new partners.

In considering these fairly obvious consequences
of multi-organisation collaboration, there seems
to be no obvious need to develop new accounting
_techniques_. Rather there is the need for cross-

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1 The term ‘mastery of events’ is used deliberately here to be
consistent with Luhmann’s (1979) use of the term. The sig-
nificance of this will become clear later in the paper.
organizational design of management accounting systems. It is doubted, however, if many companies yet go to the extent suggested here in cross-organisation cost management, budgeting and financial leverage/cost of capital analyses and, no doubt, complexities attached to tracing such effects across two or more organisations will emerge as more research is conducted. This is a rich field for empirical research. It is clear already, however, that, with a movement to collaboration across organisations, there must be a greater emphasis on negotiation to determine terms of that co-operation. To some extent negotiation is present between all organisations trading with each other and between levels within an organisation, but the development of long-standing, deep alliances implies sharing information and working out collaborative futures showing how the risk/return position of each is affected by different actions. It is likely that the accountants in all member companies of an alliance will need to become more closely involved with each other in the negotiation of actions and profit-sharing. Moreover, negotiation is normally an iterative procedure through which a deeper understanding of the nature of the project and one’s part in it come to be understood. Large projects are not just “there” with given costs and benefits to be shared. They have to be shaped and developed with modification of partner’s roles and interests. This process will be facilitated by repeated simulation of each party’s risk/return position until agreement is reached. In such a process, the accounting information needed is itself a reflexive product of the developing negotiation. A growing emphasis on simulation especially linked to investment decisions and new product development (target costing) might therefore be expected.

Discussion of profit sharing in existing accounting literature is largely focused upon the internal transfer pricing issue. Once one recognises the existence of close on-going relationships and joint planning between separate businesses, it is likely that the traditional recipes for transfer pricing will be quite inadequate as the basis for profit sharing between the parties involved. While collaborative risk analysis and fair profit sharing schemes are mentioned in the literature (e.g. Monden, 1989; Tomkins, 1991; Tomkins & McAulay, 1992), transfer-pricing literature traditionally looked upon the calculation of optimal marginal cost-based transfer prices and negotiation as alternative means of solving the transfer-pricing problem. Such a view ignores the process by which negotiation takes place in situations where the terms of collaboration agreed are likely to have a significant impact upon the participating parties. Increasingly, in business alliances, this involves collaboration over development and investment and not just trading on the basis of existing goods. Negotiation then needs to be supported by revised requests for information and revised calculations of costs and benefits to each party. The implication of this is that it will become necessary to take the collaborative decision based on two levels of analysis. First, the aggregate investment itself must earn the required rate of return for the risk attached to it, irrespective of how many parties are involved. Second, each party will not participate in the project unless it sees the prospect of fair rewards for the risks it faces for its individual contribution to the project.

To continue with a detailed consideration of such simulations would take us too far away from the main thrust of argument in this paper, but a very simple example of simulation in the Appendix attempts to illustrate the general nature of this interaction between revised information, revised calculation and negotiation. The example demonstrates how each party gradually develops understanding of what involvement in the project entails and the way in which a mutually satisfactory basis for progress emerges. This is how the presence of

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2 Tomkins (1991, Chapter 9) argued that organisations constitute a negotiated environment and that managing a firm involves gaining the support of various different factions that could be defined as “relevant entities” and that collaboration would not be gained without assessing the risks and likely returns faced by each of the main entities.

3 The terms “required rate of return” and “fair rewards” are, of course, problematic. To avoid a long digression here, it will be assumed that collaborating parties will have their own perceptions of what is required. Although they may take some guidance from conventional finance literature, it is expected that further research might well demonstrate that these perceptions themselves are usually the output of a negotiation process and not easily formulated in advance.
deeper inter-party relationships is different from simple market buying and selling. Information is not given on a take it or leave it basis. Relevant information is itself a function of the interactive process. As a collaborative venture is planned, it will be necessary to provide new information and repeated detailed analysis. This will be required especially at the stage in the alliance where major joint investment activities are being considered\(^4\) and, in practice, the interaction is likely to be somewhat more complex than it is in this example. Basic accounting techniques may not need revision, but the way in which accountants perceive their roles and employ their techniques and information bases may well change. The area warrants more empirical research with a greater emphasis upon business processes and the use of accounting in action/negotiation.

2. The relationship between trust and information

While there is some merit in highlighting this increased emphasis on negotiation and interaction in business alliances, and the associated practical problems of reliably simulating profit sharing in very complex projects, more fundamental issues arise when the nature of the social bonds and trust are explored and related back to the need for information. This will be the main focus of the rest of the paper.

2.1. Hierarchical levels of collaboration

A fairly simple structure is adopted for the rest of this article that differentiates between three different hierarchical levels of collaboration: relationships, alliances and networks. A relationship is taken as the bedrock upon which any alliance is formed, but one needs to distinguish relationships from alliances because a range of different forms of corporate alliances exist which may have different implications for business information. A network implies, however, rather more than a just a bilateral relationship or even an alliance. Networks are much more complex and formed from configurations of alliances and relationships that range from intimate partnerships to simply buying and selling on a competitive basis or even just exchanging views and other information. As Tidd et al. say:

An organisational network can be thought of consisting of a number of positions or nodes, occupied by firms, business units, universities, governments, customers or other actors, and links or interactions between these nodes. (Tidd et al., 1997, p. 210).

and, following Castells (1996), one can also think of large corporations as networks in themselves, where they have replaced their traditional hierarchical organisation structures with a highly decentralised form with many autonomous units, and different parts of a large organisation will be linked into different external networks.

This paper will develop propositions relating to business information at all three levels just specified. It will commence with a consideration of some general theorising relating to information and control needs in relationships. This will then be applied to specifying likely information needs in evolving personal relationships. It was felt that a consideration of the use of information at this level of social interaction would provide a clarification of basic concepts. The paper will then consider to what extent the determinants of information needs at a personal level are applicable to relationships between organisations. It will then expand the discussion to consider the distinct information needs of different types of alliances. Finally, the analysis will be raised to consider what is needed at the network level. Close relationships at a personal level depend to a significant extent on the establishment of trust. It is, therefore, important to address, first, the concept of trust to see why it is so central to the question of information processing within relationships.

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\(^4\) As a by-product, the example in the Appendix also illustrates how large errors in profit and risk sharing can occur if accountants simply rely on discounting expected values (or fixed-point estimates of cash flows). This may well lead to later disappointment and even suspicion about honesty in negotiation and collapse of the project.
2.2. Defining trust and its centrality for defining information need

Luhmann (1979) argues that trust in its broadest sense is simply having confidence that one’s expectations will be realised. At that level of analysis, trust can apply to things as well as people and their systems. Luhmann states that, without trust, we could hardly get up in the morning. At root, trust is simply an assumption of functional continuity of that with which we are familiar. This is really no different from any schema that we all adopt about how the world works that can be bracketed off to let us focus upon what we cannot take as given and needs dealing with right now [see Gioia (1986), for example, on the centrality of schemas to everyday life].

The discussion in this paper concerns trust that we have in people and systems run by people and yet, at the most fundamental level, this arises from the same basic requirement as trust in things. Trust in people also enables us to adopt schemas which leave us free to act without trying to process more information about of the world than we are capable of doing. Trusting in someone enables us to act as if the uncertainty that we face is reduced, although it does not reduce that actual uncertainty. Trust is, therefore, ubiquitous: it is a fundamental building block of social life. Some degree of trust in what things are and what can be done with them is unavoidable, even if we live the life of a hermit. If one wants to understand how any relationship works, one must, therefore, address the boundaries of trust within that relationship. For this purpose trust will be defined as:

The adoption of a belief by one party in a relationship that the other party will not act against his or her interests, where this belief is held without undue doubt or suspicion and in the absence of detailed information about the actions of that other party.

The word ‘undue’ is important because we can never remove all uncertainty about a future act and there cannot be significant trust unless there is also freedom to break that trust, even if one does not expect such a breach. The definition also highlights the fact that trust implies adopting a belief without full information. The notions of trust and the design of information requirements are, therefore, inextricable linked. If we accept this broad understanding of trust, namely that defining a ‘schema of givens’, the state of trust at any time is the fundamental determinant of information requirements. A person or organisation seeking to exercise mastery over some affairs will require information on only those matters that it has been decided not to take on trust. This decision will be the function of the perceived uncertainty attached to the functioning of a person or thing plus the consequences of that non-functioning.

The point is so fundamental that it is surprising that it has not taken a much more explicit and dominant role in our theories about information systems, including accounting. While, the perceived level of uncertainty and possible adverse consequences influence the balance between trust and information needed for coping with uncertainty, it must be more clearly recognised that the exercise of trust is an alternative uncertainty

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5 I take this to mean that we have trust that we will be able to stand when we get out of bed, that we have trust that the tap will contain water, that the car is still in the garage and will start and that I will arrive at work safely. A colleague, Thomas Ritter, pointed out that trust in manufactured things is really trust in the person who made them performing his/her job properly and so trust in man-made things and people may not fundamentally different.

6 This definition is framed in terms of trust in people. Obviously inanimate objects have no intent, although, if they fail to operate as intended, they can cause problems as if the object acted against the person affected.
absorption mechanism to increased information. The role of information and accounting in uncertainty reduction is obvious and widely discussed and analysed, especially in information economics approaches (see Feltham, 1968; Feltham & Demski, 1969), but the role that developing more reliable forms of trust and the cost of doing that is rarely considered in the cost–benefit analysis. In fact, it might not be too extreme to argue that information and accounting system designers should always commence the design of their systems by considering carefully and explicitly what and who can or cannot be trusted. This point alone seems to open up a stream of research possibilities right across the whole realm of accounting although this is not the place to undertake such an analysis.

2.3. A functional relationship between trust and information need and the rational basis for trust

Trust should be, then, a pivotal concept when addressing uncertainty reduction, the provision of information and accounting theory. Wicks, Berman and Jones (1999) recently took up this theme with regard to general business information and argued that businesses should attempt to identify the optimal level of trust that they employ in their business relationships. They say that there must be an optimal level of trust. If excessive trust is placed in the business partner, one may be taking too much risk for one's own wishes without fully understanding it. This may lead to resources being misallocated from one's own point of view and one might even be acting naively such that the partner can take advantage. If, on the other hand, there is little trust, but one still wishes to deal with the other party, there will be the need for more complete information about plans (what the other party intends to do), processes (how it is proposed to do it) and results (desired or unexpected ends obtained) coupled with appropriate sanctions for inappropriate behaviour. This, Wicks et al. argue, will incur higher agency costs and may have

8 A notable exception is Creed and Miles (1996), who recognise that there are costs involved in both developing and operating control mechanisms and in building and maintaining trust, but they do not follow through the implications for information provision through in detail.

9 It is interesting to note that Luhmann actually refers to some of our own accounting literature and refers to Wildavsky (1964) who showed that Congressional budgets were far too complex for Congressmen to understand in detail and who, therefore, needed rather to decide what they could and could not trust.
further disadvantages in terms of inhibiting creativity and developing new capabilities.\textsuperscript{11}

Wicks et al. say, therefore, that there is an inverse relationship between the willingness to trust and the need for information. This is consistent with the argument provided so far in this article about trust being an alternative to information, with Luhmann (1979) and is also analogous to more recent arguments by Ring and Van de Ven (1994), Madhok (1995), Zaheer and Venkatraman (1995), Creed and Miles (1996) Aulakh, Kotabe and Sohay (1997) and Faulkner (1999) all of whom offer different perspectives on the trade-off between trust and control mechanisms. However, as will be argued in the next section of this paper, the relationship between trust and information requirements are far more complex than identified by Wicks et al. and that while, to some extent, information and trust must be alternatives, the relationship between them is far from being a simple inverse one.

Wicks et al. then specify how businesses can assess the optimal degree of trust needed in each relationship. Essentially they argue that the level of trust must be matched with the level of economic interdependence between organisations. The more economically interdependent organisations are, the heavier the costs of the collapse of that association will be and so the risks faced will be higher. Hence, they argue that the greater the economic interdependence, the more one should build a closer (trusting) relationship to try to ensure that collapse in the relationship is avoided. Wicks et al. then continue to state that they would expect better corporate performance to be associated with a better match between interdependence and trust.

There is inconsistency in the Wicks et al.’s (1999) analysis. If information and trust are substitutable uncertainty absorbing mechanisms, it is clear that firms that are highly economically interdependent could strive to avoid collapse \textit{either} by building higher levels of trust \textit{or} by building more extensive control mechanisms with the associated increase in information. It is the level of uncertainty absorption effort that has to be related to economic interdependence, not trust per se.\textsuperscript{12}

It may also be argued that the very notion of optimal trust does not recognise that trust can exist without a calculative frame of mind. Certainly, trust can exist without specific probabilistic calculation. At the extreme it can occur on impulse. The adoption of a calculative perspective may also seem to ignore differing personal propensities to trust which obviously exist. In fact, despite their call for optimal assessment, Wicks et al. do argue that, although a rational cost–benefit analysis is an important foundation for trust, it provides an insufficient basis for a complete understanding of it. They even say there should always be a bias towards trust:

\begin{quote}
Trust occurs because an emotional bond is created between people, enabling them to take ‘a leap of faith’ that trust will be honoured (Wicks et al., 1999, p. 100).
\end{quote}

They also say that it seems desirable to adopt a moral belief in the good character of the other person. Once again the argument is confusing. It seems to backtrack on their stance of finding an optimal balance between trust and information: they seem now to be expressing a preference for trust over more information. Also their argument is not sufficiently penetrating in identifying the deeper relationships between information and trust. From whence are these emotions and desires to believe in people derived? Both the paper by Wicks et al. (1999) and this paper attempt to consider the managerial problem of information design given the prevailing culture and personal propensities to take risks and cope with that condition by exercising trust and/or information analysis. Even if the cultural or personal variables seem to be \textit{totally} determining the level of trust given in any situation, the theory of evolution suggests that such trust does not arise without a

\textsuperscript{11} One might also argue that that a party who does not feel sufficiently trusted might act more creatively to try to impress, at least for a while, but that does not refute the basic idea.

\textsuperscript{12} Moreover, the choice between the information and trust mechanisms will be both personally, culturally and situationally dependent: the concept of optimality would probably need to have a highly localised interpretation.
reason, even if it was never thought out explicitly by a human mind. A person may act immediately and spontaneously in a trusting manner, but that is because it is a beneficial response learned from previous “experience”. Furthermore, after discussing the emotional drivers of trust, Wicks et al. themselves revert back to offer a rational cost–benefit basis for supporting a bias towards. They refer to Jones (1995) who argued that, without some emotional attachment and self-restraint, either opportunism by one party will occur or there will be the need for high agency costs to prevent it. Trust that self-restraint will occur, therefore, reduces agency costs. This, however, is really no more than a restatement of the supposed inverse relationship between trust and information. Wicks et al. provide a stronger case for more rather than less trust when they follow Ghoshal and Moran (1996) who argue that Williamson’s transactions costs economics is likely to result in a spiralling of distrust, where both parties in a relationship erect protections to guard against opportunism, even though both would be better off . . . if they could create more trust.

But this is really saying that information processing costs not only increase as trust declines, but the inverse functional relationship between trust and information costs becomes increasingly and then excessively steep as trust declines. This is still a rational cost-benefit argument; it is not an argument based on human emotion per se.

The only empirical support offered by Wicks et al. (1999) for a desired bias towards trust is Axelrod’s (1984) well known tests of repeated plays of the Prisoner’s Dilemma and similar conclusions by Frank (1988). But Axelrod’s conclusions are based on rational cost–benefit calculation, not emotion. This, however, matters little. Irrespective of whether or not there is advantage in a bias to trust and why that occurs, the key point is that there must be, to some extent, a trade-off between trust and information need. The use of the words “to some extent” may seem surprising given the definition of trust set down earlier which implies that the more that trust is given the less information is required, but the use of these words was deliberate because the main thesis of this paper is that there is not, as Wicks et al. or even Luhmann (1979) would have us believe, a simple inverse relationship between trust and information. It will be shown that the relationship between trust and information need is more complex and, therefore, finding a balance between trust and information is also more complex than Wicks et al. suggest.

2.4. Beyond a simple inverse relationship between trust and information need and the dynamics of building trusting relationships

It is probably true to say that, at any specific point of time, when taking any one decision, there is a reasonably strict inverse association between information and the level of trust (i.e. trust intensity), but this assumes that the level of trust intensity is somehow given quite independent of any other activity. It ignores the fact that trust derives from learned, usually interactive, experiences and that process itself depends upon information as well as appropriate information depending upon the state of trust. The adoption of an inverse relationship between trust intensity and information reflects a simplistic static analysis that ignores the

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13 That ‘experience’ may be transmitted genetically as in the case of babes and their mothers or as demonstrated through differences in personal propensities to trust. The cost–benefit analysis may then be thought of as having been carried out at an earlier stage of the evolutionary process itself. There may also be a more ready willingness to trust in some cultural contexts, but the culture will have developed from a pre-history in which it became clear, probably without specific human calculation, that benefits accrued from such a culture. The nature of physical and cultural evolution is such that while behaviour may have been the result of unplanned variation, there is a mechanism that compares different forms of behaviour and selects the most appropriate for its context. There is, therefore, a rationality for that behaviour even if the behaviour was not the result of a human rational decision-process. Hence one ought not to argue in favour of preferring a bias to trust based just upon emotion, without implying, perhaps quite deep down, a underlying learned rationality.

14 In fact, the earlier footnote that contrasted agency theory and trust approaches to information reduction suggest that the use of greater trust is contingent and not universally applicable.
dynamic process of building trust and the role that information has in that. Close relationships are not usually created overnight — they take time to build and are expected by the parties involved to exist for some duration of time — that is beyond one transaction or meeting even if the duration is expected to be limited to one specific project or venture. There is, in other words, an expectation of continuity and repeated meeting\(^\text{15}\). In some cases the movement to a close relationship may be quite rapid, but it is normally created by \textit{repeated} interaction that involves the passing of information between the parties concerned.\(^\text{16}\) Wicks et al. do recognise that trust is a dynamic and continuing variable:

Relationships unfold so that individuals continually update their information base and their decisions to trust. (Wicks et al., 1999, p. 101),

\(^{15}\) This was, in fact, the basis for rejecting Wildavsky’s (1964) stark advocate/guardian explanation of public sector budgeting (see Rosenberg and Tomkins, 1983).

\(^{16}\) At the level of personal interaction, one can immediately think of exceptions. For example, one may never have met a medical surgeon before, but be willing to give trust in him/her and his/her expertise. One might, however, argue equally that this situation arose through learning in society over time. This sort of trust still evolved through a process of multiple experiences of how medical knowledge was expanding and how the profession could be relied upon. There had to be experience followed by reflexivity. Schemas of trust can be learned from our parents, social contacts and even books, rather than direct experience. It can also be institutionalised in acceptance of professional judgements. Nevertheless, information and knowledge played a central part in establishing that trust even if, for a specific individual, trust is immediately given without question. Moreover, such schemas can be quickly broken if further information suggests the trust is misplaced and there has clearly been a questioning of the standing of some professions and professionals in recent years. It is also important to address Meyerson, Weick and Kramer (1996) and their analysis of “swift trust”. They examine the increasing phenomenon of organisations coming together quickly in temporary systems in such a swift manner that detailed prior analysis is impossible. At first sight this refutes the argument of this paper which suggests that trust is a longer-run learned activity. These authors conclude, however, that swift trust is less about close relations than agreeing to take action based on a few generic features of the setting and people involved. Organisations involved in temporary systems also embarked on a significant degree of hedging of risks. This can be seen as nothing more than an initial stage of a movement towards a long-term relationship (as described in the next section of this paper) that never fully matures. Moreover, swift trust may be made possible by established notions of trust attached to social positions as just discussed. Yet furthermore, in one of the very few studies to date relating trust to financial analysis, Harrison, Dibben and Mason (1997) show that while new ventures often gain support on the basis of just broad screening, there is a heavy reliance of business angels upon the advice of entrepreneurs who have a longer run relationship with both the fund seeker and fund provider and who create the basis of the relationship. Hence, trust built up over the longer term with third parties can facilitate their contacts to enter into trusting relationships much more quickly, but, somewhere in the network, trust had to be built through stages. The swift trust phenomenon does not invalidate the proposals in this paper.

\(^{17}\) They were, of course, not so directly concerned with this as with the relationship between success, inter-dependence and trust.

\(^{18}\) Lewicki and Bunker (1996) also emphasise the dynamics of trust relationships and argue that trust develops through consecutive stages of Calculus-based trust (market orientated, economic calculation), Knowledge-based trust and then Stable-identification-based trust). As Harrison et al. (1997) say, such a framework ignores many other factors which affect trust. The analysis in the current paper tries to focus more comprehensively on information needed for all types of factors which may lead to trust. Moreover, it argues that there is a need for \textit{some} Calculus-based trust at all stages of trust development as illustrated by the introduction of two information types: Type 1 and Type 2 (Calculus-based trust) discussed later in the paper.
Fig. 1, rather than a monotonic inverse association between trust and information.¹⁹

Through repeated interaction, a closer relationship with increasing trust may develop successfully. This may reduce the risk that the activity associated with the relationship will not collapse and the need for information will then be reduced giving the initial argument for an inverse association between trust and information. However, at an early stage of a relationship, commitments are usually less extensive and so the risks attached to breach of that commitment are lower than at later stages of the relationship. Hence, there will be a lower need for either trust²⁰ or information as an uncertainty absorbing mechanism. Moreover, it is posited that, as the relationship matures from the initial state of low level of trust, there will be a positive association between trust and information simply because trust itself cannot be increased without further information. So, once one takes a dynamic view of a relationship, one sees that there is likely to be a positive association between information and trust at earlier stages of relationship development. As trust intensity becomes established at higher levels in later stages of the relationship, it is likely that less information will be needed to sustain that relationship. Hence a negative association

¹⁹ It is argued that there will be an inverse U-shaped function in all cultures, but that the shape of the function may well differ because of cultural propensities. In Japan, for example, the upswing of the inverted U may be steeper through the propensity to place more reliance to build consensus prior to making a decision and then relying more on trust and less on detailed accounting to monitor subsequent actions [See the analysis of Japanese accounting in The Ford of Europe (A) case, IMEDE Case GM-321, (1984) for a description of simplified monitoring procedures used by Japanese motor manufacturers].

²⁰ In fact, it would probably be correct to say that the issue of whether to trust does not even arise at early stages of a new relationship. A low level of trust in this sense does not mean distrust; it indicates that less significant consequences are attached to a break-down in the relationship.
arises at later stages of building trust. These two effects give rise to the inverse U-shaped function relating aggregate information needs to trust intensity and the maturity of the relationship. It seems important to grasp this in considering information system design. While requests for excessive information may reduce trust, the provision of more information is needed to create more trust in the “upswing” of the relationship — information influences trust which influences information need which influences trust and so on . . . This is a rather more complex association between trust and information than Wicks et al. or even Luhmann suggest.

2.5. Information needed to support trust distinguished from information for mastery of events

In fact, the argument cannot rest there — the association between trust and information is even more complex. Luhmann (1979) stresses the difference between information needed when trust is absent and information for the ‘mastery of events’. The recognition of the need for information to master events is important. Whatever the level of trust in a relationship, information will still be needed to help plan a collaborative future by setting down what each party wishes to achieve from the collaboration, how feasible the goals and relative roles are and what actions need to be taken (as, for example, described in the interactive simulations earlier in this paper). Information needed in the absence of trust is more related to the verification of actions of the other party in accordance with expectations rather than what the parties should collectively do. While Luhmann is right that one can never dispense with trust completely because one can never be omniscient, equally one can never dispense completely with the need for some information on the other party’s actions unless trust is absolute in a blind and unthinking manner. Even so there is a need to broaden Luhmann’s concept of information in the absence or reduction of trust even further. It is necessary to recognise the dynamics discussed earlier to incorporate information needed to help create, rather than just monitor, trust.

It is suggested, therefore, that distinguishing between two main types of information needs will help any analysis of trust and information. Type 1 is information that relates to the willingness to trust; that is what is needed to create trust and check on the state of the relationship. Type 2 is information needed for mastery of events by that relationship as an entity itself. It will be suggested below that information Type 1 and information Type 2 will both have an inverse U-shaped function with respect to relationship maturity. Moreover, while it is obvious that Information Type 1 will influence how trust intensity develops and thereby feed back into the future requirement for Information Type 1, aspects of Information Type 2 will also influence trust intensity even if that type of information was not prescribed specifically to assess the degree to which one can trust a partner. So these two types of information are not totally separate from each other. Collaborative involvement in the process of planning the mastery of events as described earlier in this paper can itself help to create or destroy trust, but, as will be shown below, there is a different emphasis in content to the information needed mainly to plan and make decisions on collaborative futures compared to that needed mainly for building trust in the actions of ones partners. Type 1 information relates to information on

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21 Das and Teng (1998) also conclude that a simple substitutive relationship between trust and control mechanisms restricts our understanding of how confidence in another’s actions is gained. They say that high levels of trust will make control mechanisms more effective. This is not, however, the same argument related to the dynamics of the interaction between trust and information used in this paper. The logic used by Das and Teng leads them to state (their Table 2, p. 500) that one can only have a high degree of confidence in a partner where both the control level and the level of trust are high. This seems to be too extreme a position, while supporting Das and Teng’s call to question simplistic substitutability between trust and control mechanisms, there must be some degree of substitutability or trust seems to lose much of its meaning. Das and Teng (in press) do, however, specify different types of trust (performance trust, competence trust, etc.) and how certain types of control and trust are more important than others in particular alliance types. There would be mileage in examining more closely in future work the relationship between their proposals and the detailed information listings in this paper.
competence and on integrity in both action and communication [see, for example, Reina and Reina (1999) and Das and Teng (in press), for discussions of contractual trust, communications trust, goodwill trust and competence trust]. Information Type 2 concerns planning what each party is going to do.

There is one final dimension to consider in looking at the association between trust and information. System designers cannot just focus upon how much or what content of information to supply to match the current state of trust intensity, but also must be concerned with the technical quality and reliability of information itself. Distrust of an individual to supply full and accurate information is the same as a lack of communications trust based upon perceptions of reputation, professional affiliation, track record, etc. There is also the question of how feasible it is technically to provide a clear and accurate picture even where there are good intentions. The rest of the paper will assume that technically reliable information can be provided. In practice, of course, accounting is greatly concerned with the technically most reliable forms of measurement, materiality, etc. In situations where matters are technically difficult to measure, relationship management through trust becomes more important.

We are now in a position to consider the practical implications of such a theoretical basis on the design of information needs in, first, personal relationships and, second, business relationships.

3. How trust and information needs change in developing personal relationships

Ford, Gadde et al. (1998) stress four different stages of development in buyer–seller relationships: the pre-relationship stage, the exploratory stage, the developing stage and the stable stage. Similar stages are also evident in the development of personal relationships. Moreover, we all have experience of the development of such relationships and so reasoning from this base should be quite meaningful to each of us because we all have much internalised research data to contribute on this question.

Belief that a consideration of personal relationships would provide some insight into the information needs of businesses entering alliances led to the development of Table 1. That table was constructed by reflecting upon the theoretical propositions set out above regarding the way in which dependence, trust and information needs change as the personal relationship develops and the distinction between Information Type 1 (needed for willingness to trust) and Information Type 2 (for mastery of events). An effort was then made to think through more specifically what kind of information was needed at each stage of the relationship for both information categories.

The model in Table 1 is “idealised” in the sense that it assumes, like the Ford et al. business model, that the relationship moves progressively through from an initial phase to maturity and stability. Of course, many personal relationships do not and many go into reverse progression and, in response to events, distrust can follow trust. In fact, even most lasting relationships fluctuate to some degree even if that is around a central trend towards increased trust intensity. Also, movement back down the ‘trust development chain’, perhaps due to a breach of trust, may call for a significantly different mix of trust and information than was needed on the way up. Hence, Table 1 is offered only as a rough mapping of the trust/information mix applicable at each stage of such an ‘idealised’ development.

The chief features of the model shown in Table 1 and associated comments are as follows:

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22 Of course, there are all sorts of personal relationships, but I chose to address this just in the form of long-run partnerships between two people leading to co-habitation and building a family in the belief that this would provide a clearer insight into different relationship stages. This is usually where interdependence is highest in our personal relationships. The development of lasting and deep friendships probably goes through a similar process. More casual relationships may not, but they do not involve high interdependence. Also each individual probably does not go through such an extended process in the development of trust in professional advice or a teacher, but it was argued earlier that this is because society has, over time, taken those steps for the individual through a process of institutionalisation of trust.
Table 1
An ‘idealised’ life cycle of trust/information needs for developing personal partner relationships

<table>
<thead>
<tr>
<th>Degree of inter-dependence</th>
<th>Degree of commitment (i.e. trust intensity)</th>
<th>Questions to be answered</th>
<th>Information Type I</th>
<th>Volume of Information Type I needed and how communicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Low</td>
<td>Exploratory relationship, Minimal commitment and trust</td>
<td>What do I need to know to fix a ‘date’ and further ‘dates’?</td>
<td>Basic personal attributes (depending upon type of ‘date’, etc.) Understanding of personal values</td>
<td>Limited, general, impressionistic.</td>
</tr>
<tr>
<td>2. Prepared to increase</td>
<td>Increasing trust: short run commitment</td>
<td>What do I need to now about partner before I get more involved? How much should I reveal of myself?</td>
<td>Aspirations / expectations Adaptability shown to me and expected from me Degree of interest in me Formation of &quot;firewalls&quot;</td>
<td>Frequent consideration of behaviour, but guarded, statements of wishes, capacities, intents and facts.</td>
</tr>
<tr>
<td>3. High</td>
<td>High trust: long term Commitment made and regularly confirmed</td>
<td>What do I need to confirm my continuing trust?</td>
<td>Actions reliably undertaken according to anticipated values Commitment given to me rather than others. Implementation of translucent information systems</td>
<td>Quite extensive and open Largely based on frequent informal communication and observation of behaviour</td>
</tr>
</tbody>
</table>

b. Information type 2: needed to attempt a collaborative mastery of events

<table>
<thead>
<tr>
<th>Degree of inter-dependence</th>
<th>Degree of commitment (i.e. trust intensity)</th>
<th>Questions to be answered</th>
<th>Information Type 2</th>
<th>Volume of Information Type 2 needed and how communicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Low</td>
<td>Exploratory relationship, Minimal commitment and trust</td>
<td>Is relationship worth immediate effort?</td>
<td>Short term cost–benefit Likelihood of “option value” derivable from the relationship</td>
<td>Low: broad comparison of obvious alternatives and consideration of other possibilities, extensive rational analysis not necessary</td>
</tr>
<tr>
<td>2. Prepared to increase</td>
<td>Increasing trust: short run commitment</td>
<td>If I get involved, what economic and other implications does this have?</td>
<td>Assessment of future jointly compared to separately Tentative scenario planning, broad consensus over paths to follow</td>
<td>More extensive; comparison with other possible relationships initially impressionistic moving to more rational, but broad, strategic analysis</td>
</tr>
</tbody>
</table>
Relationships are built through stages of experience and trust intensity. Interdependence and information needed by each party varies according to the stage of the relationship.

A relationship will not develop without the growth of trust, but willingness to continue with the relationship depends upon more than the existence of trust. The relationship must deliver something of value to the parties involved as well as being simply an arena for trust. It is, therefore, a mistake to put all information needed to build and sustain a relationship into the same category. It makes sense to make the distinction between Information Type 1 (needed to indicate willingness to trust) and Information Type 2 (needed to plan a collaborative existence and mastery of events). There are differences in content and emphasis in the kind of information needed for each purpose even though each type can contribute, to some extent, to both purposes.

The questions that need to be answered to (i) establish willingness to trust and (ii) to plan a collaborative mastery of events, both change with the development of the relationship. This is due wholly to changes in trust intensity in the case of Information Type 1. Information Type 2 needed partly depends on the degree of trust (e.g. limiting oneself to scenario planning in stage 2 when the relationship is still building trust), but more importantly upon the type and scope of the economic decisions to be made at each stage of the relationship.

The volume of detailed information for both information types required increases and then decreases with increases in trust intensity as the relationship matures. This seems to bear out the inverted U-shaped function between relationship maturity and information need as hypothesised above.

The model is “idealised” in the sense of moving steadily through to maturity, but also in the choice made by the relationship parties as to mode of operation at each stage. The pattern offered is expected to approximate the
usual mode,23 but those involved can always choose to operate differently. Choice24 is exercised and the process has to be managed and so it may always be possible to find some relationships deemed acceptable by the parties involved that do not conform to the archetypes in Table 1. The model is also ‘idealised’ in the sense that it suggests four distinct stages of development. This is merely to facilitate description and discussion. Movement through the apparent stages may be more like a continuum of ever changing trust intensity or, conversely discontinuous with leaps between levels of trust.

- The volume of detail required for Information 2 will be dependent on the wealth position of the partners in the relationship relative to their personal aspirations — especially in stages 2, 3 and 4. People with high wealth, relative to aspirations, can plan relatively expensive futures without detailed analysis in stages 2 and 3, while poorer people (or those with high spending aspirations compared to their wealth level) still have to “count the pennies” in stage 4 to remain solvent.

- The type of information, degree of detail and method of communication has a different emphasis in different stages and itself engenders movement to higher (or lower) levels of trust intensity and, hence, different information needs. The appropriate matching of information to trust intensity itself changes the information need in a dynamic process.

- The information problem addresses what each party needs for their own current level of trust intensity, but also what each thinks he/she has to give to meet what the other party needs for their level of trust intensity. Note that what each party wants and what the partner thinks he/she needs are not necessarily the same and some further information flow may be needed to sustain a reasonable level of consistency between these two assessments. It should also be noted that each party’s trust intensity at any time may be quite different from that of their partner and, hence, each party’s information needs may be different. Moreover, each party may have a different personal propensity to trust. This observation also suggests that if each party wishes to maintain the relationship, he or she must bear the cost of giving information that he or she may not themselves require. Radical differences in trust intensity are likely to result in a breakdown of the relationship, but it may not if the cost–benefit analysis undertaken using Information Type 2 suggests that the less trusting party is still better off within this relationship rather than another. At this point it would be appropriate to introduce the concept of the distribution of power between parties to the relationship, but, as already stated elsewhere, the analysis in this paper is already quite complex. If this analysis based on an equal distribution of power meets with a degree of agreement, the power dimension can be added later.

4. Is interpersonal trust the same as inter-organisational trust?

One ought not to move straight from an analysis relevant for personal relationships like Table 1 to apply that structure to inter-organisation relationships. One should first, consider whether inter-organisational trust is sufficiently like personal

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23 The word ‘mode’ is used here in both its general and mathematical sense. This is mentioned because Wicks et al. set up their search for an optimal level of trust upon the foundation of Aristotle’s ‘golden mean’, which they define as a state between excess and deficiency in human conduct. According to Urmson (1988, Chapter 2), Aristotle’s ‘golden mean’ is not a tendency to the mathematical average, but depends upon a judgement as to the appropriate matching of behaviour in any given situation — e.g. what would be excessive emotion in one situation can be appropriate or even deficient in another. The position adopted in this paper is not Aristotelian in the sense that the model in Table 1 is held to be a general mode of behaviour which will be adopted by a large section of the population and, hence, does constitute a mathematical concept, but the model is Aristotelian in the sense that it seeks to find contingent information for level of trust intensity as did Wicks et al. in a much more general way.

24 Choice here is really the outcome of an interaction rather than a unilateral choice. If it is the latter, continuity of the relationship itself can be at risk, although this does not necessarily follow.
trust for appropriate parallels to be drawn. There are several issues that need to be addressed:

(a) Can an organisation exhibit trust as a person can?
(b) People change organisational positions fairly frequently. How does that affect trust between different organisations?
(c) People work in hierarchical structures in organisations? How does this affect trust?
(d) Inter-organisational arrangements will certainly be subject to a contract of some type, doesn’t that fundamentally reduce the need for trust in inter-organisational relationships?

Point (a) raises the issue of whether an entity like an organisation can ever be said to be acting in a trusting manner. It is axiomatic that trust can only be exhibited by a living being. One might, nevertheless, think of an organisation acting as if it exhibits trust. An organisation may be thought of as a number of people who agree to act as a group. Clearly that group can then agree to place trust in certain things, people or other groups. In this quite practical sense, organisations can have trust in each other. If one can talk sensibly about an organisation having a culture, one can talk as if an organisation has a degree of trust intensity towards different other organisations.

This also partly answers point (b). Any controller using something like Table 1 to review the state of information given the current stage of an inter-organisational trust relationship would have to make allowances for changing personnel and that might mean some sort of iterative movement between different stages of trust intensity and information provided. Even so, some continuity of organisational trust intensity might be assumed as newly appointed individuals are conditioned to accept a prevailing organisational schema of trust for another organisation. As with all forms of trust, the schema will be continually tested and newly appointed people may look to test the organisational schema more than well-established employees. Such initial scepticism may lead to a backward iteration in the trust relationship as indicated above, but it could also mean that a new individual in an organisational relationship may move more rapidly to higher levels of trust than if he or she were in a personal relationship (McKnight, Cummings & Chervany, 1998). That will not, however, invalidate the notion of an organisation taking time to go through different stages to build trust. While a new employee may immediately accept a current advanced level of trust between her/his company and another organisation, there will be a life cycle to the inter-organisational relationship itself. So it is proposed that the staged life cycle model is still relevant for the analysis of inter-organisational trust and information flows.

In contrast, point (c) may present a different aspect compared to personal relationships. When an individual trusts another in a personal relationship, the consequences of misplaced trust predominantly affect just that person and, perhaps, close associates. If an executive misplaces trust in another company and its personnel, he will have to account to his superiors and the owners of the company. These extra layers of accountability may well persuade the executive involved in an alliance with another organisation to be more risk averse than he/she would otherwise be and insist on more or different information for any given level of trust. Also superiors or owners, who are at “arms length”, may also insist on more formal information about the state of that relationship, but, over time, such superiors and owners may well take the lack of problems as a sign that they need not worry and, hence, need less information. In which case the general functional association between trust and information will still holds. Points (a), (b) and (c) do not seem to invalidate the general notions of building inter-organisational trust over time and the generic consequences for information requirement as that trust develops as

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25 This may, as suggested elsewhere in this paper, be facilitated if the two organisations have similar internal and external cultures, but that is not a necessary condition. Organisations from quite different cultures may build quite trusting relationships just as, with tolerance and adaptability, people from quite different cultures or backgrounds may build successful marriages.

26 This, of course, also happens in relationships between two individuals, but this takes place by a modification to the trust knowledge base of one or both persons — it not the same as an entirely new person taking responsibility for an existing inter-organisational relationship.
outlined above. Point (d), concerned with how contracts affect trust, needs rather more consideration.

The existence of contracts might be seen to give rise to two problems in applying the trust/information life cycle analysis to organisations. First, contracts might be seen to exist directly because trust is missing. Parties do not, however, contract with each other until they have reached a given level of trust (i.e. where they are prepared to commit themselves to each other). That did not occur until the third level of trust in the simple classification given in Tables 1 and so contracts cannot render the earlier stages of building trust irrelevant. Even so, does trust become redundant once the contract has been written? It does not. It was stressed earlier that it is impossible to remove all uncertainty whatever amount of information one has. The same must be true of contracting — one can never write clauses to cover every eventuality. Indeed, the major value of contracting may lie in it being a device to set down goals and methods to enable effective mutual planning, rather than being primarily an ex-post control device. In fact, contracting may not even do that very well and there is evidence to support this view.

In what is now considered a classic paper on the use of contracts, Macaulay (1963) reported the results of a wide-ranging empirical analysis and concluded:

Businessmen desire to ‘keep it simple and avoid red tape’ even where large amounts of money and significant risks are involved ... and

... that while detailed planning and legal sanctions play a significant role in some exchanges between businesses, in many business exchanges their role is small.

Macaulay explains this by stating that it seems that businessmen often do not want to resort to the law to resolve non-performance issues. They are often aware that they may have to deal with their partner again or that, if they get a reputation for “sticking to the letter of the law”, they may find it more difficult to find new collaborators. Also, if they are too strict on the other party observing every detail in the contract, they will lose their own flexibility to modify actions as the environment shifts.

Macaulay conducted his research in the early 1960s and it is general knowledge that, since then, there has been an increasing tendency to resort to litigation in society (especially American society), but these views were still seen by Macaulay to be appropriate in the late 1970s (Macaulay, 1977) and in 1985 when he conducted a review of his 1963 study. Macaulay (1985) stated:

(Law) writers assume a number of things about the institution of contract. First, there is careful planning of relationships in light of legal requirements and the possibilities of non-performance. We must spell out everything because parties will perform only to the letter of a contract, if they go that far. Second, contract law is a body of clear rules so that it can facilitate planning. It provides formal channels so that we know the right way to proceed to produce desired legal consequences. Finally, contract litigation is a primary means of determining breach and directly and indirectly resolving disputes. Without contract law and the State’s monopoly of the legitimate use of force, performance of contracts would be highly uncertain. However, all of these assumptions about history and about human relationships are just wrong or so greatly overstated as to be seriously misleading. Contract planning and contract law, at best, stand at the margin of important long-term continuing business relations. (italics added).

Moreover, Macaulay’s work does not exhibit a peculiarly American perspective. Beale and Dugdale (1975) studied engineering manufacturers in the UK and found very similar results to those found by Macaulay. While Vincent-Jones (1985) was able to conclude:

... whilst the legal institution of contract undoubtedly plays a central role in certain
circumstances, it is clear that the 'extra-contractual’ constraints of convention, custom and expedience are of far greater and more direct importance in the vast majority of transactions (italics in the original).

One does not have to go half so far as Macaulay or Vincent-Jones (1989) to justify the conclusion that the existence of contracts in inter-organisational relationships leaves plenty of space for the reduction of uncertainty through building trust and that this will need to be supported by the provision of information much as outlined in this paper. Also, with quite different arguments from those of Macaulay and Vincent-Jones, Quinn and Spreitzer (1997) state that trust is not just an alternative to contracts, it adds value to the contracted relationship by encouraging a sharing of information and resources. It, therefore, makes sense to look for a parallel to Table 1, which might apply to inter-organisational trust — the existence of business contracts do not render this irrelevant.

5. Trust and information in business relationships

It now seems almost self-evident, that features of information in business relationships can be identified which are analogous to the eight features of the model in Table 1. All relationships are dynamic and can develop in intensity and may evolve through stages similar to those shown in Table 1. It also seems obvious that the same conceptual distinction can be made between Information Type 1, needed to facilitate trust, and Information Type 2, needed to make economic judgements on strategies, investments and on-going operations. So, using Table 1 as a template, Table 2 was constructed to suggest a set of propositions related to the information characteristics that one would expect to find at different stages of development of trust intensity in a business relationship.

If these propositions do have validity, it would be appropriate for a company to assess exactly what type of information it needed to satisfy the characteristics shown in Table 2 and ensure that it was available at the right time in each relationship. The need to recognise timing is a key finding and is crucially important because one should not expect too much from the relationship too soon. The information received in one stage determines whether there will be progression to a higher state of interdependence and trust intensity. This emphasises that designers of business information systems should not be seeking a given time-invariant optimal system, but they have a responsibility for perpetually adapting and modifying the system to meet changing relationship needs. Equally accountants should consider how they can contribute to the specific information needs listed in Table 2 and assess at what stage in relationship building the different aspects of accounting are likely to be acceptable without destroying trust. It was stated at the beginning of the paper that overheads in one organisation might drive overhead expenditure in another. The question will then arise as to whether to probe these inter-organisation effects because they are vital for mastery of events or whether to accept some fuzziness on such issues because one is at the stage where ‘firewalls’ are still necessary or, alternatively, that one does not want to demonstrate a lack of trust at a sensitive time in building trust and, perhaps, move into Ghoshal and Moran’s spiral of distrust. The fundamentals of accounting techniques will not change, but the timing of introducing them at different stages of the relationship seems important. Accounting techniques and processes must not be introduced just because they seem logically relevant for mastery of events, even though some

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One should take care not to assume general tendencies are universal rules. For example, the UK construction industry seems to place an excessive emphasis on control through contracts (as discussed in Nicolini et al., in press). In fact, contracts are widely used in that industry with the likelihood of conflict in mind. This does not undermine the arguments in this paper. Clearly there will be some contextual variability in the extent to which one can rely on the findings of Macaulay, Beale and Dugdale. The UK construction industry seems to be at one extreme of such variability and it is consistent with the arguments in this paper to find a greater reliance on contracts where trust is quite low, but, even at this extreme, contracts cannot absorb all uncertainty and this seems to be supported by the high relative incidence of legal cases relating to construction that are only resolved upon appeal to The House of Lords (Rhys Jones, 1991).
accounting will be vital for this purpose. Trust needs to be built with care. Lamming, Caldwell and Harrison (1999) discuss how inter-company accounting transfers do not exist in a near dichotomous form with or without a “firewall”. They use the concept of “translucence” to indicate a mixture of opaqueness and openness. Even that may be too simple an interpretive structure. Reality is probably more complex with more of a continuity of exposure as a relationship deepens and, perhaps, even some revelations being more apparent than real. The emergence from opaqueness, through different degrees of translucence to significant transparency offers another very rich possibility for empirical research in accounting which has significant practical implications for the way accounting can serve the building of business alliances. The cost–benefit analysis of accounting systems must incorporate the trust dimension and how that changes with the maturity of the relationship; this dimension needs to be added to our empirical research into “everyday accounting”.

6. Forms of business alliances and their information needs

The discussion so far has been couched in terms of the general features of information required to serve all relationships that deepen over time. This is insufficient, however, for specifying the precise business information needs for such relationships because there are different forms of business alliances. It is not just the development of the relation-

<table>
<thead>
<tr>
<th>Development stage</th>
<th>Information type 1 (to warrant trust)</th>
<th>Information type 2 (to master events collaboratively)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploratory/ screening</td>
<td>Possible partners’ attributes: financial, technological, market and network positioning based largely on publicly available information&lt;br&gt;Values, integrity and ethics: the way they do business</td>
<td>Costs and benefits of initial experimental ventures&lt;br&gt;Broad assessment of relationship option values</td>
</tr>
<tr>
<td>Building commitment</td>
<td>More detailed (internal) exchange of information on specific partner’s attributes&lt;br&gt;Aspirations&lt;br&gt;Adaptability exhibited and requested&lt;sup&gt;a&lt;/sup&gt;&lt;br&gt;Establishment of relevant information “firewalls”&lt;br&gt;Confidentiality demonstrated re. information released</td>
<td>Scenario development&lt;br&gt;Guarded revelation of costs and benefits of strategic options&lt;br&gt;Why interdependence is required&lt;br&gt;Comparison with alternative relationships</td>
</tr>
<tr>
<td>Long term commitment established</td>
<td>Information that processes observed&lt;br&gt;Reliable achievement of milestones, costs, quality, etc. Moving back “firewalls”; development of translucency of systems&lt;br&gt;Degree of attention provided to our relationship compared to others.</td>
<td>Detailed assessment of joint competitive position&lt;br&gt;Detailed investment appraisal (variations according to type of investment)&lt;br&gt;Agreed expectations of each other&lt;br&gt;Profit/risk sharing schemes</td>
</tr>
<tr>
<td>Later life in the relationship</td>
<td>Open book accounting for specific projects&lt;br&gt;Transparency of actions / profits-available for examination if required, but not routinely exercised</td>
<td>Main focus on results and lack of crises, not process control&lt;br&gt;How to “milk” what we have&lt;br&gt;Possibilities for extending relationship to new businesses, markets, technologies, etc.</td>
</tr>
</tbody>
</table>

<sup>a</sup> See Håkansson (1982) and Brennan and Turnbull (1998) for discussion of adaptations often required in buyer–seller relationships and how to classify and measure them.
<table>
<thead>
<tr>
<th>Forms of alliance</th>
<th>Main purpose</th>
<th>Exploratory/screening</th>
<th>Building commitment</th>
<th>Long term commitment established</th>
<th>Later life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favoured subcontracts</td>
<td>Cost reduction and quality improvement</td>
<td>Information type 1: Reputations for quality, price, delivery Likely to stay in business</td>
<td>Information type 1: Quality checks on deliveries Contracted targets for cost reduction Assessment of supplier R&amp;D</td>
<td>Information type 1: Translucent books on cost data</td>
<td>Information type 1: No checks on deliveries Open books on cost data</td>
</tr>
<tr>
<td>Technology licensing</td>
<td>Speed of access to technology at lower cost</td>
<td>Information type 1: Standing in on-going technology development Trial short term licensing arrangements</td>
<td>Information type 1: Demonstrated effectiveness of technology purchased in enabling speed to market Prospects for long run continuity</td>
<td>Information type 1: Adaptiveness of supplier’s technology development to buyer’s needs</td>
<td>Information type 1: Common knowledge of technology development plans</td>
</tr>
<tr>
<td>Strategic alliances (including PFI consortia in the UK)</td>
<td>New product development (near market) Provision of end service, rather than capital goods</td>
<td>Information type 1: Identification of other organisations’ competencies in similar technologies or products</td>
<td>Information type 1: Technical knowledge gained from initial collaborations Willingness to share risks Confidentiality demonstrated re. information released</td>
<td>Information type 1: Adaptiveness to needs of supply chain evident in planning No immediate resort to contract terms and legal means if when problems occur Translucent books on costs and revenues and technology</td>
<td>Information type 1: Satisfactory financial results from collaborations Open books on costs and revenues and technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information type 2: Broad assessment of financial possibilities compared to rival consortia</td>
<td>Information type 2: Analysis of dimensions for collaboration and likely allocation of responsibilities Consideration of alternate alliances</td>
<td>Information type 2: Target costing Joint investment appraisal and profit sharing analyses</td>
<td>Information type 2: Analysis of new market possibilities Making a cash cow of the project/product for remainder of life</td>
</tr>
<tr>
<td>Research consortia</td>
<td>New technology development</td>
<td></td>
<td></td>
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<tr>
<td><strong>Information type 1</strong></td>
<td><strong>Information type 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived need to collaborate to cope with high expenditure and risk</td>
<td>Technical knowledge gained from initial collaborations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patent record</td>
<td>Willingness to share risks</td>
<td></td>
<td></td>
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<tr>
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<td>Limit exposure on technology</td>
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</table>

<table>
<thead>
<tr>
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<th>New technology development</th>
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<tr>
<td><strong>Information type 2</strong></td>
<td><strong>Information type 2</strong></td>
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<td>Cost sharing schemes for pilot projects</td>
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<td>Willingness to share risks</td>
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<table>
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<tr>
<th>Joint ventures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Information type 1</strong></td>
</tr>
<tr>
<td>Partners' attributes: financial, technological, market and network positioning based largely on publicly available information</td>
</tr>
<tr>
<td>Values and ethics: the way they do business</td>
</tr>
<tr>
<td>Establishment of relevant 'firewalls'</td>
</tr>
</tbody>
</table>

* Though strategic alliances tend to be for specific projects or product developments for a finite life span.

* It is not surprising that the information characteristics which appear in this part of the table are similar to that in Table 2 as the specification of the purpose being the establishment of a new business is very broad.

* See Carr, Tomkins and Bayliss (1994, Chapter 5) for an example of an Anglo-German JV which had difficulties through contrasting control styles, although, as stated earlier, good relationships may be built between organisations with different cultures provided partners are flexible.

* See Hakansson (1982) and Brennan and Turnbull (1998) for discussion of adaptations often required in buyer-seller relationships and how to classify and measure them.
ship, but also the specific purpose of the relationship and the need to master events to achieve that purpose that determines information needs. Consequently, an attempt was made to consider the main different form of alliances that exist and their information needs while recognising, in addition, the phased development of trust already developed. The results of this consideration are shown in Table 3.

Tidd. et al. (1997) provided an analysis of types of collaboration (that was adopted in slightly modified form in constructing Table 3) together with evidence that specific forms of alliance tend to be linked with specific objectives. Table 3 shows the types of collaboration in the first column with their associated purposes in the second column. The remaining columns then indicate the hypothesised information need according to the stage to which the relationship has developed.

While this paper is devoted to identifying how the provision of business information in general needs to be related to the building of trust relationships in different forms of associations, it is possible to draw some conclusions relating specifically to accounting from Table 3. There is clearly a different emphasis in the detailed information content required for different types of alliance in terms of information about technology, suppliers or profitability of separable business ventures. Nevertheless, the overwhelming characteristic of the information need is that, for the most part, existing accounting techniques seem to be adequate for addressing the different specific issues at each stage. There is, however, one particular feature, over and above those identified when discussing business relationships earlier, where further accounting research and practical development might usefully be focused. This area is not totally new to the literature, but the previous work is not extensive and the analysis above suggests that more attention should be paid to it.

The analysis emphasises the need, at the building commitment stage, to consider alternative alliances that could be made. This indicates that there will be a need to place a value on the relationship with each different partner in order to assess the relative merits of alternate partnering relationships. This can be linked directly to the growing body of literature, which addresses the question of how to make investments where cash flows are difficult to assess, but little has yet been written on placing a value on commercial associations or relationships. Ford et al. (1998) addressed this question and concluded that much mileage was unlikely to be achieved by considering a DCF approach to such a problem. They proposed that one might attempt to “value” relationships using schemes for weighting relationship attributes to produce a form of utility index that could then be used instead of financial return to conduct risk/return investment appraisals for competing associations. The weighting might also be linked to the perceived benefits that the would-be associate could add to different facets of the firm’s value chain.

The analysis in Table 3 also emphasises that, once a long term commitment has been established, recent developments like open book costing, a target costing approach to product development and the return/risk sharing modelling discussed earlier in this paper come to the fore, especially in view of the increasing number of business alliances. This needs to be tempered, however, with the earlier comments about changing accounting translucence.

7. Information needs and trust within networks

Having considered the nature of information within relationships and the information needs of different forms of alliances, the level of analysis can be raised, at last, to the level of networks. As stated earlier, networks are more than bilateral alliances; they represent the configuration of alliances, but also both close and “arm’s length” relationships in which the organisation is involved.

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28 There are various ways of classifying types of business alliances (viz. Tidd et al., 1997, p. 203, and their discussion of horizontal/vertical; tactical/strategic classifications).

29 Areas of literature relating to investment in R&D, large-scale computer systems and strategic investments all address this type of problem.
To a large extent companies may not be able to manage or shape the network within which they reside. Large and powerful companies may be more able to influence its suppliers and customers, but even such companies will have to accept some aspects of its business network as given. This might relate to relationships with governments, financial institutions, universities, rival companies, etc. In any case, if an organisation wants to change the nature of the network in which it operates, it will have to do this through the medium of changing a series of bilateral alliances even if there is a wider consensus for change.

The majority of organisations will already be located in a network. Hence, any effort to manage the network must normally be couched in terms of negotiated adjustments to something that exists rather than creation of something totally new. Nevertheless, to the extent that relationships can be changed, some influence over the network can be exercised. So there is a managerial issue concerned with network design and this may be interpreted as working through the following questions:

a. Is the organisation’s information system adequate for mastery of events?
b. Is the organisation’s portfolio of alliances and relationships (i.e. mix of trust intensities) appropriate for meeting its objectives?

Addressing question (a) first, a network involves more than one alliance/relationship with high trust intensity and so the negotiation of roles, risks and profit-sharing will be more complex. Hence, the modelling of the type described in the Appendix will become more complex. This is not only because there will be more parties to the negotiation, but also because the simulations will need to capture both the direct effects of decisions made by the organisation and all its partners in bi-lateral relationships and also the effects of decisions made by its partners with third or fourth parties in the network which may impact upon the ability of the organisation to negotiate with any of those others.

The next obvious question is whether the modelling will become too complex to function practically. At first sight, the necessity to trace the impact of changes in bi-lateral relationships on all other parties in the network seems likely to create considerable additional complexity. Complexity can, of course, be minimised by treating much of the network (for example, transactions with firms with whom one has just buying and selling transactions in a fairly free market) as exogenous input to the model. On the other hand, the increase in complexity may not be excessive.

Tidd et al. (1997) say:

the number of alliances has increased over time, and networks of collaboration appear to have become more stable, being based around a number of nodal firms in different sectors (p. 215).

Partners of the nodal firm may come and go, but there is, it seems, the development of stable networks in most industries. Hence, the nodal companies might develop the models needed and educate new partners accordingly. Movement in this direction seems evident in the existence of lead contractors in consortia operations such as those becoming more widespread in the UK since the development of the Conservative Government’s Private Finance Initiative or New Labour’s Public–Private Partnership schemes. There is, though, also evidence that there is still much to be achieved to get the right balancing of risk and return in such schemes which suggests that improved modelling is needed as the basis to negotiation (Wong, 1999).

One may also conclude that there is not so much a need for new accounting techniques for the mastery of events within networks, but rather a need to consider how to use them in negotiation processes when there are more complex interactions across organisational boundaries.

Question (a) concerns the process of organising information exchange to master events given the state of relationships in the network. Question (b) concerns whether the portfolio of relationships in the network (i.e. the balance of trust intensities and information) is itself appropriate. To address Question (b), first, the organisation will need to review the portfolio of relationships to decide whether that mix of trust intensities is appropriate for achieving its goals. This might be pursued by
mapping a specification of the current network in which the organisation operates. Adapting Mitchell (1973), the four network dimensions would specify for each of the bi-lateral alliances in the network:

- the transactions needed,
- the degree of economic interdependence and value of the relationship,
- the current trust intensity and
- the current information (formal and informal).

This would incorporate relationships at different stages of development and those ranging from “arm’s length” market transactions to close-knit associations on different forms of alliances. To support the assessment of trust intensity there are already some guidelines. Cummings and Bromiley (1996), for example, have developed and applied a conceptual basis and a series of questionnaires to measure organisational trust. Moreover, Landry (1998) has made a pioneering attempt to relate trust intensity to business efficiency and concluded that the most trusting US company in his study achieved more than twice the dollar level of purchases per employee compared to the least trusting. There is certainly scope for improving the methodology for costing poor trust and the studies just mentioned are not comprehensive in addressing this, but they are a start and the process of trying to build a map as suggested by Mitchell might be very revealing for the organisation (or consortium) concerned. It might even move us towards providing a more rigorous theoretical basis upon which to determine cost-effective exchanges of business and accounting information across organisations.

This process may reveal that trust intensities in some relationships need to be changed, either because they are inconsistent with information available or the degree of economic interdependence. This may lead to direct action to build more trusting relationships or even abandon them where new circumstances suggest that resorting to open market operations might be beneficial. Associated with developing or abandoning appropriate trust intensities must come the appropriate balancing of information.

At first, this may seem too complex, but Tidd et al. (1997, p. 217) also show how different industries tend to specialise in different forms of alliance in order develop innovative links for technological innovation. If that holds across all purposes for which alliances are sought, specific firms will develop expertise for building relationships most appropriate to its own sphere of operation and the problem of assessing the portfolio of trust intensities will not be too severe. They can confine themselves to the relevant sections of Table 3.

There is, however, one additional area of complexity relating to trust intensity. The essence of a portfolio problem is that it is inappropriate to assess individual components on a separate basis. Hence, to judge whether the mix of relationships is satisfactory one cannot just assess whether the existing trust intensities match what is required and try to change some of them, in isolation, if not. Changing trust in one alliance may affect trust in other areas of the network. For example, is there an organisational parallel to personal jealousy—perhaps through members of the outer network being suspicious of the motives of an inner core membership or because relationships between the new closer partner and others in the network are already poor? Is there a limited capacity to give close attention to more than one or two relationships? If answers to these questions are affirmative, they suggest that trust in networks has an extra dimension to that in isolated bi-lateral alliances. Part of the balancing of trust and information may have to consider the “three’s a crowd phenomenon”.

8. Summary of arguments and their significance for research and practice

The initial motivation for this paper was to explore the likely influence of the growth in business networking on business information. At the first level at which this was addressed, it seemed clear that there will be a greater emphasis on the use of management accounting within inter-organisational negotiation processes and it was proposed that this would mean that accountants
would have to be more agile in providing information needed to present and respond to arguments. This is likely to lead to more complex computer simulations and it must be recognised that while relevant information influences negotiation processes, it is also a function of them. The role and significance of both accountants and accounting in alliances cannot be fully assessed without an understanding of specific negotiation processes.

The analysis was then pursued at a deeper level. It was felt to be necessary to examine in detail how information is needed to support first relationships and then alliances, both of which are the basic building blocks of networks. This called for a consideration of the concept of trust and how trust intensity affects information provision. If, as in this paper, trust is defined to mean areas of life which one can take as given, trust must be a fundamental factor in deciding what amount and type of information should be presented. The consideration of trust is the fundamental consideration before all other determinants come into play. Trust as defined here will determine where the information system needs to focus and with what intensity. It is surprising, therefore, that this dimension seems to be absent from accounting theory, although it is obviously implicit in many accounting procedures. Quite apart from the debate about alliances, this paper argues for more work to develop explicit theories of how trust needs to be taken into account in all the different dimensions of accounting. Such a step has promise for laying a more rigorous basis for accounting theory and practice.

A conceptual examination of the relationship between trust and information suggested that the conventional argument that there is a simple monotonic inverse relationship between employment of trust and the provision of information is simplistic. This only holds at a specific point of time for a specific decision. An inverse U-shaped function is appropriate when the dynamics of relationship life cycles are considered. It was also found to be conceptually useful to distinguish between information needed to create and support continuing trust (Information Type 1) and information needed for mastery of events (Information Type 2). Both types exhibit, over time, an inverse U-shape function between trust intensity and information. This further suggests that a model of information redundancy could be constructed based upon the concept of trust. An understanding of what this entails might enable accountants to keep their systems lean, up-to-date and more cost-effective. The practical implications of this could be very far reaching.

While it is useful to make the conceptual distinction between the two types of information, Information Type 1 and Information Type 2 are not totally separate from each other. Information Type 1 will directly affect the degree of trust and then subsequently be influenced by it. Trust intensity will also show what cannot be taken as given and influence the focus of control behaviour, which, in turn, generates the demand for Information Type 2. Interaction over Information type 2 will also provide experience that will influence the state of trust and, through that, feed back into demands for more or less Information Type 1. These are, however, propositions deductively derived. Empirical research is needed to test these propositions and this would entail unravelling the network of direct and indirect influences between Information Types 1 and 2 and trust intensity.

The paper also explored whether propositions based on interpersonal trust can be applied to inter-organisational trust. It was concluded that, with modifications, they can. Moreover, the existence of contracts as the basis of alliances does not make the argument over the trust/information mix irrelevant. In fact this mix should be addressed in forming inter-organisational contracts. Research on the extent to which contracts already prescribe information exchange would be valuable. Even then, it is doubted that contracts can completely prescribe the desirable trust/information mix and so the issue needs regular attention by controllers in alliances.

No new basic accounting techniques seem to be required to cope with operation in alliances and networks, but the need to trace the impact of planned and actual events across two organisations will need more complex analysis in most areas of accounting. Recent developments like open book costing and target costing seem par-
particularly relevant. However, it was argued that accounting techniques should not be introduced just because they seem rationally apposite. Their impact on trust in the relationship should also be considered and the notion of opaqueness, translucence and transparency in information systems offers a valuable area of enquiry both in relation to alliances and in the wider fields of accounting.

It is clear that different forms of business alliances have different information needs, but all of them exhibit a staged development of the balance between trust and information as the alliance develops and further investigation is needed to establish in more detail how accounting information flows need to differ according to the type of alliance.

Moving finally to multi-party networks, more complex simulation models will be needed to support negotiation over sharing tasks, risks and profits in order to master events, but they may not need to be excessively complex. Networks bring with them, however, a new problem of establishing an appropriate portfolio of trust intensities and associated information requirements. Organisations might gain benefit from mapping networks along four dimensions: transactions needed, economic interdependence, trust intensity, information needed. This line of thinking may also lead to a more rigorous theory for cost-effective information system design.

Quite far-reaching implications have been drawn in bringing in a consideration of trust into the design of information systems. One must remember, nevertheless, that, while some element of trust is essential for life to proceed, custom and practice can change the level of trust intensity employed. One may question whether the recent growth in business alliances and networking will be a persistent phenomenon on such a widespread basis. The growth of alliances has followed largely in the footsteps of Japanese and Continental European success in utilising close business relationships. Furthermore, Japanese alliances depend significantly upon the power of nodal firms and the network in general to exercise sanctions for trust breaking (Hagen & Choe, 1998). Will networks and nodal firms be able to maintain such a grasp of events in a world ever more open to international competition? More recently general opinion seems to be that the greater American (and to a lesser extent UK) reliance on markets will return to dominate. The recent (1999) recovery in the Japanese and German stock markets was largely predicated upon the assumption that this will happen. Moreover, will a different form of network, the Internet, take over from close personal relationships and, if so, can trust be built up to the same extent when interactions are electronic-based rather than personal? Will E-commerce facilitate the development of a more global market whereby it will be easier and more economic to operate as infrequent buyers and sellers rather than close associates? To some extent the need for close and trusting relationships may lessen and save us from the more complex models suggested in this paper.

The Internet will, however, also aid the development of collaboration. Many examples already exist of companies exchanging information, in real time, relating to procurement, joint product development and investment. In principle, this should involve no different concepts from those described in this paper, but it will need considerable application from accountants and information managers. The inter-organisation cost behaviour effects will need to be readily seen at lower levels of the organisation if errors are to be avoided, perhaps on a free access basis. On the other hand, the development of capable “firewalls” and translucent systems to prevent the loss of key information too early in the relationship when costs of betrayal are low will also need attention. These current developments in business organisation and information must be recognised and taken into account in attempts to test empirically the propositions expressed in this paper.

Collaboration both between species and within species is evident throughout the natural world where competition to survive is severe and energy is not expended needlessly. I see no reason why the same should not apply to the business world. Irrespective of the current state of technology, alliances will be pursued and trust given where that approach to reducing uncertainty supports
mutual survival. Writing about the natural world, Jones (1999, p. 44) states:

Without collective trust, it (science) could not work. Instead there would be the dismal apparatus of mutual suspicion familiar to every accountant.

It is time for accountants to demonstrate that they do not distrust everyone and, hence, do not try to insist on excessively detailed information. It is time for them to make their systems lean. Recent discussions of lean accounting (e.g. Maskell, 1996), have emphasised more the need to be sparse with supplying information Type 2. Even more leaness might be obtained by balancing trust and information more carefully.

Acknowledgements

This paper results from the author being invited to attend The University of Uppsala Workshop on Business Networks and Accounting, Sigtuna, Sweden, September, 1999. Although now substantially extended, this paper would not have been written had there not been an invitation to present thoughts on this topic. Thanks are also due to Anthony Hopwood for his encouragement to extend the paper and offer it for critical debate and also to Louise Young, Robin Holt and two anonymous, but helpful, reviewers for their comments.

Appendix A. Illustrating the use of simulation to provide mastery of events for each partner and an acceptance of fairness.

Table A1 is based on the assumption that two firms, A and B, are to collaborate over an investment project and that A is to provide some tangible goods as inputs to B’s processes. Let us assume that, at first, each controller says initially that the relationship seems to be fair if each earns the same IRR on their own investment as that earned by the project as a whole. It is possible to set up a simple simulation on variations in the transfer price to achieve that. Table A1 shows that, for the cash flows assumed, the project earns an IRR of 27% and each firm will achieve that IRR at a transfer price of £1588.

One controller may then argue that, while this yields the same expected return for both parties, it does not address the extent to which the two firms face different risks. Hence, A and B decide to analyse relative risks in detail with a view to adjusting the transfer price, and hence give a larger expected return, to compensate the party bearing most risk. As a means of doing this a Monte Carlo Analysis has been run on the cash flows for this project to develop the full probability distribution of IRRs earned by (a) the project as a whole and (b) each firm at a transfer price of £1588. Various underlying probability distributions have been assumed for the different figures in Table A1 and put into the spreadsheet using the @Risk software. The results of this first simulation are shown in Table A2 under the label Simulation 1.

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30 This example is framed as a transfer-pricing situation, but similar examples could be constructed for any form of business association.

31 The project illustrated is, of course, an extremely simple one, but this Appendix is concerned just to demonstrate the type of interaction between the parties to a relationship and how this is subject to and developed by a series of calculations (simulations).

32 In fact, a more efficient variation on Monte Carlo sampling has been used called Latin Hypercube sampling using the @Risk package, but it should be borne in mind that this form of simulation has only been used to illustrate general concepts. These inter-party negotiations could be conducted through the medium of any type of calculation that was thought to be appropriate. This Appendix is not meant to be advocating the use of @Risk nor, indeed, any particular type of simulation — probabilistic or otherwise.

33 The @Risk software permits a user to employ a high variety of forms of probability distributions. This simple example uses normal distributions for all variables, but the principles apply equally whatever form or mix of probability distributions is used in the model. The distributions have been assumed to be independent of each other in this example, but, in practice, it would be necessary, and quite easy, to allow for interdependence between the uncertainty attached to different variables in the model.
Recognising the risks involved shows that B is most unlikely to be satisfied with the financial arrangement specified in Table A1. It becomes quite clear that, although B has the same expected return of 27%, it is subject to much more risk than A. It has a far larger downside risk and a somewhat lower probability of achieving even a positive rate of return.

Let it be assumed that B, once this is recognised, wants a lower transfer price to compensate for the extra risk it faces and proposes that the transfer price should probably be as low as £1,400. Of course, the project IRR will not change, but the manual simulation showed that A will now be expected to earn an IRR of just 12% whereas B would now get 30%. Now A will want to look at Table A1

<table>
<thead>
<tr>
<th>Year</th>
<th>A cash outlays (£)</th>
<th>B cash outlays (£)</th>
<th>Volume</th>
<th>Final product price (£)</th>
<th>Revenue (£)</th>
<th>Net cash flows (£)</th>
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<td>10,000</td>
<td>800,000</td>
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Project IRR 27%

b. Decomposition into the separate returns to each firm

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<th>Cash outlays</th>
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IRR(A) 27% IRR(B) 27%

Table A1 Decomposition of project cash flows to give parties an equal IRR

Let it be assumed that B, once this is recognised, wants a lower transfer price to compensate for the extra risk it faces and proposes that the transfer price should probably be as low as £1,400. Of course, the project IRR will not change, but the manual simulation showed that A will now be expected to earn an IRR of just 12% whereas B would now get 30%. Now A will want to look at

### Table A1: Decomposition of Project Cash Flows to Give Parties an Equal IRR

**a. Total Project Appraisal**

<table>
<thead>
<tr>
<th>Year</th>
<th>A Cash Outlays (£)</th>
<th>B Cash Outlays (£)</th>
<th>Volume</th>
<th>Final Product Price (£)</th>
<th>Revenue (£)</th>
<th>Net Cash Flows (£)</th>
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Project IRR 27%

**b. Decomposition into the Separate Returns to Each Firm**

<table>
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<th>Year</th>
<th>Cash Outlays</th>
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<td>£1000</td>
<td>£522,960</td>
</tr>
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</table>

IRR(A) 27% IRR(B) 27%

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34 It can be seen from Table A2 that the Monte Carlo simulation generates slightly different expected rates of return from the 27% generated in the manual simulation. The use of more iterations in the Monte Carlo simulation would gradually reduce and, in theory, eventually remove these differences. There is an important practical lesson here. The author used 10,000 iterations to generate the results in Table A2 and, even with this very simple model, the results still did not stabilise on the IRRs calculated on the expected values of each variable. Table A2 indicates simulated IRRs that are different by several per cent from the appropriate outcome. Practising managers must not simply assume that, say, 2000 iterations are sufficient and accept the results blindly. This would become more problematic in real life investment problems. The author has experimented with more complex models and it can take 30,000 plus iterations to achieve stability. Even with modern PCs, this can take several hours and, hence, limits the value of this type of simulation actually within the negotiations on a real time basis. The differences between the IRRs generated in the manual and Monte Carlo simulations have been shown in Table A2 to warn of this practical issue. For the purposes of the discussion in this section of the paper, attention should be focused on the risk descriptors being aware that they also might be slightly different if many more iterations were employed.

35 The @Risk package provides much more detail on the distributions than shown here. One can also choose to work with various measures of risk including variance. The measures shown in Table A2 are just illustrative of risk measures that can be generated. They may, of course, be far simpler and not based upon probabilistic data at all.
the risk attached to the 12% return. B will know that its risk has been reduced, but it will also want to see by how much.

The revised position on relative risks is shown by Simulation 2. It can be seen that A would now be expected to earn 12%, but now has only an 85% chance of a positive return and the maximum downside increases to −33%. B achieves a small increase in expected return, but does not achieve much risk reduction at all. Consequently, A might argue (assuming they are operating the model openly together) that there seems little point in making its position significantly worse when B does not benefit greatly — this occurs because B’s involvement in the project is more extensive. So suppose that A now suggests that, in order to reduce B’s risk, A pays B a fixed sum of £100,000 at the outset of the project as its contribution to initial development costs incurred by B and that this payment is incorporated in a revised manual simulation to find the transfer price which then gives both A and B an expected IRR equal to the project 27% IRR. Hence, the terms of the agreement between A and B would include a fixed initial payment from A of £100,000 and the transfer price used would be as revised. Under this suggestion the revised manual simulation showed that both parties would be expected to achieve a 27% IRR at a transfer price of £2626. The associated revised risk profiles are shown in

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### Table A2
Monte Carlo simulation to support negotiation in alliances

<table>
<thead>
<tr>
<th>Simulation</th>
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<th>Firm B</th>
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<tr>
<td><strong>Simulation 1</strong></td>
<td>TP = 1588</td>
<td>(%)</td>
<td>(%)</td>
</tr>
<tr>
<td>Mean IRR from simulation</td>
<td></td>
<td>31</td>
<td>28</td>
</tr>
<tr>
<td>Maximum</td>
<td>302</td>
<td>79</td>
<td>326</td>
</tr>
<tr>
<td>Minimum</td>
<td>−310</td>
<td>−25</td>
<td>−401</td>
</tr>
<tr>
<td>Probability that IRR is positive</td>
<td>84</td>
<td>98</td>
<td>80</td>
</tr>
<tr>
<td><strong>Simulation 2</strong></td>
<td>TP = 1400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRR on expected values of each cash flow</td>
<td>27</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Mean IRR from simulation</td>
<td>31</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td>Maximum</td>
<td>271</td>
<td>54</td>
<td>310</td>
</tr>
<tr>
<td>Minimum</td>
<td>−373</td>
<td>−33</td>
<td>−376</td>
</tr>
<tr>
<td>Probability that IRR is positive</td>
<td>84</td>
<td>85</td>
<td>82</td>
</tr>
<tr>
<td><strong>Simulation 3</strong></td>
<td>TP = 2626</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRR on expected values of each cash flow</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Mean IRR from simulation</td>
<td>32</td>
<td>27</td>
<td>23</td>
</tr>
<tr>
<td>Maximum</td>
<td>299</td>
<td>79</td>
<td>422</td>
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<tr>
<td>Minimum</td>
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<td>−207</td>
<td>−672</td>
</tr>
<tr>
<td>Probability that IRR is positive</td>
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<td>99</td>
<td>73</td>
</tr>
<tr>
<td><strong>Simulation 4</strong></td>
<td>TP = 2626</td>
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<td></td>
</tr>
<tr>
<td>IRR on expected values of each cash flow</td>
<td>25</td>
<td>10</td>
<td>33</td>
</tr>
<tr>
<td>Mean IRR from simulation</td>
<td>25</td>
<td>10</td>
<td>34</td>
</tr>
<tr>
<td>Maximum</td>
<td>65</td>
<td>44</td>
<td>159</td>
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<tr>
<td>Minimum</td>
<td>−32</td>
<td>−26</td>
<td>−411</td>
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<tr>
<td>Probability that IRR is positive</td>
<td>96</td>
<td>87</td>
<td>96</td>
</tr>
</tbody>
</table>

*a* These maximum and minimum returns look extreme and are due to the shape of the tails of a Normal distribution. More realistic values would be achieved by using distribution forms with truncated tails. There are several of these in the @Risk package including discrete, triangular and TNormal distributions. This does not affect, however, the principles being discussed in this Appendix.

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(a) Tomkins / Accounting, Organizations and Society 26 (2001) 161–191
Simulation 3 in Table A2. The results show that A, rather than B, benefits from risk reduction. A is now 99% likely to avoid loss, although there is a very small probability of a large downside risk of up to −207%. B’s risks increase significantly in terms of downside potential and probability of positive returns. So this financial arrangement does not seem to be the answer.

Now suppose that the two parties start to feel uncomfortable with the whole project risk and agree to engage in risk management to reduce the stotal risk that has to be allocated between them. B then analyses its initial capital outlays more closely and notes that the probability distribution entered into the Monte Carlo simulation in the form @NORMAL(600000,250000)36 to indicate considerable uncertainty could be split as follows:

Fundamental @NORMAL (400000,200000)
Development and @NORMAL (200000,50000)
capital equipment

and that the fundamental research would be contracted out to a third party specialist for a fixed payment of £420,000 of which A would pay £150,000 and B the balance. The transfer price of £2626 would be retained. The manual simulation showed that this arrangement would yield a project IRR of only slightly less at 25% and A would get 10 and B 33%. The revised risk positions are shown in Table A2 under Simulation 4. Now A’s position is not a great deal different from Simulation 2, but at least B’s position seems improved.

It matters not whether A and B would settle on this arrangement. They might continue to try alternative financial arrangements until a financial basis for fair collaboration was found. The point has simply been to illustrate how simulation (i.e. repeated revisions of calculation and information) will be needed to help shape the project and develop mutual understanding of what it involves.

36 A Normal distribution prescribed by a mean of £600,000 and a standard deviation of £250,000.

References


