Managing Dependencies in Inter-Organizational Collaboration: The Case of Shared Services for Application Hosting Collaboration in Australia

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Abstract

This study proposes an approach to improve understanding of dependencies in inter-organizational collaboration and so assist managers make more informed decisions. Data has been collected through a case study on shared services in the Australian financial services industry and DNDs (dependency network diagrams) employed to analyze the complex web of dependencies associated with the collaboration. The paper suggests that it is not sufficient to consider a collaboration in isolation. In particular it is noted that a change affecting one dependency may trigger a compounding and cumulative interaction with other dependencies. DNDs also surface details of the governance control associated with each dependency and the availability of alternative partners—enabling an organization to assess the risk associated with each dependency. Finally, a weakness of DNDs is noted; specifically that they are static and are unable to capture the dynamics of developing dependencies in inter-organizational collaboration.

1. Introduction

The benefits of inter-organizational collaboration supported by information systems have been long promoted in the literature [3, 13]. Organizations collaborate to gain access to a combination of resources and skills that enable the development of new or improved capabilities [21]. Inter-organizational collaboration is defined here as the cross-organizational pooling and transferring of resources and knowledge for efficient service delivery. It is suggested that when collaborating across organizations, participants become dependent on one another. If these dependencies are effectively managed, such collaborations lead to increased efficiency and improved service delivery [23].

Shared services networks [4] are a form of inter-organizational collaboration. In such networks actors from various organizations share an interest in sharing scarce resources. These resources can be organizational, technical, or both. The principal motive for engaging in such collaboration is usually cost reduction or service improvement [23]. Aligning resources is an important factor in creating emerging capabilities/synergies [28] and accomplishing sustainable competitive advantage. Aligning these resources also means managing dependencies between the involved organizations.

In this paper, based upon resource-dependency theory, dependency network diagrams (DNDs) are used to create a better understanding of the dependencies associated with inter-organizational collaboration and so provide an informed basis for their management.

The paper proceeds as follows: the following section summarizes the literature on inter-organizational collaboration, shared services, resource-dependency theory, and DNDs. Next the methodological approach is described. The case—application hosting collaboration in the Australian financial service industry—is then described and discussed through the lens of DNDs. The paper concludes with contributions for research and practice.

2. Literature review

2.1. Inter-organizational collaboration

For a considerable period of time authors such as Scott [36], Dosi et al. [13], and Aoki et al. [3] have suggested that information technology (IT) allows for the creation of networks of firms which can realize the benefits of specialized production while retaining a high degree of market responsiveness. Typically organizations seek to focus on their core capabilities [45] and rely on others for the provision of ancillary activities [20]. While the bulk of collaboration research has focused on partnerships between two organizations [1, 14] there have been studies of multi-
organization arrangements [10, 25]. One such arrangement is inter-organizational shared services, which has been suggested [24, 43] as an effective vehicle. There often however is an imbalance in the distribution of benefits of collaboration. According to Tapscott et al. [38] the primary beneficiary will often be the context provider who “leads the choreography, value realization, and rule making activities of the system” (p. 19). Yet as Davidson and Bryant [12] suggest the advantages of a collaboration need to be apparent to all parties or it will fail to gain acceptance.

Multiple authors have sought to classify collaborations. Moss Kanter [27] suggests that they range along a continuum from weak and distant, to strong and close, while Lambert and Knemeyer [26] define three types of partnership based on the level of integration between partners. Kumar and van Dessel [25] and Thompson [40] differentiate between collaborations based on the degree of interdependency and this will form the focus for the current examination. Specifically dependency is suggested as a proxy for understanding the likely distribution of the benefits of a collaboration.

2.2. Shared services

Shared services is an organizational concept—or management idea—that consolidates services in order to reduce redundancies and cut costs [35]. The unit providing such services is usually called a shared services center. It typically delivers services to a number of other business units or customers.

Shared services come in a variety of flavors. They can focus on service delivery in areas as diverse as IT, human resources, accounting, or legal. The modus operandi of shared services varies from country to country. Local initiatives prevail in, for example, Swedish government agencies [42] or German municipalities [29] whereas enterprise-wide initiatives are more common in Canada through the Canadian Shared Services Bureau [5] or in the UK where shared services initiatives have been launched by the Cabinet Office [9].

The particular form of shared services of interest here is inter-organizational shared services. In some ways they can be seen as an extension of the outsourcing literature. Brown [8] for example suggested that the evolution of outsourcing will see it extend to the provision of standardized services to a group of organizations while Gallivan and Oh [17] proposed a class of outsourcing where a group of organizations come together to obtain a common service from a supplier. Such inter-organizational arrangements can lead to many benefits such as a reduction in costs through the realization of economies of scale (see for example Roberts [34] or Edwards and Tornbohm [15]). With such arrangements one of the key questions has been around ensuring a structure that gives a sustainable benefit distribution—i.e. that is not perceived to be inequitable by any of the parties involved prompting their withdrawal [6].

Becker at al. [4] describe one particular form of inter-organizational shared services, shared services networks. A shared services network is an arrangement that stretches over organizational boundaries, including several independent organizations voluntarily collaborating to gain mutual benefits. These arrangements require changes in the structures of power, control, processes, etc associated with service provision [18]. They also create new or changed dependencies between actors in the service-provision network. However, there is a paucity of research examining the change of dependencies and their impact on such arrangements.

2.3. Resource dependency theory and its application

Building upon earlier work in social exchange theory [16, 39] the central proposition of resource dependency theory is that an organization’s survival is influenced by its surrounding social, political, and task environment, and hinges on its ability to procure critical resources from that environment. Such resources can be tangible or intangible, and include capital resources, information, leadership, guidance and institutional legitimacy [30]. Pfeffer and Salancik [32] argue that for any specific resource the degree of dependency of an organization is a function of the importance of it to the organization and the available sourcing options. Specifically it is determined by:

- The importance of the resource to the survival of the organization
- The extent to which the resource is controlled by another
- The extent to which there are alternative sources of supply

To secure the flow of needed resources, organizations try to restructure their dependencies [11, 22, 44] and collaboration is seen as a particularly valuable mechanism to this end [32]. The historical focus has been on one-to-one collaborations between an organization and the controller of the resource of interest [32]. However it has also been recognized that groups of organizations with similar interests may create an intermediary to moderate the relationship. Such arrangements can yield a more balanced distribution of
benefits between the parties [7]. While it has been recognized that such collaborations create new dependencies [19, 31, 33] the complexity of the totality of dependencies has so far not been examined in a rigorous structured manner.

Two oft cited dependency modeling techniques are i* [46] and DNDs [41]. The latter approach was chosen on the basis that is more closely and clearly built on theoretical foundations—specifically resource dependency theory. Such foundations provide a rationale and structure for the concepts included. While i* is more complex in coverage the absence of a theoretical basis makes it difficult to assess its logical completeness. This paper therefore seeks to propose DNDs as a means through which organizations can analyze dependencies within a collaboration and identify where the risk of benefit appropriation is highest so that they take appropriate action.

2.4. Dependency network diagrams

The DND modeling approach has been developed to represent dependencies in inter-organizational collaborations and help facilitate their management [41]. DNDs help organizations “to improve organizational effectiveness by explicit focus on the definition and control of coordination and cooperative role interdependencies” (p. 116).

DNDs aim to model the essential elements of a relationship. Specifically they seek to bound the context of the activity under investigation and capture the resources, roles, and goals that activity encapsulates, the dependencies, and the governance controls put in place to manage it (Table 1).

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Tillquist et al. [41, p. 95]</th>
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<tbody>
<tr>
<td>An activity is the means or procedure for the provisioning of material or informational resources necessary to achieve a goal.</td>
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<td>A resource is anything perceived as valuable by a role, such as information, material, capital, or access to markets.</td>
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<tr>
<td>A role is the encapsulation of a set of activities and goals. Roles represent individuals, work groups, organizations, or industrial segments sharing common activities and goals.</td>
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<td>A goal is a desirable or suitable objective.</td>
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<td>A dependency is the need of one role to achieve a goal through the action of another role.</td>
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<td>A governance control is a prescription for acceptable actions to fulfill a dependency.</td>
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An important aspect of resource dependency theory that appears not to be captured by DNDs as initially envisioned though is whether there exist alternative sources of supply and it is proposed here that it would be useful to add this as an additional dimension.

Tillquist et al. [41] were primarily interested in mapping dependencies at an operational level in an Information Systems (IS) context. It is suggested here that DNDs may also be useful to examine inter-organizational collaborations more generally and provide guidance with regard to their structuring and management.

Using shared services for the hosting of a core banking system in the Australian financial services industry as an example, the intention of this paper is to create a better understanding of dependencies in inter-organizational collaboration and how DNDs can contribute to their management.

3. Methodology

An instrumental case study approach [37] was used to create a better understanding of dependencies in inter-organizational collaboration. The case chosen was in the Australian financial services industry, focusing on the provision of core banking functionality to credit unions.

Traditionally, credit unions in Australia were responsible for providing their own IT services. This changed in the mid-1990s when the industry moved to a collaborative mode of service provision. It is this change, and especially the change of dependencies, which was the focus of the case study.

Data was primarily collected by the means of interviews (see Table 2). Questions focused on five themes: activity, motivation, organization, environmental context, and operation. Interviews lasted between 40–90 minutes, were audio-recorded, and transcribed.

DNDs [41] were used to interpret and analyze the collected data. Transcribed interviews were analyzed to identify dependencies and their essential features. DNDs were constructed to represent both the collaboration and the prior situation. The results of applying DNDs to the case are summarized in the next section.

4. Application hosting collaboration in the Australian financial services industry

Credit unions are member-owned financial institutions that provide a comprehensive range of retail banking products and services. Around 120 credit
Table 2. Interview details

<table>
<thead>
<tr>
<th>Organization</th>
<th>Details</th>
<th>Interviewees</th>
<th>Number of interviews (total duration) – Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit union 1 [CU1]</td>
<td>Operates from one branch with approximately 2,000 customers and AUS32m in assets</td>
<td>Chief executive officer 2 (145 mins) – 2005/2009</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Corporate manager 1 (55 mins) – 2005</td>
<td></td>
</tr>
<tr>
<td>Credit union 2 [CU2]</td>
<td>Operates 11 branches and has approximately AUS270m in assets</td>
<td>Managing director 1 (95 mins) – 2005</td>
<td></td>
</tr>
<tr>
<td>Application hosting collaboration [AHC]</td>
<td>5 staff servicing over 35 credit union customers / shareholders</td>
<td>General manager 2 (105 mins) – 2006/2009</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Credit union relations officer 1 (40 mins) – 2009</td>
<td></td>
</tr>
<tr>
<td>Core banking system supplier [CBSS]</td>
<td>Approximately 180 staff providing services to over 150 customers</td>
<td>Managing director 1 (65 mins) – 2006</td>
<td></td>
</tr>
<tr>
<td>Hosting services provider [HSP]</td>
<td>IT services provider with over 1,000 staff, 2,000 customers and annual revenues in excess of AUS500m</td>
<td>IS manager 1 (80 mins) – 2006</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Managing Director 2 (90 mins) – 2006/2009</td>
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<tr>
<td></td>
<td></td>
<td>Financial controller 1 (45 mins) – 2006</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Client services director 1 (60 mins) – 2009</td>
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</table>

Credit unions currently operate in Australia with 3.6 million members and more than $29 billion in assets.

In the early-1990s credit unions recognized that IT was becoming more critical to their business—as operations were IT enabled and customers started the move towards a 24/7 access mode—and as a result more expensive and skill intensive. While previously the norm had been for credit unions to have in-house IT departments the changes led many to reassess their position and look for alternatives. The primary area of focus of the credit unions was on their core banking system (CBS) and its hosting, which together accounted for the bulk of their IT. A CBS is a platform-based application that supports the transactional services of a bank—deposits, loans, and payments—across all available channels such as branches and automated teller machines. Hosting simple refers to the provision of infrastructure to operate the CBS, including hardware, operating system, and network bandwidth.

Three broad approaches with variations emerged, as illustrated by Figure 1. In essence the sector converged on three different CBS—one credit-union owned and two provided by commercial vendors which are then hosted either in-house, by a commercial hosting service provider (HSP) or by one of several credit union owned HSPs. Additional complications are that the credit-union owned CBS could only be used in conjunction with the HSP that was owned by those credit unions—i.e. as part of a bundled offering—and that a number of credit unions had established an intermediary between themselves and a commercial HSP: Application hosting collaboration (AHC). The focus of this case study is highlighted in Figure 1 and centers on the collaboration that includes AHC.

AHC has five staff and does not itself provide hosting services but rather manages the service relationship between credit unions and the services provider. Each credit union signs the same standard contract. While the aggregated service provider contract is put out to tender every three years it has remained with the same supplier—a division of a mid-size IT services provider—since the mid-1990s. However, the division was sold off to another IT services provider in 2007. While the sale triggered a contract review no change occurred and the contract has subsequently been renewed.

Figure 1. Credit union core banking and hosting options

Customers can choose to be shareholders of the company with holdings in proportion to the asset size
of the credit union. The company’s constitution provides for A and B class ordinary shares, and C and D class preference shares. Only the holders of A class shares are entitled to appoint company directors.

“Effectively what we’ve done is we’ve put a middle man in there to look after our interests . . . they manage the relationship with [the external provider].”

AHC-GM

The managerial implications of the dependencies associated with the creation of AHC are analyzed from the perspective of the credit unions below.

5. Analyzing the case using dependency network diagrams

Figure 2 illustrates the DND for a credit union before August 1992. The hosting of the CBS is done internally by the credit union (CU) and there is only one dependency—of the CU on the core banking system supplier (CBSS). The dependency is governed by a contract, which specifies the terms of the software license. With regard to the number of alternatives available to each party the relationship was asymmetrical in that there was a much larger potential market of CUs for the CBS than there were choices of CBS for the CU (approximately 300 CUs compared to 4 CBS suppliers).

Figure 3 is the DND following the introduction of AHC and the move to outsource the hosting of the CBS. Seven separate dependencies can be identified.

Dependency 1: Each credit union is dependent upon CBSS for the supply of core banking software. The relationship is governed by a contract whereby the two parties agree to provide core banking IT services to its credit union customers. The relationship is broadly asymmetrical and the credit unions would only be able to find a limited number of alternative suppliers individually.

Dependency 2: CBSS is dependent upon AHC-GM (and indeed the CU) for the supply of core banking software. As with Figure 1 the relationship is asymmetrical though the ratio has changed quite substantially (it is now approximately 120 to 3).

Dependency 2a, 2b: Each credit union depends upon CBSS, AHC and the move to outsource the hosting of the CBS. CBSS hosting services (ruling out a role for AHC). For CBSS, AHC suggested that there are very few that are capable and willing to work with them.

Dependency 3: Credit unions are dependent upon HSP for the provision of core banking IT services. There is no direct governance of this relationship—the supply contract being between HSP and AHC. The relationship is predominantly asymmetrical. A large potential market is available for HSP. Given that few suppliers find the aggregate demand from AHC to be commercially attractive even the largest credit unions would only be able to find a limited number of alternative hosting service providers in Australia AHC suggested that there are very few that are capable and willing to work with them.

Dependency 4: AHC is dependent upon HSP agreeing to provide core banking IT services to its credit union customers. The relationship is governed by a contract including pricing and service level details. The relationship is asymmetrical. HSP supplies many customers in multiple sectors and the AHC contract is a small proportion of its $500m total revenues. While there exist many alternative hosting service suppliers in Australia AHC suggested that there are very few that are capable and willing to work with them.

Dependency 5a, 5b: CBSS is dependent upon AHC-GM continuing its policy of only facilitating the provision of IT hosting services for CBSS’ core banking application. There is however no direct relationship between the two—all the relevant licensing agreements are directly between CBSS and individual credit unions. While the relationship is broadly asymmetrical there are few alternatives available to either party. Of the other available core banking applications one is too complex for many of AHC’s credit unions and the other is only available bundled with hosting services (ruling out a role for AHC). For CBSS, AHC customers together represent a significant proportion of their total business—approximately 50 percent—that could not easily be replaced.

Dependency 6a, 6b: Between individual credit unions. The actions of each credit union have implications for the others—in particular with regard to whether they might withdraw from AHC. Withdrawals impact upon the aggregate demand that serves as the lever for obtaining attractive hosting pricing from HSP (and indeed in extremis its willingness to provide services at all). The symmetry of the relationship depends upon the relative size of the credit unions. There are fewer replacements for CU2, for example, with assets of AU$270m. There is no direct governance of the relationships the only potential influence being via mutual ownership of AHC.
### Figure 2: DND for core banking activity pre-collaboration

### Figure 3: DND for core banking activity post-collaboration
Dependency 7: A number of credit unions have entered into additional individual contracts with HSP for supplementary services. The scope of these contracts vary but at the extreme extend to the provision of all IT related services. The relationship is predominantly asymmetrical. Each credit union represents only a very small part of the total business of HSP. HSP is only willing to provide the additional services because of the existing AHC based relationship—stating that only for the largest credit unions would provision be commercially attractive on a standalone basis. It seems reasonable to assume that this would similarly be the case for the majority of other hosting service providers.

The dependencies identified do not appear to be homogeneous. It is suggested that there are three dimensions along which they can be differentiated:

- Whether one party is dependent upon another with or without any degree of dependency in the other direction (i.e. one way and two way dependencies)
- Whether a dependency relates to the conduct of the activity in focus or relates to a separate activity but contributes to the overall pattern of dependencies between the two parties which influences how they relate to one another in toto and therefore needs to be considered (i.e. primary and secondary dependencies)
- Whether a dependency between two parties directly immediately influences the performance of the activity in focus or is such that the actions of one impacts upon the ability of the other over time (i.e. direct and indirect dependencies)

Assessing each dependency in turn suggests:
- Dependency 1: one-way, primary, direct
- Dependency 2a,2b: two-way, primary, direct
- Dependency 3: one-way, primary, direct
- Dependency 4: one-way, primary, direct
- Dependency 5a,5b: two-way, primary, indirect
- Dependency 6a,6b: two-way, primary, indirect
- Dependency 7: one-way, secondary, direct

Figure 4 provides a DND incorporating the different types of dependency.

6. Discussion

In the application hosting case the DND highlights the complex web of dependencies that are created through collaboration and suggests that it is unlikely to be sufficient to consider a collaboration in isolation from other activities and relationships. In particular the recognition of indirect and secondary dependencies suggests that dependencies can be reinforced or created in unanticipated ways. For example the sourcing of additional IS services from HSP by a CU will magnify any dependency related to core banking hosting. Another example is the dependencies created between CUs without any formal exchange of services. Indeed the absence of activities associated with a number of the identified dependencies suggests that it might be appropriate to simplify the approach by removing activities and narrowing the focus to the goals of relationships.

The case also suggests that a change affecting one dependency might trigger a compounding and cumulative interaction with other dependencies. For example, if a CU hosting with AHC wants to change its
core banking system it would also need to find a new hosting arrangement increasing the dimension and complexity of the change.

A further contribution of a DND when analyzing inter-organizational collaboration is that the details provided with regard to the governance control associated with each dependency and the availability of alternative partners enables an organization to assess the risk associated with each dependency. For example there is no direct governance control over dependency 3—the actual supply of core banking hosting services by HSP to credit unions. Combined with the asymmetrical nature of the relationship with regard to the availability of alternatives this may lead to a credit union concluding that they need to devise a strategy to address the high risk associated with the dependency. While there is a similar lack of a direct governance control associated with the dependency created between CUs the existence of shareholdings in AHC might be seen to provide some comfort regarding the stability and equity of that dependency.

A weakness of the DND is that it only captures dependencies at a single point in time. Dependencies are likely to change over time and it would be useful for organizations to develop scenarios to assist their organizations to develop scenarios to assess the risk associated with each dependency. For example there is no direct governance control over dependency 3—the actual supply of core banking hosting services by HSP to credit unions. Combined with the asymmetrical nature of the relationship with regard to the availability of alternatives this may lead to a credit union concluding that they need to devise a strategy to address the high risk associated with the dependency. While there is a similar lack of a direct governance control associated with the dependency created between CUs the existence of shareholdings in AHC might be seen to provide some comfort regarding the stability and equity of that dependency.

A weakness of the DND is that it only captures dependencies at a single point in time. Dependencies are likely to change over time and it would be useful for organizations to develop scenarios to assist their planning. For example, in the credit union sector, while there is currently a large number of credit unions, significant consolidation is occurring through takeovers and mergers. Over time this has the potential to change the nature of a number of the identified dependencies and even call into question the value of AHC.

A second weakness is that a DND does not explicitly capture the relative significance of each relationship. The implicit assumption is that they are all equal. While the approach therefore is useful in identifying concerns related to individual dependencies—for example that there is no governance control associated with the dependency between AHC and CBS—it does not clearly prioritize the order in which an organization might want to consider addressing them.

It also appears important to consider the context of the specific parties involved in a collaboration. For example—and as partially highlighted by the DND—the relative position of a credit union depends upon its size (expressed for example with regard to its total assets). With the largest being more important to AHC—in terms of the scale they bring.

In conclusion, it is suggested that the paper builds upon the original Tillquist et al. [41] work and subsequent extensions by Al-Natour and Cavusoglu [2] and others, contributing to the literature in five principal ways. The first, and perhaps most fundamental, contribution is that the paper successfully extends the application of DNDs from a specifically IS oriented, operational context to a much broader consideration of collaboration at the strategic level. Such a shift raises the potential for a much greater contribution of the approach.

Second, the paper makes explicit, and separates out, the influence of the availability of alternative providers of an activity. Previously research appears to have considered the availability of alternatives, if at all, from a uni-directional perspective, i.e. how many alternative suppliers exist (see for example Al-Natour and Cavusoglu [2]). Here the availability of alternatives is considered from both sides to assess its impact. It is likely that the effect of there being a small number of suppliers will vary depending upon whether there is a large or a small number of buyers. The paper also makes it apparent that it may not be just the number of alternatives that is important but also their relative size—for example do both sides of a dependency have similar quanta of revenues or assets.

Third, the case not only reinforces the significance of intangible resources but through the identification of indirect dependencies for the first time suggests that dependencies can be created around an intangible resource without the need for it to be incorporated into an activity between the parties involved. In the analyzed case the resource is the existence in each party of a compatible perspective. For example, consider the dependencies (6a, 6b) between credit unions. There is no direct transfer of resources between them simply compatible perspectives that see collaboration as beneficial. Based on this each credit union independently enters into contracts with AHC (dependencies 2a and 2b). Without compatible perspectives however AHC would likely not survive.

Fourth, while previous research has recognized the bi-directional nature of dependencies this has typically been in relation to the attainment of a single goal. For example Al-Natour and Cavusoglu [2] recognize that both sides of a dependency may have an investment in the realization of a goal and that an accurate estimation of the strength of a dependency needs to take this into account. The case presented here highlights that such an assessment is however more complex since there is the potential for two-way linked dependencies associated with related but separate goals. For example, with dependencies 2a and 2b a credit union has a range of goals including economies of scale benefits and relationship management while AHC is focused on securing a critical mass of users. While AHC’s goal clearly supports the credit union’s goal of delivering economies of scale benefits its direct contribution to effective relationship management is less apparent.
Finally, the paper makes explicit that drawing a boundary around the area of focus as recommended by Tillquist et al. [41] may cause dependencies to be under- or overstated—at least at a strategic level. Secondary dependencies associated with other activities may have a compounding or mitigating influence. Dependency 7 from the case, for example, is likely to reinforce dependency 3. The paper therefore suggests that it might be beneficial to bridge the gap between modeling techniques such as DNDs, which examine specific relationships in detail and those such as social network analysis, which are focused on the overall pattern of relationships—and starts to lay some potential foundations for that bridge.

In terms of contributions to practice it is suggested that the paper has aided in the development of a tool—DNDs—which organizations can use to identify and document the dependencies they face in different parts of their business. With the additions proposed here organizations will be well placed to be able to recognize differences in the nature of those dependencies. Ultimately though the primary value of the proposed approach may come through the process of modeling itself which will raise awareness of dependencies, assist in developing a shared understanding of them and identify shortcomings in how they are governed.

7. References


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