VA^3: GOVERNANCE SELECTION IN VALUE WEBS

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Abstract   To deal with complex customer needs, enterprises increasingly form constellations, rather than just operate on their own. Cisco Systems and Dell are good examples of organizers of such constellations in their own industries. An important problem while designing these constellations is the selection of a performing enterprise for each value adding activity in the constellation. In this paper, we propose a *model*-based approach to do so. We use the existing e^3-*value* methodology to represent a value constellation formally, and extend e^3-*value* with VA3; a step-wise approach that assists in selecting enterprises for performing value activities. How VA3 practically works, is illustrated using a case study on Cisco Systems.

Keywords: Value webs, governance structures, e^3-*value*

1.   Introduction

Today, end-customers more and more buy products from *value webs*. Such webs are constellations of companies that offer jointly a good, service, or a combination of these to a customer. Well known examples include Cisco Systems and Dell, but many other small constellations exist.

To design and model a value web, we have developed in earlier work (Gordijn and Akkermans, 2003) the e^3-*value* methodology, addressing the creation, exchange and consumption of economic value in a network of enterprises (see also Sec. 2). The e^3-*value* approach models value webs using pre-defined and formalized constructs, e.g. actor, market segment, value activity and value ex-

change. There are a number of reasons for *modeling* value webs, such as:
(1) a better, and shared, understanding of the web by the stakeholders in-
volved compared to an ambigious textual outline of the value web, (2) the
possibility to use software tools for the design and analysis of value webs (see
e.g. http://www.cs.vu.nl/˜gordijn/tools.htm), and (3) a precise statement of the
value web, usable for software engineers to do software requirement analysis.

So, the e^3-*value* methodology produces a *value model* showing enterprises
(actors), exchanging things of economic value with each other, and performing
value adding activities. Execution of these activities leads to profit (and need
satisfaction in case of end-customers). An important issue in value webs, and
thus in e^3-*value* , is the *assignment* of value adding activities to *performing*
enterprises. On the one extreme, a *single* enterprise may perform *all* value
adding activities by itself; on the other extreme, *each* value adding activity can
be executed by a *different* company. Significant work has been done on this
value activity assignment problem, including strategy decision making (e.g.
(Porter, 1985; Porter, 2001)) and transaction economics (e.g. (Williamson,
1985; Williamson, 1998)). However, this work has not been integrated into
a *model*-based approach, such as e^3-*value* , yet. So, the key contribution of
this paper it that we propose a stepwise, model-based approach, called VA^3
to select performing actors for value activities, based on the forementioned
contributions. Ultimately, VA^3 should support the designer of value models
and thus should be seen as prescriptive. In this paper, we have a more modest
goal: to assess whether VA^3 can be used to describe a case study adequately.

This paper is structured as follows. Sec. 2 articulated the aforementioned
value activity assignment problem. In Sec. 3 we propose the VA^3 approach
for dealing with the assignment problem. Then we illustrate VA^3 using a case
study in Sec. 4. Finally, in Sec. 5 we present our conclusions.

2. The value activity assignment problem

The e^3-*value* methodology

As Fig. 1 shows, an e^3-*value* model can be represented graphically . Expe-
riences with business users in various research projects have shown that this
is a particular useful feature of e^3-*value* . Following, we discuss the e^3-*value*
constructs only briefly (more information can be found in (Gordijn and Akker-
mans, 2003)).

First, Fig. 1 (a) contains a series of **actors**. An actor is entity that is per-
ceived by its environment as an independent economic (and often legal) entity.
An actor makes a profit or increases its utility. In a sound, sustainable, value
model each actor should be capable of making profit. In the example *buyer*,
seller and *producer* are all actors.

An actor may have a need. This need is expressed by means of a **start stimulus** that triggers exchanges of goods and services between actors. Here, the need is *watch DVD*. In order to satisfy the need, an actor exchanges objects of economic value with other actors. The **value objects** are services, products, money, or even consumer experiences. The important point here is that a value object is of value for one or more actors. In the example at hand, *DVD*, *fee*, and *transport* are all examples of a value object. These value objects are offered/requested via value ports of an actor. The concept of **port** enables to abstract away from the internal business processes, and to focus only on how external actors and other components of the business model can be 'plugged in'. Ports are grouped into a **value interface**, expressing that the objects via *all* ports in the interface should be exchanged or *none at all*. This models economic recicprocity and bundling. So, *buyer* can only obtain a *DVD* if he pays a *fee* for it, and vice versa. The start stimulus and the value interface of *buyer* are connected by means of a **connection element**, representing that in order to satisfy a need, a *buyer* should exchange value objects via that specific interface. A **value exchange** is used to connect two value ports with each other. It represents one or more potential trades of value objects between value ports. As a result of the semantics of a value interface (all its ports should exchange values or none at all), value exchanges occur in combinations. E.g., a *fee* and a *DVD* should both be exchanged between buyer and seller. Such a combination is called a **value transaction**.

Additionally, actors can perform value activities. Such a **value activity** is an operation with which an actor *creates profit*. In this case, *seller* earns money with *selling DVD's*. Since value activities create profit, the assignment of value activities to performing actors is an important problem while designing e^3-*value* models. Providing guidelines how to do so is the key contribution of this paper.

Connection elements and exchanges form a **dependency path** (with on the path the value exchanges). This path is used to count the number of value exchanges as a start stimulus occurs. These counts are the basis for net cash flow calculations, to assess whether the business value model is profitable for every actor involved. The end stimulus represents the end of the path, and signals that counting of the number of exchanges can be stopped.

Actors perform value activities

An important decision during the design of value models is the assignment of activities to performing actors. This decision influences *how* enterprises are creating profit and thus is seen as important. To exemplify the decision, consider Fig. 1 (b). There is one important difference with Fig. 1 (a): whereas in (a) *seller* performs transportation of DVD's itself, in (b) there is a *logistic*
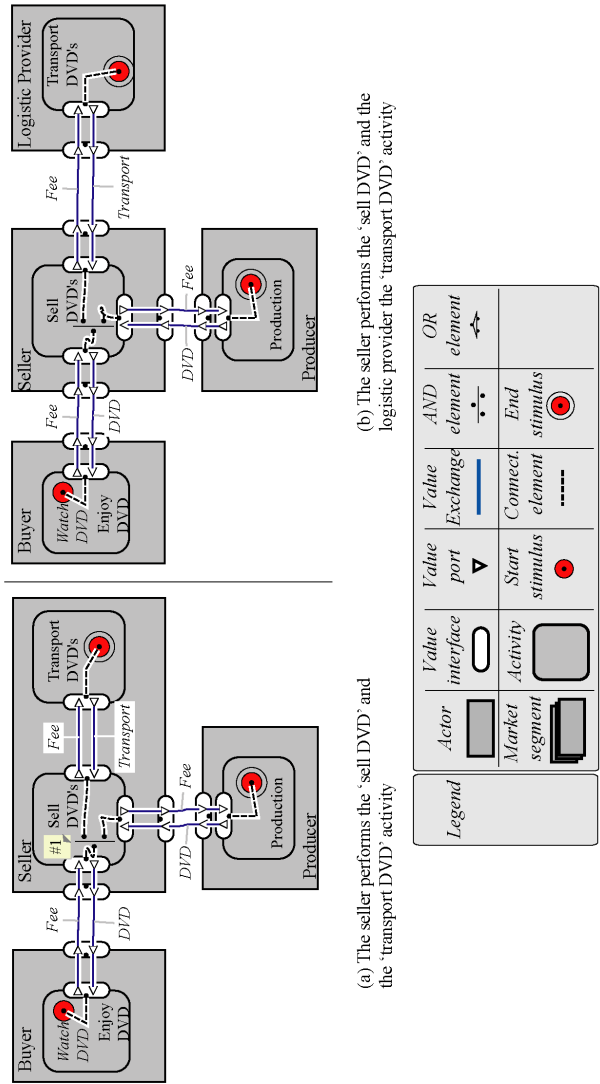
Figure 1. An e^3-*value* model.

provider for DVD transportation. In other words, the value activity *transport DVD* has been assigned to a different enterprise. As a result, *logistic provider* creates now profit with the *transport DVD* activity, and not *seller*.

The decision to assign an activity to another actor can be represented by an e^3-*value* model, but how to take such a decision? This paper proposes a multi-perspective, step-wise approach called VA^3 to make such a decision.

Obviously, the VA^3 approach is closely connected to the existing *e^3-value* method.

3. VA^3: A stepwise approach for assigning value activities to actors

Governance structures

An *e^3-value* model can be seen as a set of value activities, connected by means of value exchanges. At the one extreme, all value activities can be performed by one large enterprise; At the other extreme, each value activity can be assigned to a different enterprise. We consider the assignment of activities to performing actors as a governance structure selection problem. A **governance structure** describes the organisational form of value exchanges between activities, specifically which actors are involved and which coordination mechanism is used. Various goverance structures can be characterized by the following properties (see e.g. (Malone et al., 1987; Williamson, 1985; Pyke and Johnson, 2003)):

Scope of the supplier-buyer relation. A supplier and buyer may select each other *per business transaction*, they may have *medium/long term contracts* that are used for more than one transaction, or supplier and buyer may be in the same company and have a *hierarchical* relationship.

Coordination costs. According to (Malone et al., 1987), coordination costs include the transaction costs of all the information processing necessary to coordinate the work of people and machines that perform the primary processes.

Production costs. Production costs include costs for primary processes to create goods and services (Malone et al., 1987).

Product adaptability. Adaptability is the ability to adapt the product or service to the needs of buyer and the agility too react on uncertainties.

Information sharing. Information sharing quantifies the amount of information sharing between supplier and buyer.

Asset specific investments. Asset specific investments are those investments that a firm needs to invest to be able to perform the value activity under consideration.

Business with competitors. Business with competitors refers to the amount of business the supplier will do with the competitors of the buyer.

Based on these characteristics, we sketch four different governance structures, using (Williamson, 1985) and (Pyke and Johnson, 2003) as a starting point. For explanatory purposes, we assume a situation with two value activities, va_1 and va_2 and activity va_1 wants to buy a good or service from va_2 and

pays for that in return (see Fig. 2). Using the goverance structures below, these activities can be assigned to actors in different ways.
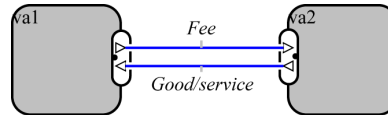

Figure 2. Value activities exchanging objects of value.

Market governance. In case of market governance, va_1 and va_2 are assigned to different actors, and this assignment may change on a per *transaction* basis. *Coordination* costs are high because for each transacion, the best supplier has to be found. However, *production* costs are low because for the supplier economies of scale apply. The possibility to *adapt* the final product is low because in order to obtain the parts (half-products) from someone else, standardization of these parts is important. *Information sharing* is not so easy, since for each transaction, a new infrastructure to do so needs to be created. The actor performing va_1 has no asset specific investments; these are all done by the actor performing va_2. Obviously, the actor performing va_2 does also business with the competitors of the actor performing va_1.

Hierarchical goverance. In the situation of hierarchical governance, va_1 and va_2 are done by the same actor. There is a single point of decision authority rather than various actors in a market. *Coordination* costs are low because no other enterprise has to be found and managed to perform va_2. *Production* costs of half-products are high because the enterprise produces only for itself and as a consequence, economies of scale are difficult to reach. The possibility to *adapt* the final product is high because there are no contractual restrictions regarding the half-products and va_2 is directly controlled. *Information sharing* between both activities can be exploited at a maximum extent. Asset specific investments are high, because the enterprise can not use others to do these investments. Finally, because both activities are performed by the same enterprise, there are no competition issues.

Relational and joint governance. Relational goverance and joint governance are both structures that suppose that va_1 and va_2 are performed by different enterprises, but these enterprises have a closer relationship compared to market governance. In the case of relational governance, contracts are set up that are used for a series of transactions between enterprises. These contracts can agree on design, quality, quantity and delivery schedules of products. It lowers coordination somewhat (because not for every transaction a new enterprise has to be found), and information sharing may be useful.

Joint governance is about a strategic partnership between two firms. Not only a series of transactions is governed, rather the entire cooperation between enterprises. This creates opportunities for low coordination costs, high adaptability of the end product to customer needs, intensive information sharing, and half-products which are only limited available to competitors.

Governance structures can be represented by e^3-*value* models. Fig. 3 (a) shows that activity a_2 is performed by an actor, part of a market segment. The actor has to be selected on a per transaction basis from the market segment. A **market segment** is an e^3-*value* construct, denoting a set of actors that assign economic value to objects in the same way. Relational governance is presented in Fig. 3 (b). Two opions are available: If an actor has contracted many other actors for the performance of activity a_2, the leftmost part is selected, modelling that a selection is made from a pre-defined set of actors. In case there is a contract with only one actor, the rightmost part applies. In Fig. 3 (c) joint governance is shown. Here, two enterprises form a partnership. Each enterprise performs its own activity (activity a_1 and a_2 respectively), but there is an additional activity, performed by the partnership, to model that both partners need coordination. Finally, in case of hierarchical governance, Fig. 3 (d) can be used. Here, both activities a_1 and a_2 are performed by the same enterprise.
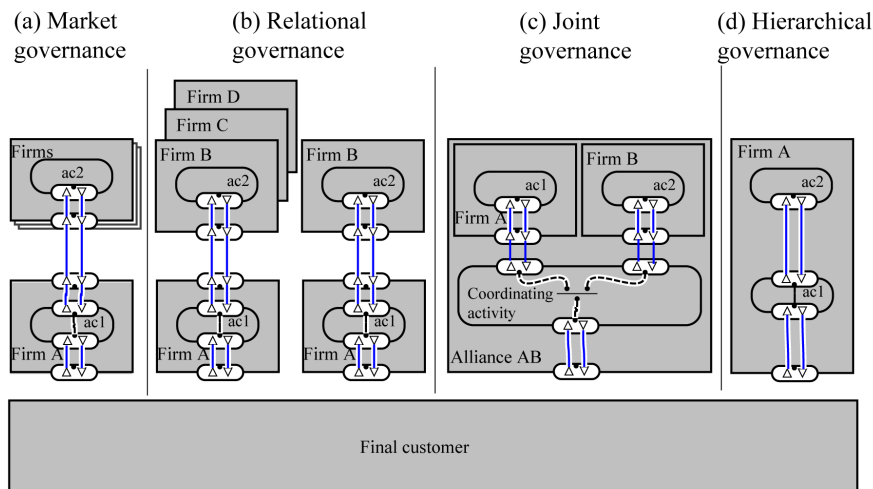

Figure 3. Four governance structures in e^3-*value* .

A multi-perspective approach

How to assign value activities to performing actors? In this paper, we reduce this question to finding an appropriate governance structure for each value

activity. A series of factors influence the choice for a particular governance structure (see e.g. (Ghosh and John, 1999) and (Hamilton and Wada, 2001)). In this paper, we consider a company's strategy, transaction costs, possession of information, and available resources.

Strategy. In (Porter, 2001) it is stated that strategy, and strategy alone, determines governance structure, in favour of hierarchical governance. This is a bit one-sided, biased view on the disadvantages of market, relational, or joint governance (see e.g the discussion in (Porter, 2001), and reactions (Ticoll, 2001)). Companies employing other forms than hierarchical governance (Dell, Cisco Systems, American Airlines, Citybank, Dow Chemical, Siebel) have proven to be very successful. Therefore, we will not regard hierarchy as the most preferred governance structure on beforehand. However, we will not disregard Porters opinion. We suppose that least one value activity should be governed internally, to sustain competitive advantage and to reach the necessary distinction from competitors.

Transaction costs. Williamson (Williamson, 1998) shares a similar one-sided, biased view on the expected influence of his theory on make-or-buy decisions. Transaction costs, and transaction costs alone, determine governance structure. Although, in time, Williamsons view on this matter changes more and more towards a more multi-perspective approach. Aspects like strategic positioning and available resources are also likely to influence the governance decision.

Possession of information. It is widely accepted that possession of information can be of commercial interest and may be lead to competitive advantage. Therefore, while deciding on a goverance structure, possession of information should be taken into account.

Available resources. Apart from strategy, transactional costs and possesion of information, the resources of a firm are believed to play a role in the value activity assignment problem. Resources can be defined as the scarce and imperfectly mobile skills, assets or capabilities owned by a firm for the purpose of performing one or more activities. These resources are by definition a competitive advantage to a firm; they cause positive performance differences. In their research on governance value, (Ghosh and John, 1999) distinguish marketing resources, technological resources, and channel resources, based on earlier research (including (Day and Wensley, 1988)). Possession of these resources by a specific value activity may result in choosing hierarchical governance, to exploit competitive advantage.

Steps in selecting a governance structure

How do we use strategy and transaction costs issues, as well as available information and resources of an enterprise to arrive at a governance structure?

Starting point for the governance structure selection is the *preference of market governance*. *Hierarchical governance*, the other extreme of the governance spectrum, is the least preferred governance structure. Only with sound motivations, hierarchical governance is chosen. This assumption follows transaction cost theory and is in contradiction with Porters opinion, as he states that for strategic reasons, hierarchical governance is preferred to market governance. We assume that these strategic reasons exist for a *limited* amount of value activities only. Therefore, we regard market governance, based on Williamson's arguments, as the default governance.

Starting point is a value model consisting of *only value activities*, exchanging value objects (e.g. Fig. 1 (a) but then *without* actors). For a value model, an enterprise considers each activity, in order to select a specific governance model, following a series of steps that are illustrated in Fig. 4 and presented below.

Step 1: Is the value activity under consideration mission critical? For each value activity, the first question is whether the value activity is mission critical for an enterprise. In other words, if this value activity will not be performed, is it still possible for an enterprise to offer its core value object(s) to its customers? A *core* value object is offered by an enterprise to its customers and is seen as crucial for profit generation and sustainability for that enterprise. If a value activity is not mission critical, market governance is a suitable governance structure, otherwise we proceed to step 2.

Step 2: Are transaction costs high? If a value activity is considered as mission critical, next step is to research the transaction costs for the value activity. Important aspects to determine transaction costs are asset specificity, uncertainty and frequency. To determine whether transaction costs are high, these three aspects need to be evaluated: Asset specificity, Uncertainty, and Frequency. The assignment of these values should be done on basis of the transaction cost theory (see (Williamson, 1985) for more details). If asset specificity is high, uncertainty is medium or high and frequency is recurrent, the transaction costs are high. This is the case if highly asset specific investments need to be done to perform a value activity. In addition, the uncertainty is high, so adaptability, agility is very important, so direct control and extensive information sharing is needed. We then continue with step 4. If asset specificity is low or medium, uncertainty is low or frequency is occasional, transaction costs are low or medium. In these cases transaction costs give no reasons for joint or hierarchical governance , and we continue with step 3.

Step 3: Does the value activity under consideration provide useful information? If a value activity is mission critical and the transaction costs are low or medium, question is whether this value activity provides useful information. We will define information useful if the possession of information increases

competitive advantage significantly. By enabling better performance, more efficient business processes or useful client information, information increases competitive advantage. If a value activity provides this sort of information, this information should be governed internally or shared by the supplier, so the governance structure should be hierarchical or joint governance, to be decided upon in step 4. This only applies if the useful information can not be acquired in case other governance structures are deployed. Otherwise, relational governance is selected.

Step 4: Are resources available for the value activity under consideration?
If a value activity is decided to be mission critical, and involves high transaction costs or provides useful information, the last question is whether the value activity should be performed internally, or outsourced to a joint venture. Both joint governance and hierarchical governance result in comparable advantages on information exchange, adaptability and co-ordination costs. The question is then whether investments in resources to perform the value activity in case of hierarchical governance are justified in relation to expenses for joint governance. If the needed resources for a value activity are available internally already, the decision for hierarchical governance can be taken without any doubt. If available resources conflict with a value activity, joint governance should be chosen. If resources are not available internally and no conflicts occur, a serious consideration is needed.

Earlier, we defined hierarchical governance the less preferred governance structure. Unless resources are internally available, joint governance is preferred to hierarchical governance. One exception on this principle exists: If contracting and co-ordinating costs for joint governance are expected to be significantly higher than needed investments for hierarchical governance, then the latter governance structure should be chosen. Obviously, it is difficult or impossible to calculate all contracting and co-ordinating costs involved by joint governance, as difficult as it is to forecast the exact amount of needed investments to acquire resources for hierarchical governance. Nevertheless, it is important to do this as conscientious as possible.

4.   A case study: Cisco Systems

We have used VA^3 in two case studies: Dell and Cisco Systems (**?**). Here we concentrate on Cisco Systems, a leading company on computer networking equipment and software. The goal of the case study is to assess whether, by following the VA^3 approach, reasonable explanations can be found for the current structure of Cisco Systems. So, the goal is *not* to test whether the VA^3 approach arrives at the same structure as Cisco Systems has in real life. We have information from three sources: (1) one of the co-authors has been working for Cisco's International Internet Business Solution Group; this group

advises Cisco and its main customers about their e-business strategy, (2) literature on Cisco Systems (Slywotzky and Morrison, 2001; Hartman et al., 2000), and (3) one of the co-authors is operations director of Cisco Systems.

Based on our internal knowledge of Cisco Systems, we have constructed an e^3-*value* model (see Fig. 5) consisting of value activities connected by means of value exchanges (note that the diagram does also contain enterprises; these enterprises are not part of the starting point rather show the result of the coming steps). The activity *Consuming Networking Power* models that a consumer needs networking power (meaning a solution for datacommunication needs; not equipment in the first place) for this business. The *Providing Networking Power* activity bundles networking equipment, and online and on-site services. Activities, such as *Providing Equipment* require hardware, software, assemblies of these and quality control, and so result in new value activities.

Step 1: Mission criticality. Initially, we assume that all value activities are needed to offer Cisco System's core product namely *networking power*. So all listed value activities are mission critical.

Step 2: Transaction costs. Most value activities have low or medium transaction costs. Only the value activities developing software, quality control and providing networking power need asset specific investments. Most of Cisco's activities require no asset specific investments. None of Cisco's hardware suppliers is allowed to supply more than 25% of its production to Cisco. Cisco values the independence of their suppliers, requiring that the production lines of their suppliers can be used or redeployed for the production of non-Cisco products. If asset specific investments need to be done, Cisco supports the supplier with both financials and expertise. Developing software for Cisco equipment is highly idiosyncratic, in other words, this software needs to be developed especially to the characteristics of Cisco equipment. The expertise that is needed for this activity can hardly be redeployed for other activities. Quality control requires asset specific investments, because test cells need to be developed, to test Cisco's product. The test cells test whether a product meets all Cisco quality norms, and whether it is compatible with other Cisco equipment. Such Cisco-specific test hardware can not be redeployed for any other use. Providing networking power requires asset specific investments. An actor that wants to be a reseller of Cisco's products, needs to follow courses, obtain certificates and meet quality requirements. These investments, needed to be acknowledged as a reseller by Cisco, can not be redeployed for any other value activity or partner. Since all needed investments for all other value activities could be redeployed for other buyers, asset specificity is low or medium. Neither are these value activities subject to high uncertainty or occasional frequency. Therefore, the transaction costs for these value activities are low or medium, are considered in step 3 for relational governance. The activities with

high transactional const are considered in step 4 for hierarchical or joint governance.

Step 3: Useful information. Six out of the eleven value activities provide useful information to Cisco. Quality control provides valuable information on the quality of a product, and the outcomes of a production line. Consulting provides useful information on the needs and wishes of customers. Providing equipment and providing networking power offers direct contact with customers, providing useful information on their needs and interests. In addition, the sales history of customers is known; this can be used for customer relationship management. Providing services, whether on-line or on-site, provide useful information on what customer needs what support for what equipment. Based on this knowledge, both production and support can be improved. Consequently, these activities are considered for joint or hierarchical governance in step 4. For all other activities, relational governance is selected, meaning that they are outsourced.

Step 4: Resources. Cisco Systems possesses resources for four value activities.

Developing software. The expertise Cisco has on network software is immense. The Internet Operating System (IOS), developed by Cisco Systems, has become the industry-wide standard for moving data among connected computer systems (Slywotzky and Morrison, 2001). IOS is licensed to all big actors in the industry, so it is a revenue source for Cisco. Being the company that created the standard is essential to the success of Cisco. This resource should be used to perform the value activity software development.

Quality control. With the Autotest quality control, Cisco is able to guarantee the quality of each produced piece of equipment, without the need of physical presence of dedicated personnel. An Autotest test cell is a sealed 'black box' placed on the location of the product manufacturer. If a product leaves the product line, it is plugged into the test cell and tested on performance and compatibility with other Cisco products. Only if a product passes the test, it may be labelled a Cisco product. This resource can be used for the value activity quality control.

Providing network power. Cisco's Supply Chain Management is one of the worlds most advanced. It enables Cisco to tightly co-ordinate the production, supply and assembly of equipment. To assure the quality and delivery times of the produced goods, Cisco has access to the Enterprise Resource Planning systems of all its partners. This high level of transparency and control enables Cisco to deliver high-quality, build-to-order equipment right on time. These resources should be used to perform the value activity providing equipment.

Providing online services. Finally, with Cisco Connection Online (CCO), Cisco offers millions of web pages to resellers and customers, providing product information, support and updates.

Because Cisco Systems already possesses the resources for the above activities, these activities are considered for hierarchical governance.
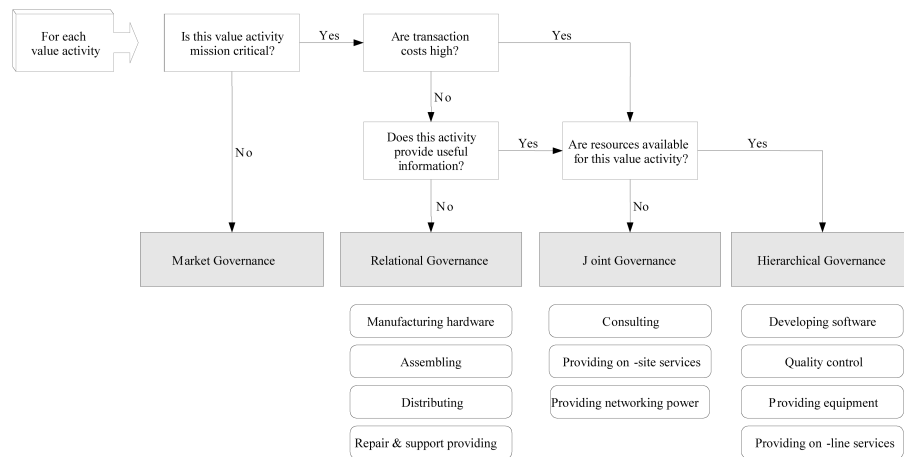

Figure 4. Governance spectrum for Cisco.

In sum, following the steps in Sec. 3 , we decide on the assignment of value activities to performing actors (see Fig. 4). This decision diagram shows that relational governance is advised for the value activities manufacturing hardware, developing software, assembling, distributing and repair & support providing. For consulting, providing on-site services and providing networking power joint governance is advised. The value activities quality control, providing equipment and providing on-line services should be performed internally. Based on these conclusions, an *e³-value* model can be constructed (see Fig.5). For the relational governed value activities, the names of Cisco's partners are used if applicable. In all other cases, a descriptive name, like 'hardware supplier', is used. The value activities consulting, providing on-site services and providing networking power are joined with Cisco's internal activities in the strategic alliance Cisco Reseller Network.

5. Conclusion

Is the Cisco value model produced by the $V A^3$ steps different from the real situation? The most important difference concerns the activity *providing networking power*; $V A^3$ selects joint governance while in reality, Cisco Systems
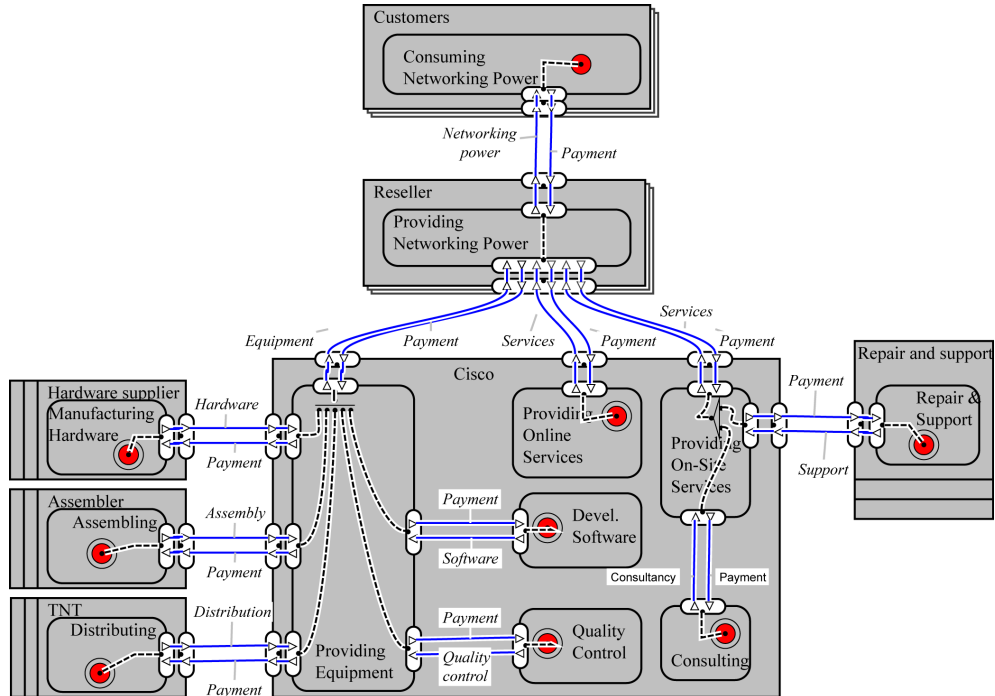
Figure 5.   Value activities assigned to actors in the Cisco value web.

handles this value activity differently for different clients. For ISP's (Internet Service Providers), the *providing networking power* activity is governed hierarchically. The consideration for doing so is that ISP's require very specific knowledge concerning Cisco's products, which can only be delivered by own staff. For all other clients, Cisco maintains a network of direct sellers and value-added resellers (Slywotzky and Morrison, 2001). Such a large amount of partners would usually suggest market or relational governance. However, some characteristics of joint governance are present. Long-time relationships exist, because resellers need to invest in Cisco certifications and knowledge. Therefore, we would characterise the governance structure for the non-ISP clients as joint governance. In conclusion, selection of an appropriate governance structure depends also on the type of customer and therefore, governance selection can not be seen in isolation.

Are the VA^3 steps useful to understand and explain Cisco's value model? Sec. 4 provides numerous considerations and explanations for the current value model of Cisco Systems. For example, reasons to keep *autotesting* under hierarchical control are the asset specific investments, the information on pro-

duction lines, and the already available resources for testing. Additionally, *developing software* is highly idiosyncratic and uses already existing resources (IOS). So, we experienced that the main value of using VA^3 for an existing company as Cisco Sytems is explaining, in a structured way, the value web of Cisco Systems. In future research, we will model more case studies using VA^3, to assess its descriptive value.

Currently, the VA^3 approach takes a *single enterprise* perspective on selecting a performing actor for a value activity. However, in real life many enterprises will *compete* for the execution of a specific value activity. This will specifically occur if the activity at hand is of strong commercial interest. Consequently, extending the VA^3 approach with support for *negotiating* the assignment of an activity to a performing actor, is an additional topic for further research.

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