Governance of CaaS Enabled Supply Chain Collaborations

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ABSTRACT
Cloud computing is an increasingly popular solution in hosting and service delivery over the internet. Coordination as a Service is a new type of cloud service that allows for data exchange in inter-organizational collaborations, such as supply chain collaborations.

Governance is an important aspect of these collaborations, because it is believed to contribute to the efficiency and effectiveness of inter-organizational arrangements. However, there seems to be a lack of research regarding the governance of these types of collaborations, especially the relatively new CaaS enabled collaborations. In this paper, we attempt to define the models of governance that are suitable for a CaaS enabled supply chain collaboration. We use existing network governance literature and attempt to apply this to CaaS enabled supply chains.

We also look at the factors which determine whether a particular model of governance is suitable for a CaaS enabled supply chain collaboration.

We found four indicators in previous literature which provide a framework to network governance. We then added a fifth one called the Information Technology Component. Together, these indicators seem to give a good indication of which governance model is suitable. We found that two of the discussed governance models are suitable for CaaS enabled supply chain collaborations. The shared governance type, in which governance is shared equally between members, and the NAO type governance, in which a separate network administrative organization is established. Lastly, we found that Lead Governance is not an effective type of governance for CaaS enabled supply chain collaborations.

Keywords
Cloud computing, coordination, supply chain, collaborations, integration, governance

1. INTRODUCTION
Cloud computing is an increasingly popular solution in hosting and delivering services over the internet. It is an attractive solution for business owners because it eliminates the requirement of planning ahead for provisioning, and allows for flexible scalability [26]. Cloud computing also greatly reduces or abolishes any upfront costs for customers, and provides instant access to large amounts of computational power for companies with large batch-oriented tasks. Furthermore, it provides economy of scales benefits to the provider [1].

The Commerce Department’s National Institute of Standards and Technology (NIST) defines three basic types of service models of cloud computing. These are Cloud Infrastructure as a Service (IaaS), which involves the provisioning of fundamental computer resources (e.g. processing, storage and networks), Cloud Software as a Service (SaaS), which involves access to a provider’s software applications running on a cloud infrastructure and Cloud Platform as a Service (PaaS), which involves the provision of the capability to deploy users’ applications on the provider’s cloud network [16].

A growing fourth type of cloud service is Coordination as a Service (CaaS). Coordination as a Service, as defined by van Hillegersberg et al. [24] is “a set of coordination services that can be rented from the cloud for the purpose of achieving agile service integration.” This service is used to support the emerging trends of agile business networks and provide organizations with a platform that allows them to exchange data by connecting multiple SaaS services. This means that cloud computing’s implementation can be used in inter-organizational collaborations.

A type of collaboration that would greatly benefit from CaaS is the supply chain collaboration. Supply chain collaborations are collaborations where the organizations in a supply chain work closely together. These collaborations put great emphasis on sharing information amongst companies in the supply chain in order to obtain competitive advantages by both reducing the cost and increasing the quality of forecasting and planning. This dependence on the sharing of information inherently means that these collaborations heavily rely on information technology [17, 21].

There are several issues associated with integrating traditional information systems. There are a high number of different information systems, many of which are rather unique, making integration an often difficult task. In addition to this, many of them are very closed and proprietary systems, and there are vested interests in legacy systems. [24]

Establishment of supply chain networks has been increasing for the past three decades and has become a pervasive trend [15]. This, combined with the factors mentioned above, makes us believe that supply chain networks can benefit from the features that CaaS offers, and that this approach can solve some of the issues currently faced by this type of integration.
1.1 Problem Statement
While the concept of CaaS and CaaS enabled supply chain collaborations is a fairly new one, there are already some projects in practice that could be considered CaaS enabled supply chain collaborations. The problem is that, partly due to the fact that this subject matter is so new, there is very little research done on how a collaboration like this should be governed. “Governance is important because it is believed to contribute to the efficiency and effectiveness of inter-organizational arrangements” [8]. Given the fact that governance is highly important for a collaboration like this, we are interested in finding out which types of governance are suitable for these collaborations.

In order to look at CaaS enabled supply chains further, and to discuss their governance, it’s important to define what exactly governance is. According to Markus and Bui “Governance refers to the solutions that individuals and organizations devise for problems of coordination.” [8]. In this paper we will use the term governance for the more high-level strategic choices rather than mundane operational coordination.

Some research has been done on which models of governance are suitable for networks or collaborations in general, as well as supply chain collaborations, but the nature of CaaS changes the relations in a collaboration. There is suddenly another party involved with the collaboration, namely the supplier of the CaaS.

In addition, CaaS may be able to address typical governance problems that emerge when integrating using traditional supply chain integration solutions.

1.2 Research Questions
The main purpose of this research will be to find out what kind of models of governance are suitable for CaaS enabled supply chain collaborations. Once we have established this, we aim to find out which factors determine the choice of governance type in a CaaS enabled supply chain collaboration. So, in summary:

- RQ1: Which indicators determine the choice of governance type in a CaaS enabled supply chain collaboration?
- RQ2: Which kind of models of governance are suitable for CaaS enabled supply chain collaborations?

2. RESEARCH CONTEXT
2.1 Coordination as a Service
CaaS consists of several components which are shown in figure 1. The first component is the CaaS platform and software itself. This component is developed and maintained by the CaaS provider, and managed by whoever is in charge of the supply chain collaboration, and used to integrate and process data (to optimize the collaboration of Supply Chain Activities). The CaaS software directly interacts with each of the connected SaaS software, which in turn are used by the different companies in the supply chain. Each of the SaaS software is then developed and maintained by one or more SaaS providers.

Below is an illustration of an example of a CaaS enabled supply chain integration.

![Figure 1. CaaS-enabled supply chain collaboration industrial structure][2]

3. RESEARCH METHODS
The main research method used in this paper will be a literature study. Each of the research questions will be answered by performing a thorough literature study. To answer the first two research questions, we will expand on the work of Provan and Kenis [14] and try to adapt their network governance framework to the governance of CaaS enabled supply chain collaborations. In order to do this, we will attempt to find more key predictors that can be used to determine a proper type of governance.

After this literature study is done, a case study will be performed in a CaaS enabled supply chain collaboration, namely a retail control tower project. This is done in an attempt to verify our literature findings in practice.

This case study consists of a comprehensive semi structured interview with the business analyst that worked on the project, from one of the transport companies in the project.

By following this approach we hope to gain some insights about how CaaS enabled supply chain collaborations can be governed.

4. LITERATURE REVIEW
While there is very little research done on the subject of CaaS enabled supply chain collaborations, there is some useful research done on network governance in general.

4.1 Governance Models
Provan and Kenis [14] developed a theory and a framework of interorganizational network governance in which they determined three types of governance models: Shared, where each organization in the network takes part in the governance of it, Lead organization, where one organization takes the lead and governs the network, and network administrative organization, where a separate organization is created in order to govern the network.

In this theory the term network is used in the non-technical sense, their focus is on focus is on “groups of three or more legally autonomous organizations that work together to achieve not only their own goals but also a collective goal”.

Networks may or may not be brokered. When an organization takes the lead or is set up specifically for governing the network, it is an example of a highly brokered network. An example of a non-brokered network is a wholly participant-owned network.
The resulting dense and highly decentralized form of governance is what Provan and Kenis [14] call Shared Governance. They also state that a brokered network can be participant-governed or externally governed. Participant-governed networks can either be governed by each of the members themselves (shared), or for example by a single network participant taking the lead. This is what we call a lead organization. If a network is externally governed, this is done by a unique network administrative organization (NAO), which is further discussed below. This organization can either be voluntarily established by the members of a network, or mandated as a part of the process of network formation [14].

4.1.1 Shared Governance
This is the simplest and generally the most common form of network governance. It is a form of governance associated with participant-governed networks, where “the networks depend exclusively on the involvement and commitment of all, or a significant subset of the organizations that comprise the network” [14]. It has no separate or unique governance entity, and can both be governed formally (by scheduling regular meetings, having designated organizational representatives, having rules in place) or informally.

Shared governance may be used in smaller, multi-firm strategic alliances and partnerships, that are designed to develop new products or to attract new business in various ways that could otherwise not be accomplished through the independent efforts of network members [25].

This form of governance gives the collective of members themselves the power to make decisions and to manage the activities of the network. The power is divided equally between members, though members may differ in the size of the organization, resource capability and performance [14].

4.1.2 Lead Organization
Lead organization-governed networks are brokered networks that are led by a single member of the network. It is a centralized approach to network governance where a single organization is in charge of the governance activities within a network. They are the broker in this type of network.

This type of network governance commonly occurs in buyer-supplier relationships where one single powerful, large organization does business with several smaller organizations. In this case the lead organization occurs because one organization clearly has more power than the rest of the network. Examples can be found in the Keiretsu models of Japanese manufacturing relationships [4] and similar models of cooperative buyer-supplier relationships in the United States [22] and in Europe [6, 7].

4.1.3 Network Administrative Organization (NAO)
A network administrative organization (NAO) is a form of organizational governance where an organization is set up to govern a network and its activities. Unlike the lead organization governance, the NAO is specifically not a member of the collaboration. It is an organization setup purely to govern the network. It is a centralized, brokered type of network where the NAO performs as the broker, they coordinate and sustain the network and its activities [14].

NAOs can vary in size, ranging from just a single broker to a formal organization [10, 13]. The more formalized types of NAOs typically have board structures which include all or a subset of the members of the network. The nature of these NAOs enables them to be a mechanism for enhancing network legitimacy and deal with unique and complex network-level problems and issues, as well as reducing the complexity of shared governance. [13]

Markus and Bui [8] looked at a type of collaboration called Interorganizational Coordination Hub (ICH). They define this type of collaboration as an “inter-organizational arrangements in which several autonomous organizations come together to provide (or contract for the provision of) IT-enabled services that support communication, coordination, or collaboration among the participating organizations”. Their focus on IT technology makes them suitable for CaaS enabled supply chain collaborations, as an ICH is a specific kind of network with a NAO as type of network governance and a high IT technology component.

Markus and Bui [8] mention that NAO’s can be either member owned or investor owned and that they can be any kind of legal entity. Provan and Kenis [14] mention that it is common for a NAO to be a nonprofit organization.

4.2 Key predictors
Provan and Kenis [14] then defined four key predictors for these governance forms: Trust, Number of Participants, Goal Consensus and Need for Network Level Competencies. We propose adding a fifth predictor called the Information Technology Component.

<table>
<thead>
<tr>
<th>Governance Forms</th>
<th>Trust</th>
<th>Number of participants</th>
<th>Goal Consensus</th>
<th>Need for Network Level Competencies</th>
<th>Information Technology component</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>High density</td>
<td>Few</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Lead organization</td>
<td>Low density, poorly controlled</td>
<td>Moderate number</td>
<td>Moderately low</td>
<td>Moderate</td>
<td>None to low</td>
</tr>
<tr>
<td>Network administrative organization</td>
<td>Moderate density, NAO mentioned by members</td>
<td>Moderate to many</td>
<td>Moderately high</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

4.2.1 Trust
Trust is something that has been frequently discussed in the available network governance literature. Trust can be explained as an aspect of a relationship that reflects “the willingness to accept vulnerability based on positive expectations about another’s intentions or behaviors” [9].

If the so called trust density in a network is high, the trust is widely distributed between members, while a low trust density implies that the trust is occurring differentially within individual dyads or cliques [14]. Provan and Kenis [14] argue that trust can not only be viewed as a network-level concept but that the network governance must be consistent with the level of trust density that occurs throughout the network as a whole. They argue that shared governance is most likely an effective form when trust is pervasive throughout the network, while a lead organization or a network administrative organization to broker the network is a better idea when trust is less prevalent.

This vision is shared by the work of Gulati and Singh [5], who argue that “Alliances in which there is less trust between partners are more likely to be organized with more hierarchical
governance structures than are those in which there is greater trust.”. They also mention that interfirm trust can be a large boost for alliances that involve considerable interdependence and task coordination between partners.

Trust is thus an important factor when it comes to network governance; after all, a supply chain integration is a partnership in which multiple firms have to work together. Having trust in each other makes it easier to come to decisions that favor each of the members equally, or the integration as a whole. This does however not mean that if trust is less prevalent that a partnership is not possible. It does seem however that if this is the case, shared governance is not the right choice of governance.

4.2.2 Number of Participants
One of the biggest challenges of network governance is that the activities of a multitude of organizations must be coordinated and accommodated. The way a network should be governed will largely depend on the number of participants of the network, and in general it seems that the more members, the more complex it becomes to govern.

In order to have shared governance within a network, it is best to have a relatively small amount of participants. If every member has equal power within a network, problems that arise have to be dealt with by every member. This nature of these small networks allow for face to face meetings and active participation from each member. The more members, the more difficult this becomes; the governance then becomes highly inefficient, with participants ignoring to deal with critical network issues or spending too much time coordinating across a multitude of organizations [3, 18, 20]. This problem becomes even worse when the members are spread around the world, making face to face meetings very difficult.

The number of participants also has an effect on trust and trust density. The higher it is, the more it will decrease the amount of trust members have in each other [11]. The increase in the amount of members makes it very difficult to identify and realize common interests. Furthermore, the increase in members simply makes it less likely that every member trusts each other [5].

The governance forms of a lead organization or NAO are capable of solving this problem. Their centralized nature allow them to accommodate for larger numbers of participants since the direct involvement of all organizations is no longer a necessity for many network decisions [14]. It also removes the need for interaction between members, and allows every one of them to interact mostly with the lead organization or the NAO.

4.2.3 Goal Consensus
Goals and goal consensus are subjects that have been discussed by scholars for many years now, at both the organizational [12] and the interorganizational [23] level. According to Provan and Kenis [14], “The general argument has been that consensus in goals and “domain similarity” allows organizational participants to perform better than when there is conflict, although conflict can also be a stimulant for innovation.”. This argument is important for understanding network behavior, as network members have to be responsive to the goals of both their own organization as well as the network.

Goal consensus has several important implications for network governance. According to Provan and Kenis [14] there may be a considerable variance across networks and network members regarding agreement on network-level goals and the extent to which organizational goals can be achieved through network involvement.

We believe that when the goal consensus is high, so members generally agree on network-level goals, shared governance is likely to be effective. It allows the participants to work together without any significant conflicts. When the goal consensus is low, it might be worthwhile to reconsider a collaboration at all, but it doesn’t mean collaboration isn’t possible. A lead organization is likely the best fit when the general goal consensus is low. Members don’t tend to directly interact with each other in a lead organization governance type network, and as long as the lead organization keeps a network-level focus, it should be possible to avoid conflict. This is in line with the framework of Provan and Kenis [14].

Networks governed by a NAO tend to have a sub set of the members involved with the NAO. It is therefore important that they share a goal consensus, while it is less important for those not involved in the NAO to have a high goal consensus. Ofcourse when members aren’t involved with the actual NAO, the need for goal consensus becomes lower, for the same reason as a lead organization type of governance.

4.2.4 Need for Network Level Competencies
The need for network level competencies considers the notion that all networks are seeking to achieve some goal that they could not have achieved independently. It becomes important to consider how the competencies, that are required to achieve the network-level goals, can be attained.

Provan and Kenis [14] state that different governance forms place a different burden on network members to provide these competencies. If the nature of the competencies requires significant interdependence among members, then the need for network-level coordinating skills and task-specific competencies will be great, meaning that governance needs to facilitate interdependent action. This means that shared governance will be less likely to be an effective form of governance, because these tasks might require skills that they do not possess. A NAO might be much more effective, because a NAO will have the means to develop the required skills.

Lead organizations are better suited for handling network-level needs and demands, but their own skill set might not be exactly what’s needed and they might not be willing to commit what are essentially their own resources to developing these skills [14].

4.2.5 Information Technology Component
We propose to add a new predictor named the Information Technology Component to the framework of Provan and Kenis [14]. IT Technology is a key predictor which is continuously changing and increasingly important in all business. We believe that a strong IT technology component within a network such as a shared information system can have strong influences on how a network should be governed and brings a unique set of challenges to network governance.

An example of such a challenge is data ownership. If members of a network are expected to share their data, it raises a multitude of legal questions such as: who owns the data? Who can access the data? How is the data processed? This is important because members may fear that they will lose their competitive advantage if they lose their control over their data. There might also be concerns about security and/or privacy breaches. These concerns about data ownership increase the need for a structured and formalized type of governance, which has governance mechanisms in place which deal with these questions.
In addition to this, technology is often accompanied by large financial commitments such as hardware leasing agreements, software licenses, support relationships and development costs. There are often multiyear agreements and contracts with IT companies and in general, IT services require a significant commitment from those involved. We believe this further increases the need for a more structured and formalized type of governance, as members might be less inclined to commit to such investments if it isn’t perfectly clear who has ownership, who is in charge and or responsible and who deals with any issues that come up.

Both these concerns indicate that a high IT technology component goes hand in hand with a more structured and formalized type of governance, which also seems supported by the available literature, which we will discuss below.

Earlier in the paper we introduced the concept of ICHs by Markus and Bui [8]. An ICH is a specific type of network governance with a high IT technology component. In their research, they identified IT technology as an important factor for network governance, and argue that “ICHs are unlikely to start up with nonformalized governance, or if they do start up as informal cooperation, they are unlikely to remain informally governed for long.” This same line of thinking is also suggested by Gulati and Singh [5], who mention that: “Alliances with an expected technology component are more likely than those without a technology component to be organized with more hierarchical governance structures”.

Furthermore, It is suggested that [8, 19] Lead Governance is not a likely fit with ICH’s, largely because other members may fear that the lead organization uses the data from the other members to gain a competitive advantage over them. This makes it less likely that a network with a large IT technology component opts for a lead organization form of governance.

In conclusion, we believe that the bigger the IT technology component is within a network (and thus in a CaaS enabled supply chain collaboration), the bigger the need for a more structured and formalized type of governance. Lead organization may however not be a good fit for networks with a large IT technology component given the concerns about data regulation.

### 4.3 Best fit for CaaS enabled supply chain collaborations

To consider a best fit of governance form for CaaS enabled supply chain collaborations, we must first determine the various aspects of such a collaboration. The trust level and density will vary from one collaboration to the other and so will the number of participants. These predictors are simply too different in each project. Any CaaS enabled supply chain collaboration will have a high goal consensus; this is due to the nature of a supply chain integration. These types of collaborations will have a clear and shared goal between its members. The same goes for network level competencies. A supply chain collaboration is always done in order to be able to perform better and improve the supply chain as a whole. A CaaS enabled supply chain collaboration by definition is a (cloud-) software project, and thus as a high IT component to it.

<table>
<thead>
<tr>
<th>Table 2. Properties of a CaaS enabled supply chain collaboration</th>
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<tr>
<td>Trust</td>
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<tr>
<td>CaaS enabled supply chain collaboration</td>
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When we take the aspects of table 2 and compare these with the earlier table 1, CaaS enabled supply chain collaborations have most in common with the predictors for a NAO type governance. There’s a fit on both the network level competencies and IT component predictors, as well as the goal consensus. While trust and number of participants vary, each of the others are in line with the predictors for a NAO type governance. Therefore we believe a NAO type of governance is the most likely fit for a CaaS enabled supply chain collaboration.

There is however the possibility of a shared governance as well, especially if the supply chain consists of a relatively small number of participants and trust density is high. We don’t consider a lead organization type of governance to be a good fit for CaaS enabled supply chain collaborations because the considerable IT component of CaaS does not fit with lead organization governance.

### 5. CASE STUDY: TRANSPORT COMPANY (RESULTS)

PT Transport (alias) is a transport company with roughly 1200 employees. They own 600 trucks and their main product is transport. 80% of their transport is for the food services and food retail industry.

One of their biggest customers is a company which amongst many other things owns a chain of supermarkets. In collaboration with them, a control tower project was recently completed. It is a supply chain integration which allows the customer to be aware of the position and arrival time of any of their transports at any moment, in real-time. It is a PaaS with a SaaS solution run on top of it, it’s made by YST solutions (alias). The software gets its transport data from the transport companies through an Application Programming Interface (API). See figure 2 for a graphical representation of the CT project.

It then adds all kinds of traffic information such as Tomtom, information from the matrix signs along the road, traffic stop info, etc. This allows the software to determine at what time a specific transport will arrive and adjust it to traffic information in real time, as well as show the transport’s current location on the map.

This control tower is a collaboration between the supermarket chain, the developer of the platform YSS solutions, the different transport companies who do transports for the supermarket chain, and an additional IT company which is in charge of the integration between systems.

We attempt to discuss each of the factors previously mentioned in the paper and to find out what type of governance is used in the CT project.
Trust
Trust wasn’t a considered a huge factor by the interviewee. He really sees it as a hype word which everyone uses when it comes to data and data sharing, but it’s not actually that important in his opinion. It also wasn’t a very big consideration when it came to governance for them. Members generally trust each other. The only point where some trust issues were raised was in the sharing of data, and who owns them. This was resolved by guaranteeing that each transport company retains ownership of their own data and that transport companies couldn’t see each other’s data, the only one that can see all the transports is the customer, the supermarket chain. Furthermore, the supermarket chain is not allowed to use the combined data for anything other than the purpose of the project, which is to show the time of arrival and current location of shipments. They aren’t allowed to use the data for other types of analysis. Overall, the trust density would be considered high.

Number of Participants
The project consists of the supermarket chain (their distribution centers as well as their stores are connected to the system), YSS solutions, another IT development company and twenty five or so transport companies, as well as their TMS suppliers who helped realize the connection between their TMS and the platform. We consider this to be a moderate number of participants, but not many (there are types of networks with hundreds of participants).

Goal Consensus
The Goal Consensus in the CT project is high. While the supermarket chain and the platform owner likely have the most to gain from the realization of the project, there are benefits for all the parties involved. The transport companies have lower operating costs because they get much less calls to handle from stores wondering why their shipment isn’t there yet or when it will be. Everyone involved was happy to participate in the project and the aims of the project itself have been fulfilled. We consider the goal consensus within the CT project to be high.

Need for Network Level Competencies
There is a considerable need for network level competencies in the CT project. Without participation from each of the transporters, the value of the project would diminish greatly for the supermarket chain. There is little use for a system where you can for example only see 80% of your shipments. The project realized goals that needed all the participants and that none of the participants could have realized on their own. The need for network level competencies is high.

Information Technology Component
Considering that this is a software (integration) project, the level of information technology is (very) high. An illustration of the information system can be found on the next page, see figure 2.

This project is capable of being CaaS, depending on the underlying system of the specific transport company. If the Transport Management System from which it gets the transport information is set up as SaaS, the project becomes a CaaS project. Because the data is delivered through an API, this project always has the capability of becoming CaaS; after all, it doesn’t matter which kind of system delivers the information, as long as it’s in the correct format expected by the API.

In conclusion, we found the following properties for the CT project:

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<th>Table 3. Properties of CT Project</th>
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<tr>
<td>Trust</td>
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<td>CT Project</td>
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Governance within the CT project
The CT project is peculiar in how it’s governed. It seemingly looks like one party has the lead; Investments have mostly been done by the supermarket chain, who paid for the realization of the project as well as pays for the use of the platform. The transport companies mostly had to invest a little in adjusting their current software to connect with the platform API. However, there was a very distinct choice not to have a lead organization in this collaboration, even if the supermarket chain would appear like a logical choice to be the lead organization. PT Transport is interested in having the same project with other retailers, and if the supermarket chain owned the platform, other retailers would be very hesitant to join a platform owned by the competitor.

Earlier in the project the option was considered to have a separate entity govern the project, a new B.V. In the end this was rejected because of much the same reasons as lead organization was; it would be harder for other retailers to join or set up similar projects. They wanted to keep things very separated. YST solutions owns the platform, the transport companies own their data, and the supermarket chain is allowed to use it, and they pay for the usage. Each of the three retains some level of decision making power.

It was mentioned in the interview that the project was a very hands on project. They just wanted to start, without having to spend a lot of time on planning everything, considering governance beforehand, etc. they just adjusted the governance as the project moved along.

When discussed, they mentioned it was shared governance. We agree that it has more in common with shared governance than a NAO or a lead organization, mainly due to the shared decision-making process. It is likely though, that it isn’t shared governance where every member has the exact same amount of power or even every member has decision-making power, but a shared governance where a big sub set of members makes the decisions.

6. DISCUSSION
When looking at the results of the case study/interview, a few limitations become apparent. The first major limitation of this research is that only 1 case study was performed. Preferably, we would have liked to have either a multitude of projects to compare, or at least multiple points of view from within the same project. More research is needed to fully validate the framework.

A second limitation seems to become apparent after the initial project is done. Until that point it is clearly a shared governance, but after the initial startup of the project is done, and just the collaboration remains, the transport companies don’t play quite the shared role that they had during the project itself, and power kind of shifts towards the supermarket chain and the platform owner. This new form of governance does not really share all the aspects of any one of the governance forms we discussed. This
gives the impression that more research might be necessary in maybe adding an additional form of governance to the framework.

7. CONCLUSION

In order to answer our first research question, *which factors determine the choice of governance type in a CaaS enabled supply chain collaboration?*, we established a framework based on available literature which has five indicators to determine the best choice of network governance. It should be noted that different networks value the various indicators differently. Some might find number of participants to be the strongest indicator of a governance type, while others may put more emphasis on the need for network level competencies as indicator.

We then look at CaaS enabled supply chain collaborations, and determine that the most likely fit for CaaS enabled supply chains is a NAO type of governance, followed by a possible shared governance. We however ruled out lead governance as a choice given its bad fit with high IT technology.

When we look at the case study, we get a mix of indicators which when compared with our research, look like a typical CaaS project and as such a NAO governance structure is expected. The governance structure of the CT project is however shared. We believe this to be for several reasons.

Firstly, the project was a very hands on project. Governance was not strongly considered before starting the project, and knowledge about network governance may have not been present. Secondly, NAOs have some drawbacks. They are expensive to set up and run, it requires major investments, both monetary and man-hours. They simply might not be willing to fund such an undertaking in the CT project.

The clear refusal of a lead organization seems to support the literature in saying that lead organization is a bad fit for high technology collaborations. In the case study we found that the members of the collaboration were clearly opposed to having one of the members take the lead organization role. This brings us back to our second research question: *Which kind of models of governance are suitable for CaaS enabled supply chain collaborations?*

We believe that the most suitable governance model for CaaS enabled supply chain collaborations is of the network administrative organization (NAO) type. We have also found shared governance to be feasible in certain situations, such as in smaller collaborations. We did however find a lead organization governance unfit for a CaaS enabled supply chain collaboration.

![Figure 2. Retail Control Tower Project](image)
8. REFERENCES


APPENDIX
A. INTERVIEW TRANSCRIPTION

A.1 Questions regarding the company

What is the product of your company? I assume it is transportation?

Yeah. We are a logistics company whose main product is transport. We don’t do warehousing, we don’t have a warehouse. We don’t do warehousing or any other services, just transport.

So you only own trucks, and use those for transportation?

Correct. This is a clear choice we made. You see many other logistics companies do a part transportation and also some warehousing. We chose to do transportation only because we see it as a separate discipline. Transport takes other knowledge than warehousing. We chose to focus on transportation.

We like to say we sell hours and kilometres. 80 to 90 percent of our work consists of food distribution and food retail distribution. Food retail consists of all the big chain supermarkets (Albert Heijn, Jumbo, etc.) and food services is all the big chain of the distribution centers live with 8 form ready, stops etc., and you look at their supply chain, where they say: these are the rides they have to do for us, and then we drive the transports.

So then you drive from the distribution center to the stores? And they do the warehousing?

Yes. The retailer has their own warehousing and they also supply the planning of the rides. We just drive them. The same goes for the rides we do for wholesalers such as Sligro, they provide the planning. Only in the other 20% which we call network transports, do we do our own planning.

Who owns the company? Is it a single owner, or are there shareholders?

Our company is director-owner. So that’s pretty simple.

Then I’d like to move on to the project itself.

Yeah, maybe just for a quick overview since I don’t know what your view of us or how big we are is; we have 1200 employees and 600 trucks at around 40 locations in The Netherlands (mostly on location at our customers).

A.2 Questions regarding the CT tower project

Who initiated the project?

I did. Together with [name], a consultant from the supermarket chain, and [name], the director/owner of a software company. The supermarket chain has for years now wanted to know what happens to their shipments outside the walls of their distribution center. Within those walls they have insights and information about every little thing, they scan the container and the truck, so they know which shipment is in which truck, but the moment a truck leaves they know nothing about it. And if you look at their supply chain, they plan very strictly. It’s very important for a store to know when they can expect a shipment, so they can have the door open, have personnel ready to load and unload, etc. And that’s the main reason that they said hey, we need more information about these trucks. The reason it suddenly became an issue is because they changed their planning methodology last year. Instead of having a 20-week plan, where a shipment would always be on Friday, 14.00, for 20 whole weeks. Now they do it weekly and so the planning changes every week. So it’s important for a store to know when a truck will come, and when will it really come.

[live demo]

This is the platform, the platform is made by [company]. Internally we have a TMS which contains all our transports. The provider of the platform already had their platform ready, so we just decided let’s use this platform. What the platform does is the bundling of various traffic-data.

-shows some stuff-

We use all this traffic data to determine any delay a truck might have while getting to a specific store.

When was the project initialized, and how long did it take to go live?

We decided on the platform in September 2013, we presented it for the supermarket chain in October 2013, who were very enthusiastic. Then in December the project started and in week 9 of 2014 we had one of the distribution centers live with 8 transporters, and since then we kept adding new centers and transporter companies step by step.

So it pretty much started by you guys, a transport company, the supermarket chain and a software company? It came mostly from you guys, but every transport company joined the collaboration?

Yeah. We said we couldn’t do it alone, and that we needed data from all those parties. Then we were wondering like hey, should we have a specific role in this? But in the end we decided to let the supermarket chain pay for the platform, and we just deliver our data.

Would you say the project succeeded?

Yes, absolutely. The stores use it, you see that transporters have their data in order a lot better, and everybody’s starting to realize that if they deliver the data properly, that they get a lot less disruption on the phone. There used to be a ton of phone calls by storeowners wondering where the trucks were, which they can now all see in the software.

What benefits does the platform have for the transport companies?

A. our customer is very happy and B. we have a lot less phone disruption. And C. we have our data transparent with our customer.

Where did the investments come from in the Project?

The platform invested in building their platform, which already existed. Any changes in the backend and frontend of the software were paid for by the platform, because they saw this project as an opportunity. The supermarket chain paid for the general project costs, and each of the transport companies had to make sure they were able to deliver their data into the API of the platform.

How is the project paid for, what kind of payment model?

The supermarket chain pays the platform a price per transport entry in the system.
A.3 Questions regarding the governance

Who participate in the project?
The supermarket chain, the platform, the transport companies and partly the software companies who realized the connection between the TMS and the platform.

Say the supermarket chain employs another transport company, can they simply join the collaboration?
Yes, they just need to make sure to supply their data to the API of the platform. There’s an entire description of the API. We deliver 2 streams of data, one is planning data and the other is onboard computer data, and for both there is an extensive description.

Does the project have a lead organization, or an owner of some kind?
The company that owns the platform keeps ownership of the platform. We did consider doing something more, do we need to do something with it, take part in it. But we didn’t want that. Because then you get a ‘saucé’ over the product, so it’s customized to our flavors, but we specifically didn’t want that. It has to go to others too. I see this as a standard in The Netherlands, try to make it a standard in the Netherlands. So that in the end you also get a better view of all the transport streams, and with the eye on big data you could do specific analyses and things like that. Imagine every transport company on this system. It allows for greater cooperation and optimization. And that’s why we said that platform is owned by the company that made it, we deliver the data, and the supermarket chain is the customer. We really didn’t want the supermarket chain to have any ownership over the platform or a lead role, because then none of the other retailers would want to join the platform, since it’d be owned by a competitor.

Who has the decision-making power in the project?
The original inquiry/problem came from the supermarket chain, and then I said let’s use this platform, put in our data, we’ll simulate one day. Then along the way we sat around the table and discussed things like what should we do with this, what should we do with that, etc. It was a very shared process, no one had the leadership. That was in the project itself. Now that the project is mostly finished and at this point it just becomes about optimization, that part is more between the platform owner and the supermarket chain. At this point in the collaboration transport companies play only a small role, but we do retain the ability to decide on things that actually affect us.

Would you consider the way this collaboration is governed any of the three types we discussed earlier?
In the project each of the parties had equal decision making, we considered everyone equal. We had the intention to just start, and not talk too much about technicalities such as who owns what, is it a little bit more mine than yours, etc. we just wanted to go and figure things out along the way. We didn’t want to use too much time planning every situation and scenario/contingency. At some point during the project the plan was to create a new company for the collaboration, but in the end we didn’t do that because we didn’t want anyone to have more influence than anyone else, we want it to become a standard. We wanted to keep things separated.

How is the data ownership handled? Did anyone not want to participate in fear of misuse of their data? Were there any trust issues?
Hmm, no. then you really have to think about the transport companies, because they share their data. However it is impossible for the transport companies to see each other’s data, they only see their own.

No trust issues, but with the very clear note that everyone keeps ownership of their own data.

But the supermarket chain sees all of it. Are they allowed to use it for anything?
They are not allowed to use it for any data analyses, they’d need permission for that.

Do you still meet regularly between the members of the collaboration?
I still meet with the supermarket chain and the platform regularly. Between all the transporters and the supermarket chain we meet too, but less often. Mostly to push them to do more with this, I personally want to see this be more, and give even more additional value for transport companies.

Lastly I’d like to talk about the different indicators I mentioned. What role do you think they play in choosing a form of governance? Do you think they are good predictors?
I personally don’t like the trust factor. It’s a word you hear everywhere in big data, and data sharing, you read it everywhere, everyone talks about trust this, trust that. They say it falls or stands with trust, and I’m like, yeah I know you read that, but do you really feel that way too?
I personally think there’s one important factor missing, which is the business case. I think that’s the most important one.