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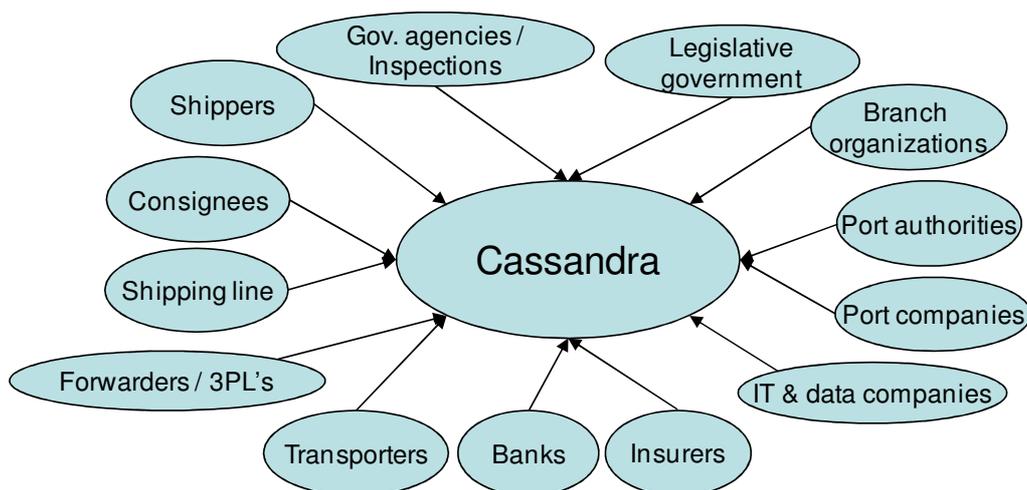
Common assessment and analysis of risk in global supply chains

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Executive summary

This document identifies methods for stakeholder analysis, it identifies the major stakeholders and analyzes their opinions and positions. This analysis is an input for further steps in the Cassandra project that are aimed at consensus building and the actual creation of a data pipeline.

The most important stakeholders and stakeholder groups are shown in the following figure.



Stakeholders are categorized based on their 'sense of urgency', 'influence on the outcome', and 'importance for the outcome'. Combining the scores on urgency, influence and importance leads to identification of groups that should be most involved in the project.

Characteristics	Stakeholder groups
High urgency & high influence & high importance	Consignees, Forwarders / 3PL's, Government Agencies
High importance & high urgency	Shipping lines
High importance & high influence	Shippers, legislative government.

The sense of urgency is the highest with the government agencies. The stakeholder groups with the most influence on the outcomes are the consignees. All stakeholders except for the transporters have an above average importance. The most important stakeholders are the IT & data companies and the forwarders/3pl's. Without cooperation of these organizations an implementation of the data-pipeline is not possible. The relation between government agencies on the one hand and shippers, consignees, and forwarders/3pl's on the other hand is important in this project; without consensus between these parties creation of greater supply chain visibility is virtually impossible.

The stakeholders that expect to benefit the most from a data pipeline are the government agencies. Other stakeholders that can benefit are consignees, shippers and forwarders/3pl's. The perceived benefits for the later organizations are however considerably lower than those of the government agencies.

The willingness to share shipment data is of crucial importance for the project, especially among shippers and consignees, but many organizations are reluctant to share the

necessary data. This is related to the relatively low perceived benefits from these organizations.

The stakeholder analysis gives some indications for actions that have to be taken for a successful implementation of a data pipeline:

- The urgency of some stakeholders has to increase: shippers and consignees
- The perception of possible benefits has to improve: all private supply chain parties
- The willingness to share data should increase: shippers and consignees
- The IT capabilities need improvement: mostly smaller organizations in all stakeholder groups

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1 Introduction

The Cassandra project aims to develop a data-pipeline that increases visibility in the international flow of containerized cargo. This enables the adoption of a risk based approach to supply chain management for both private sector companies and government. By developing an integrated concept a 'system based assessment' of risks by governments is made possible. For businesses it might create a smoother running supply chain because there is better information available. On the other side there are concerns when it comes to data gathering and sharing, in the fields of privacy and competitively sensitive information that might come available for competitors.

Part of WP600 is a stakeholder analysis in which the different stakeholders and their opinion/positions on the different subjects is analyzed.

The stakeholder analysis follows these three steps:

1. Identification of the stakeholders
2. Collection of opinions, positions, priorities, interests etc.
3. Analysis of stakeholder groups

This document starts with an overview of stakeholder analysis methods in chapter 2. Chapter 3 identifies the relevant stakeholder groups for the Cassandra project. Chapter 4 presents the basic information about stakeholder involved in the project. In the next chapter,5, a further analysis is made of the different positions and opinions of stakeholders. This results in conclusion presented in chapter 6 about how to proceed in the project and which stakeholders to involve in which steps.

2 Stakeholder Analysis Methods

2.1 Stakeholder analysis: role and purpose

Individuals, groups and organizations who have an interest (stake) and the potential to influence the actions and aims of an organization, project or policy direction are called stakeholders (Brugha and Varvasovszky, 2000). Stakeholder analysis is used to evaluate the relevance of stakeholders to a project. Stakeholder analysis helps to describe stakeholders' position, interest, influence, interrelations, networks and other important characteristics. Various stakeholders in research and development projects have different interests and perspectives (Tipping et al., 1995). Therefore it is of utmost importance to bring together different stakeholders in order to create consensus between them on future directions and secure their commitment to the project's results (Elias et al., 2002).

Stakeholder analysis has roots in two major disciplines: management and political science (Reed et al., 2009). In management literature stakeholders are analyzed as potential forces that influence a firm's performance. Elias et al. (2002) developed the stakeholder literature map that traced the development of the stakeholder concept in the management literature. The authors pointed out three stages in the development of this literature: "classical stakeholder literature", "strategic management: a stakeholder approach", and "the dynamics of stakeholders". Classical stakeholder literature stressed the importance of stakeholders for organization's survival. In that period stakeholder concept started to be applied in the corporate planning, system development theory, corporate social responsibility studies and organizational theory (Freeman, 1984). Freeman's (1984) book *Strategic Management: a Stakeholder Approach* marked the next period in the development of the stakeholder concept (Elias et al., 2002). Freeman (1984) introduced three levels of stakeholder analysis – rational, process and transactional. His approach took the external environment into account in a systematic way (Elias et al., 2002). Finally, the literature on the dynamics of stakeholders acknowledged that with time the stakeholders change which affects the influence they exert on the organization.

In policy science, stakeholders are studied in order to understand how "information, institutions, decisions and power shape policy agendas for interest groups in social networks" (Reed et al., 2009, p. 1934). Policy analysts adapted stakeholder analysis in the 1970s drawing on the management literature and the earlier work of policy scientists who focused on the distribution of power and the role of interest groups in the policy process (Reed et al., 2009). Within the policy research tradition stakeholder analysis focuses on the interrelations of groups and organizations and their impact on policy.

As a result of development and intersection of the management and policy research streams, the third application of stakeholder analysis has been formed – application for development projects and programs. "In project planning and implementation, the support or opposition of parties involved in or affected by the project is an important factor in determining its success or failure" (Brugha and Varvasovszky, 2000, p.243). King and Cleland (1978) were the first to suggest a method of analyzing stakeholders in project management. Since then the field has been steadily growing and the number of different stakeholder analysis methods is enormous by now.

2.2 Overview of stakeholder analysis methods

The most recent overview and typology of stakeholder analysis methods has been suggested by Reed et al. (2009). The authors distinguish between three groups of methods depending on the stage they are applied at. Reed et al. (2009) divide stakeholder analysis into the following stages: 1) identifying stakeholders; 2) differentiating between and categorizing stakeholders; and 3) investigating relationships between stakeholders. Focus groups, semi-structured interviews and snowball sampling are proposed to be used for the stakeholder identification. The methods for differentiating between stakeholders can be divided into analytical (top-down) and reconstructive (bottom-up) techniques. Analytical methods like Interest-influence matrices or radical transactiveness methods suppose little engagement of the stakeholders in the process and rely mostly on the knowledge of the expert community. Reconstructive techniques like stakeholder-led stakeholder categorization and Q methodology on the contrary move forward the stakeholders' opinions on the matter. Finally, Reed et al. (2009) suggest using methods like social network analysis, knowledge mapping and actor-linkage matrices for the investigating relationships between stakeholders.

Although the typology developed by Reed et al. (2009) is the most recent one that was found, it doesn't match the purpose of stakeholder analysis within the Cassandra project which is the development of the consensus-building plan. Therefore for the guidance on the stakeholder analysis methods we preferred to rely on the typology suggested by Bryson (2004) which takes into account such stages of stakeholder analysis as building a coalition and implementing and evaluating strategic interventions.

Bryson (2004) pointed out in total four stages in the stakeholder analysis: organizing participation; creating ideas for strategic interventions; building a winning coalition around proposal development, review and adoptions; and implementing, monitoring, and evaluating strategic interventions. The following table summarizes the description of techniques corresponding to the stage of stakeholder analysis proposed by the author.

Table 2-1: Stakeholder analysis techniques for organizing participation (Bryson, 2004)

Technique	Short technique description
1. The Basic Stakeholder Analysis Technique	<ul style="list-style-type: none"> • Brainstorm the list of potential stakeholders • For each stakeholder list the criteria the stakeholder would use to judge the organization's performance (or list what the stakeholder's expectations are of the organization) • Decide how well you think the stakeholder thinks the organization is doing from the stakeholder's point of view. • Identify and record what can be done quickly to satisfy each stakeholder and record longer term issues with individual stakeholders and with stakeholders as a group
2. Power versus Interest Grids	This grid array stakeholders on a two-by-two matrix where the dimensions are the stakeholder's interest in the organization or issue at hand, and the stakeholder's power to affect the organization's or issue's future. Four categories of stakeholders result: players who have both an interest and significant power; subjects who have an interest but little power; context setters who have power

	but little direct interest; and the crowd which consists of stakeholders with little interest or power.
3. Stakeholder Influence Diagrams	Stakeholder influence diagrams indicate how the stakeholders on a power versus interest grid influence one another.
4. Participation Planning Matrix	The matrix prompts planners to think about responding to or engaging different stakeholders in different ways over the course of a policy or strategy change effort. The matrix contains action plans for how to follow through with each stakeholder. The levels of participation range from a minimum of simply informing stakeholders through to empowerment in which the stakeholders or some subset of them are given final decision making authority.

Table 2-2: Stakeholder analysis techniques for creating ideas for strategic interventions (Bryson, 2004)

1. Bases of Power–Directions of Interest Diagrams	This diagram indicates the sources of power available to the stakeholder, and the goals or interests the stakeholder seeks to achieve or serve. Power can come from access to or control over various support mechanisms, such as money and votes, or from access to or control over various sanctions, such as regulatory authority or votes of no confidence. Directions of interest indicate the aspirations or concerns of the stakeholder. Typically the diagrams focus on the stakeholder’s bases of power and directions of interest in relation to a focal organization’s purposes or goals; the powers that might affect achievement of the focal organization’s purposes.
2. Finding the Common Good and the Structure of a Winning Argument	Bases of power–directions of interest diagrams can be explored in depth to determine which interests or themes appear to gain support from a significant number of stakeholders. Members of the planning team will need to search for these common themes, which are called supra-interests. After identifying these themes, the team should then construct a map that indicates what appear to be the strongest relationships among the supra-interests. The final map thus will represent the supra-interests that tie together the individual stakeholders’ interests as well as what the relationships among the supra-interests appear to be.
3. Stakeholder–Issue Interrelationships Diagrams	Stakeholder-issue interrelationship diagrams help show which stakeholders have an interest in different issues, and how the stakeholders might be related to other stakeholders through their relationships with the issues. The resulting diagrams help provide some important structuring to the problem area, in which a number of actual or potential areas for cooperation – or conflict – may become apparent.
4. Problem-Frame Stakeholder Maps	The technique is especially useful in helping develop problem definitions likely to lead to a winning coalition. Analysis is necessary to find desirable problem definitions that can motivate action by a coalition of stakeholders large enough

	to secure adoption of preferred solutions and to protect them during implementation. The map links stakeholders to alternative problem definitions, accounts for their position and power.
5. Ethical Analysis Grids	This grid is used to clarify and prompt a dialogue about who and what counts ethically. Results of the analysis should indicate which proposals or options should be eliminated or altered on ethical grounds.
6. Stakeholder Support Versus Opposition Grid	This grid builds on problem-frame stakeholder maps by using the same grid and basic process. But this time specific proposals – rather than problem frames or definitions – are assessed in terms of stakeholder support opposition and importance.

Table 2-3: Stakeholder analysis techniques for proposal development, review and adoption and for policy implementation (Bryson, 2004)

1. Stakeholder Role Plays	Role plays, in which different members of the planning team play the role of different stakeholders, can be used to develop proposals that are likely to address stakeholder interests, effectively build a supportive coalition, and ensure effective implementation.
2. Policy Attractiveness Versus Stakeholder Capability Grid	The construction of this grid involves assessing the attractiveness of policies, plans, proposals, or options in general against stakeholder capacities to implement them.
3. Policy Implementation Strategy Grid	This grid combines the information revealed by previously created bases of power–directions of interest diagrams, stakeholder support versus opposition grids, stakeholder role plays, and policy attractiveness versus stakeholder capability grids.

As we have shown, the methods that can be used for stakeholder analysis are numerous. The choice among them should be guided by the specific goal of the stakeholder analysis and the resources available for it (Brugha and Varvasovszky, 2000; Reed et al., 2009). In the next sub-chapter we discuss in the detail the approach that was chosen for the stakeholder analysis within the Cassandra project.

2.3 Approach for the Cassandra project

The goal of the stakeholder analysis in the Cassandra project is primarily the identification of the stakeholders, their opinions and positions. Further steps are the involvement of the stakeholders in the consensus building process based on their characteristics and positions. Accordingly the stakeholder analysis for the Cassandra project can be divided into the following steps: identification of stakeholders, categorization of stakeholders, and development of intervention policy.

For the identification of stakeholders we chose to rely on the experts within the Cassandra community which is knowledgeable and large enough to be able to detect the majority of relevant stakeholders. The request to suggest relevant stakeholders was sent to partners participating in the project and the initial database of stakeholders was formed. Nevertheless we reserve the freedom to expand it by identifying new relevant stakeholders via interviews with the initial stakeholders or via new suggestions from CASSANDRA partners at the later stage.

For the differentiation between stakeholders we implement the existing framework suggested by Wagenaar (1992) based on the supply chain roles. In order to identify other dimensions relevant for CASSANDRA we relied on literature review on data sharing and interviews with Cassandra partners. As a result, the following parameters were considered to be of importance for the project: 1) importance of a stakeholder for CASSANDRA project; 2) level of influence on project's outcome; 3) urgency of a stakeholder; 4) attitude towards risk-based assessment; 4) benefits from supply chain visibility; 5) threats from supply chain visibility; 6) readiness to share information; 7) benefits from information sharing; 8) IT capabilities; 9) information to receive and to share. The survey was sent out to the relevant experts within the project to rank the stakeholders on these dimensions (see Appendix 1 for the survey form).

3 Stakeholders in the Cassandra project

The stakeholders in the Cassandra project are mainly links in global supply chains, completed with organizations that support and enable the flow of goods and the functioning of the supply chain. Based on Wagenaar (1992) we make a categorization of the organizations in Table 3-1.

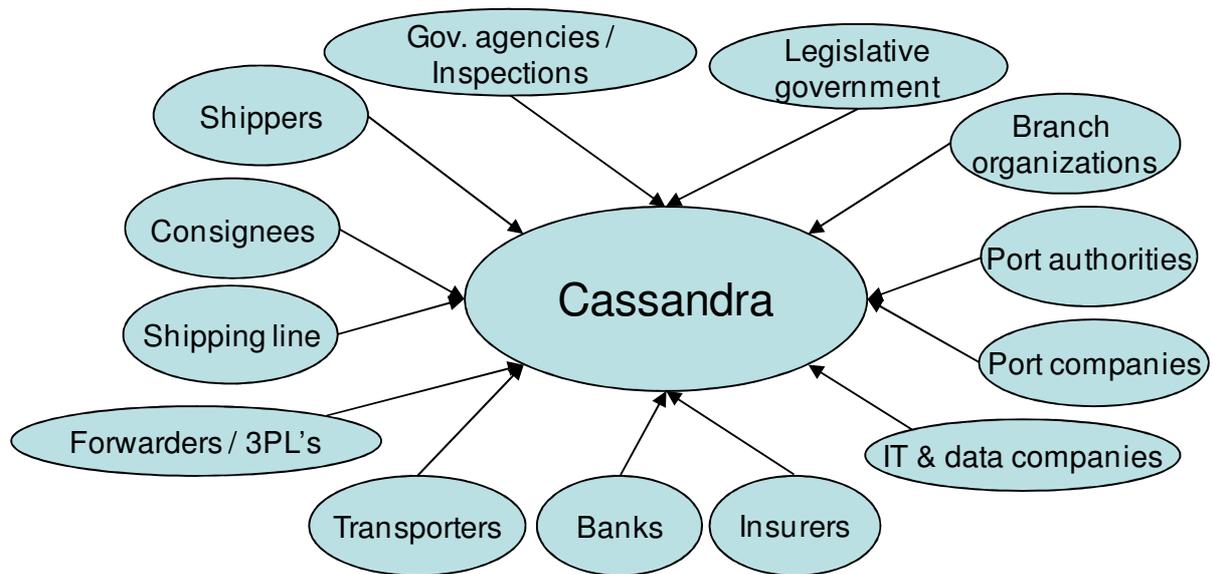
Table 3-1: Organizations involved in container transport; adopted from (Wagenaar, 1992)

Group	Examples of organizations
1. Commercial group	Seller/supplier (shipper); Buyer/customer (consignee)
2. Organizing group	Forwarder; Shipping line; Logistics service provider (4PL)
3. Physical group	Sea terminal operator; Shipping line/sea carrier; Pre- or On-carrier: carrier inland transport, i.e., barge operator, rail operator, road carrier; Inland terminal operator; Logistics service provider (3PL); Empty container depot operator
4. Authorizing group	Customs; Port authorities; Seaport police; River police; Inspection authorities
5. Financial group	Bank; Insurance company

Firms in the commercial group (1.) are concerned with the production and distribution of products, and constitute trade lanes in which commercial transactions (buying/selling) take place. These firms have competencies and direct interests in providing products to end-customers, and are responsible for the quantity and quality of the product. For transporting the products, they employ the logistics services provided by the second and third group. The organizing group (2.) mainly consists of brokers and intermediaries who integrate the cargo transportation, whereas the physical group (3.) actually performs the physical movements. These two groups usually have less interest in the product (c. q. cargo) but focus on the operational efficiency of the physical flow of cargos. Authorizing group (4.) has responsibility on monitoring and inspecting the cargo flow for purpose of enforcing the security and economic regulations. Lastly, the financial group (5.) supports financial transactions between the organizations in the supply chain and facilitate the monetary flows. These five groups depend on one another to achieve their own goals. Without certain supply chain participants' input or activity, products cannot be produced or transported and thus customer orders may not be fulfilled. These dependencies are to a large extent what makes supply chains vulnerable.

3.1 Stakeholder groups and their relation to Cassandra

In workshops, face-to-face interviews and e-mail correspondence with Cassandra partners the relevant groups of stakeholders for the project were identified (see Figure 3-1).

Figure 3-1: Stakeholder map Cassandra project

The various groups of stakeholders have a different role in the implementation of the Cassandra project. Also their incentives and possible benefits or drawbacks can be different for every group of stakeholders.

Government agencies are one of the main beneficiaries of the Cassandra project. The idea of a data pipeline that can be used for a system and risk based approach is mainly geared towards the customs organizations. Also other inspections can benefit from extra information availability. Possible drawbacks for these organizations can be that not all information they need is included in the data-pipeline, which might make it more complex to fulfill all their tasks.

The *legislative government* is a stakeholder because they make rules and regulations that make it possible or impossible to implement a data pipeline and risk based approach. Also they might be influential for international standardization of the protocols used.

Branch organizations often play an important role in creating support for a certain activity or plan. They have knowledge about the opinion of their members and can influence that opinion.

Port authorities are relevant stakeholders because ports are the locations where cargo is exchanged and where most inspections take place. Also some port authorities are active in the development of port community systems for the processing of data. These systems can be very useful for the Cassandra project. Ports are also beneficiaries of a more efficient inspection system, this adds to the competitiveness of the port.

Port companies are all companies in the port that have activities related to the cargo that is transferred there. Mainly these are container terminals, but also some warehousing activities might be included. These companies form an important link in the transport and information flows. Stevedoring companies might also profit from better information about the cargo, this can help them plan their processes better.

IT & data companies are those companies that provide the infrastructure or data-storage and interpretation that is needed to implement the Cassandra project. The IT companies are suppliers to the system and in that sense will benefit from the implementation. The data companies are often the port community systems that collect data about shipments and can thus be important partners for businesses in the supply chain and government inspections. A possible issue is the ownership of the data.

Insurers and banks could contribute to the Cassandra project because they have in certain cases information about shipments that is not available elsewhere. Furthermore, financing and insuring of transport might be easier when the data pipeline can provide more and better information about the shipments.

Transporters the companies that provide hinterland transport. These companies bring containers to or from the port. They are a stakeholder in the Cassandra project because their work might be influence by better data availability. Their role in the data pipeline is probably limited because they do not create extra data other than trip information.

Forwarders and third party logistics providers are in many cases at the start of a transport chain and sometimes even control the whole international flow. These companies act on behalf of the shippers and have an important role in creating the correct data and making it available to other parties in the supply chain. Possible benefits for these companies are that they can use the data pipeline to provide a smoother supply chain to their customers. For some forwarders it might be a limitation of their work related to custom clearance.

Shipping lines fulfill the largest part of international transport and are in many cases also involved in the logistics and hinterland transport. They also form an important link in the data flow, in many cases they are the ones collecting the data from the shipper and delivering it to other parties in the supply chain. This central role in the data pipeline makes them an important stakeholder for Cassandra.

Consignees are at the receiving end of the supply chain. They often are responsible for delivering the right information about the shipments they receive to the customs organization. The potential benefit for these organizations from improved data quality and availability is substantial. The system based approach of the customs organizations can be attractive for them, but could also create extra work for the smaller consignees.

Shippers are together with the consignees the main stakeholders in the supply chain. They form the organizations that benefit the most of a smoother running supply chain. The possible benefits for them are cost savings and better insight in their supply chain. A drawback of the system and risk based approach for the shippers might be the obligation to provide more shipment data than they would like.

3.2 From categories to stakeholders

The identification of categories of stakeholders is useful to get a quick overview of the relevant parties for the project goals. However, even within the categories differences exists between the stakeholders in terms of opinions and positions. To create an overview of all stakeholders, the project partners in Cassandra were asked to complete a list of

stakeholders in this project. They were asked to specify the name of the stakeholder, the category it belongs to and the location of the stakeholder.

Table 3-2: Stakeholders per categories identified in the Cassandra project

Location (COUNTRY)	Branch organizations	Gov. Agencies / Forwarders / Consignees	IT & data companies	Legislative government	Port authorities	Port companies	Shipping line	Shippers	Transporters	Grand Total			
Arab emirates							1			1			
Australia				1					1	2			
Belgium	8		1	2	2			1	1	15			
Chile									1	1			
China				1					4	5			
Denmark			2						3	5			
EU				2	1					3			
France	1		1						3	5			
Germany		1	6	2	5	1			2	17			
Great Britain			1					1		2			
Isreal									1	1			
Italy						2				2			
Japan			2					2	3	7			
Korea									2	2			
Kuwait									1	1			
Malaysia				1					1	2			
Netherlands	17	4	17	3	11	5	6	4	21	1	1	90	
Singapore				1						1	2		
South-Korea			1								1		
Spain	4	7	7	8	9		31	4	12	5	3	90	
Sweden									1		1		
Switserland			1							1	2		
Taiwan									1		1		
Turkey								1			1		
UK	1	1	1		1	2			1		7		
USA			1		4	1			5	1	12		
worldwide				2							2		
Grand Total	31	13	41	23	32	6	6	37	11	45	31	4	280

The list of individual stakeholders is not representing all possible parties, but is based on the contacts of the organizations involved in the Cassandra project. Most of these organizations are involved in one or more specific trade lanes. For this reason the list of stakeholders consists of many Dutch and Spanish companies and organizations related to the two living labs where trade lanes between Asia and the Netherlands and trade lanes between Africa and Spain are analyzed.

4 Opinions and positions of stakeholders

The Cassandra project aims to develop a data pipeline in relation with the supply chain, primarily by linking existing data sources and ‘piggy-backing’. To create this data pipeline it is important that the stakeholders involved are willing to share their data and that the stakeholders trust each other in providing correct and complete data. These two prerequisites are not automatically present in the current supply chain setting. Many different opinions and positions exist on these issues. In this chapter we identify the various opinions and explain the background of positions.

4.1 Sample of stakeholders

The information about stakeholders is gathered by the partners in the Cassandra project. Partners were asked to give an estimation of the positions and opinions of the various stakeholder groups. They were instructed to estimate the average of each group for which they have sufficient knowledge based on practical experience in the Cassandra project and knowledge of the parties from previous projects. From 9 experts within the Cassandra project we received information about 71 types of organizations and their opinions and positions regarding the sharing information and the risk- and system-based approach.

Table 4-1: stakeholder categories included in the analysis

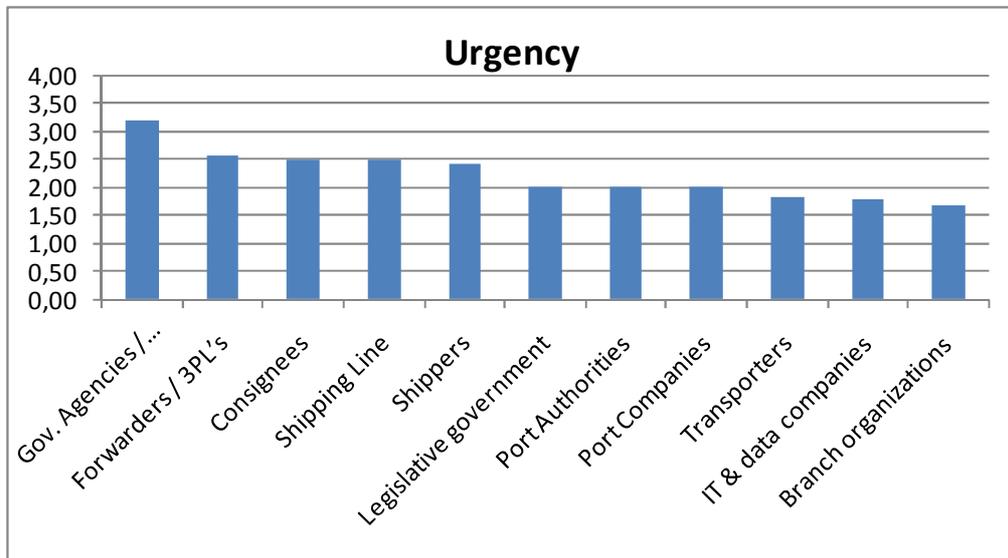
Supply Chain Role	responses
Branch organizations	3
Consignees	7
Forwarders / 3PL's	7
Gov. Agencies / Inspections	10
IT & data companies	5
Legislative government	5
Port Authorities	6
Port Companies	5
Shippers	10
Shipping Line	6
Transporters	7
Total	71

4.2 Opinions and positions of stakeholders

The position of stakeholders is identified based on three elements. First the urgency a stakeholder has to implement a data pipeline to facilitate a system and risk based approach. Typically organizations that can benefit from the data-pipeline will have a high sense of urgency. Second, the influence a certain type of stakeholder has on the outcomes of the project. Stakeholders that can shape the implementation of the data pipeline or influence the behavior of other stakeholders in the project have a high influence. The third element is the

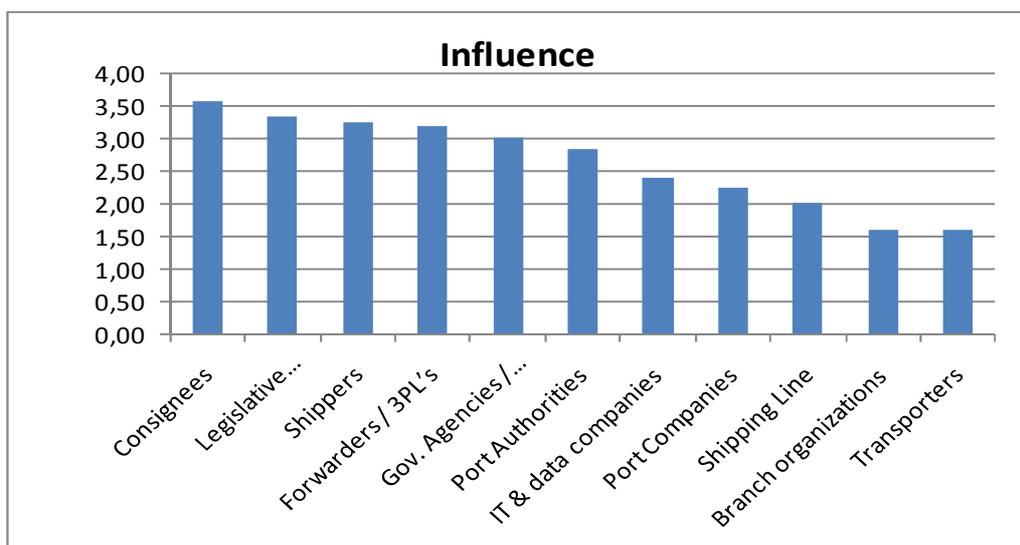
importance of groups of stakeholders for the Cassandra project. Stakeholders with a high importance are stakeholders without whom it's virtually impossible to develop and implement a data pipeline.

Figure 4-1: Sense of urgency per stakeholder category



The sense of urgency is the highest with the government agencies. This is in line with expectations since the idea of a data pipeline and use for a risk based approach comes from the customs organizations. Other groups of stakeholders that show an above average sense of urgency are forwarders/3pl's, consignees, shippers and shipping lines. These organizations deal with the practicalities of data related to the supply chain everyday and therefore are probably more aware of the potential benefits. IT companies, transporters and branch organizations don't show that they think a fast implementation of a data pipeline is of importance.

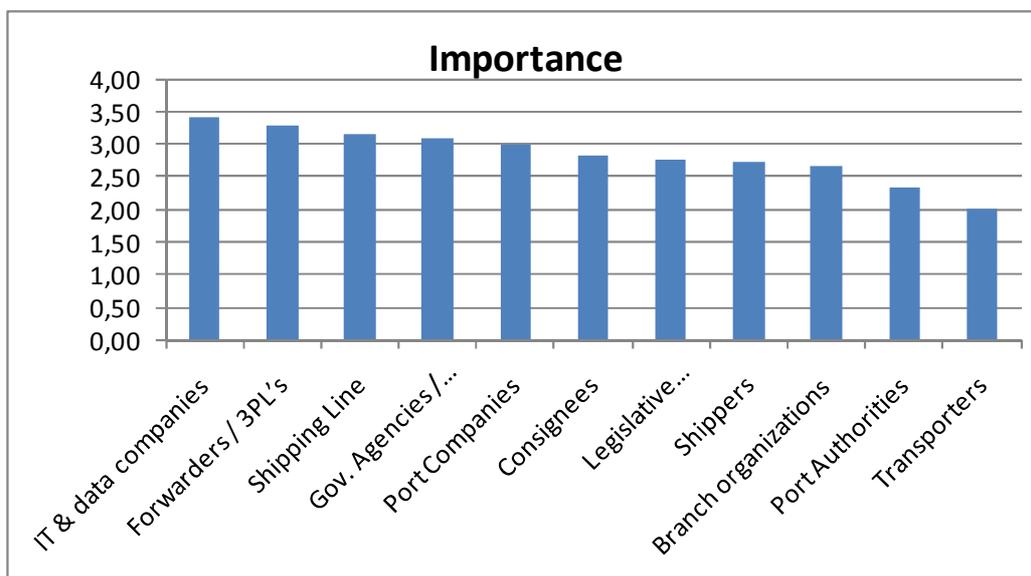
Figure 4-2: Influence on the project outcomes per stakeholder category



The influence stakeholders have on the outcome is overall thought to be substantial. Several stakeholder groups score above 2,5 on a four-point scale. The stakeholder groups with the most influence on the outcomes are thought to be the consignees. These companies have a large interest in the functioning of the supply chain and often deal with customs and inspection. The high interest and the close relations combined, make them highly influential. Shippers are influential for the same reasons, but have a little less direct contact with customs and inspections. The legislative government is also thought to be influential, albeit in a different way. The government can influence the implementation very directly through laws and regulations that might or might not enable a system and risk based approach. Transporters and branch organizations are thought to have little influence on the outcome of the project. Transporters because they are less involved in the whole supply chain and often only provide domestic transport. The branch organizations can indirectly create support for the Cassandra project, but will have little influence on the practical implementation.

The third element that determines the stakeholder’s positions is the importance they have for the implementation of the Cassandra project. Importance is an indication of how much the specific stakeholder is needed to implement the data pipeline. Importance and influence might come together but not necessarily in every case. A stakeholder might be important but have little influence on the actual outcome. All stakeholders except for the transporters have an above average importance.

Figure 4-3: Importance for the project outcomes for stakeholder categories



The most important stakeholders are the IT & data companies and the forwarders/3pl’s. Also government agencies, port companies and shipping lines are important. Most of these stakeholders are considered important because they will have to change the way they provide data or even do business to make a data pipeline possible. IT & data companies are important because without these companies it is simply impossible to build a data pipeline. Consignees and shipping lines are of importance because they are at the start and the end of the transport chain. Their importance is thought to be a little bit lower than that of some other stakeholders because they are in many cases not directly involved in the transport

chain and use agents, such as forwarders, that facilitate the data flows. Port authorities and transporters are thought to be the least important stakeholders, they have relatively little relations with the international transport planning, and without their involvement it would still be possible to design and implement the data pipeline.

4.3 Data issues

The most important issue in the Cassandra project is data; the availability and quality of the data and the willingness of supply chain parties to share data. One important issue in the creation of a data pipeline is the value data may have for certain parties. The asymmetry of data availability is one of the main reasons for the existence of intermediaries in transport chains. Part of the business of forwarders and ship agents is based on their access to transport information and knowledge about transport chains. Making more data available for many parties in the chain can be interpreted as a potential threat to the business of these companies.

An issue when data is shared is ‘who is the owner of the data and who is responsible for the quality of the data?’. The stakeholders can have different opinions on these questions. Stakeholders that might be held responsible might want full control over the data and restrict the number of parties that can access the data. Du et al (2011) state that the willingness to share information is mainly a trade-off between efficiency and the responsiveness of the information resources.

The data pipeline concept is meant to create benefits for several parties in the supply chain. It should enable shippers, transports and receivers to better streamline their operations and it should give inspection agencies the possibilities to introduce risk based inspections. This means they will inspect those shipments that are more likely to violate regulations, for instance tax or health and safety regulations. Stakeholders can have different opinions on the appropriate use of data. For shippers it might be interesting to share the data if that means there will be less checks in the port. But is it leads to more checks because the customs organization s has more information and may want to check more than they would in a random situation, shippers and the transporters working for them might be less willing to share the data.

Another specific risk is identified by Steffanson (2002). Smaller companies run the risk that they are excluded from integration in supply chains when they cannot keep up with the development of data infrastructure. Implementation of new IT-based systems should therefore be done after the capabilities of the parties involved are at least identified.

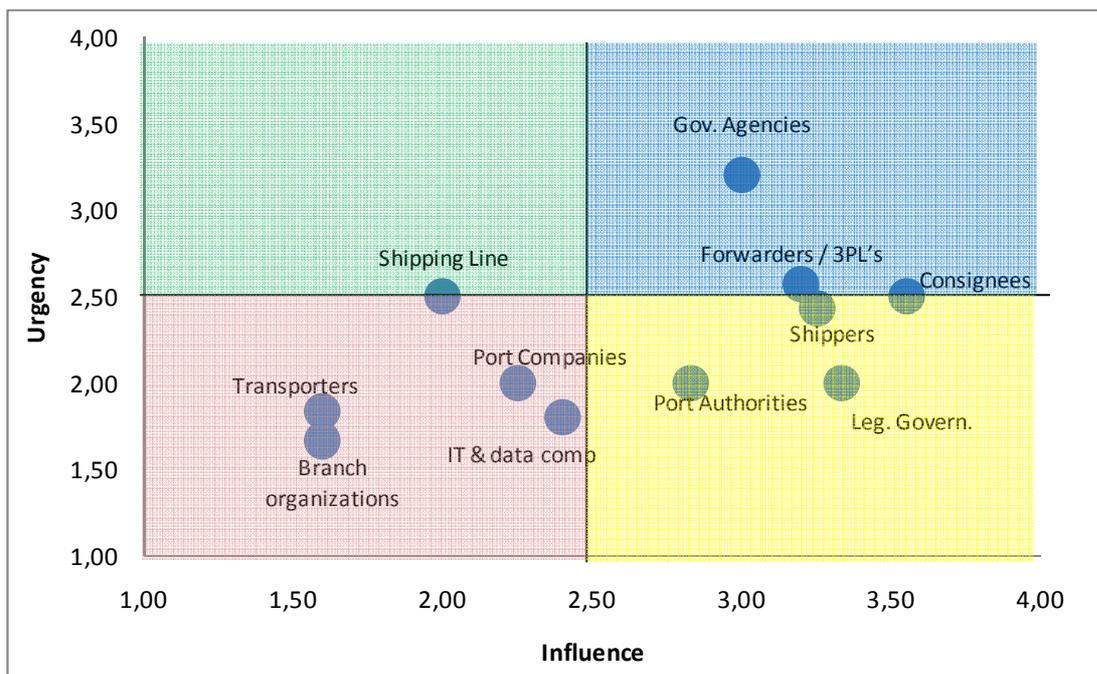
5 Analysis of stakeholders in the Cassandra project

The ownership of, access to and need for certain data elements – from either operational and/or risk assessment perspective – is an important basis to assess positions of stakeholders in relation to the Cassandra data pipeline concept. The relationship among partners, the usage of data and the existing IS in place are some of the factors that can influence willingness to share data. The relationship between data, position of stakeholders and willingness to share data is explored further in this chapter.

5.1.1 Influence and urgency

The stakeholder analysis starts with determining the stakeholders’ level of support for the Cassandra project and their power to influence the project outcomes, both positively and negatively. In the research the stakeholders are categorized based on the influence they have and the urgency they feel according to the participants in the Cassandra project. Both variables are scored on a 4-point scale, resulting in a matrix allowing for a first distinction between stakeholders that allows for different strategies towards these stakeholders.

Figure 5-1: Urgency vs. Influence of stakeholders



The lower left corner of the matrix, marked red, contains the stakeholders that both have a relatively low urgency, and low influence. These stakeholders should not be bothered too much and only be involved when they are important for a specific part of the project. Typically, this is true for transporters and branch organizations.

The stakeholders in the lower right corner are influential stakeholders that have a low urgency, the yellow marked box, these stakeholder are potentially limiting the project outcomes. They do not feel the need for the implementation but have a large influence on the outcome, which can lead to a conservative position. These stakeholders need attention to convince them of the importance of the project and must be educated about the possible

benefits they can derive from the implementation of a data-pipeline. Port authorities and the legislative government are two groups that should be approached in this way.

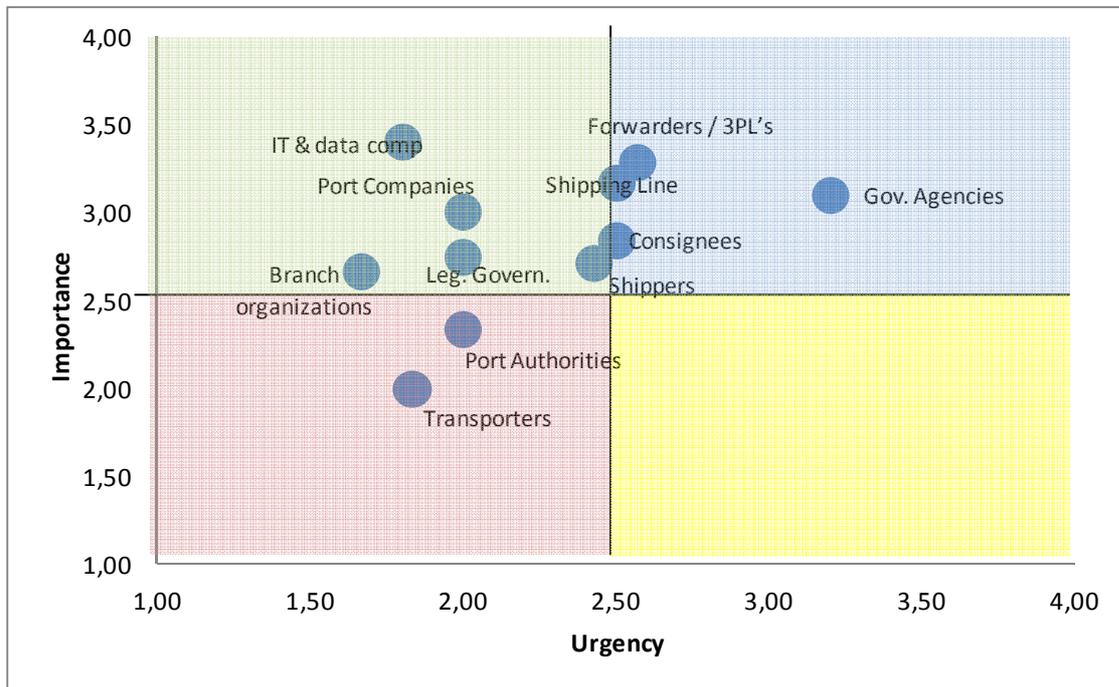
The stakeholders in the top left corner, the green box, are stakeholders that want the project to proceed and anticipate a positive outcome. However these stakeholders have a relatively low direct influence on the project elements, for example because they are not data owners. These stakeholders can be involved a bit more in the project development; they are willing to contribute to the development of the new system and can be used to influence the stakeholders in the yellow box. Shipping lines are close to this category, but have too little sense of urgency to be involved in all implementation steps.

The stakeholders in the top right corner are the most driving stakeholders in the project; they both have a great influence and find it important that the project succeeds. These stakeholders must be part of many activities in the project to help keep pace in the development and to positively influence other stakeholders. On the other hand, it must be guarded that these stakeholders do not go it alone in the development and the gap between the 'blue' and especially the 'yellow' stakeholders does not become too big. The relation between government agencies on the one hand and shippers, consignees, and forwarders on the other hand is important in this respect.

5.1.2 Urgency and importance

Another interesting confrontation is between the level of support for the project (expressed as urgency) and the importance of a stakeholder for a successful implementation of the project. The difference with the previous analysis is that influence means that a stakeholder can change the outcome of the project and importance means that a stakeholder is actually needed to complete the project. E.g. branch organization can have a large influence because their members tend to listen to their advice, but they are of less important for the practical implementation of the whole project.

Figure 5-2: Urgency vs. Importance of stakeholders



Stakeholders in the top left corner are important for the project to succeed but feel relatively lower urgency that the project is actually carried out. These stakeholders are the group that needs attention. They have to be convinced that the creation of a data pipeline is also in their benefit and that they should participate actively. The group of stakeholders in the top right corner is both important and feels the need to act. These stakeholders are the driving force of the project, and should be part of the effort to involve other stakeholders in the development of the risk based and system based approach. Especially other stakeholders with high importance but relatively low urgency, the green group: IT & data companies, branch organizations, port companies and legislative government.

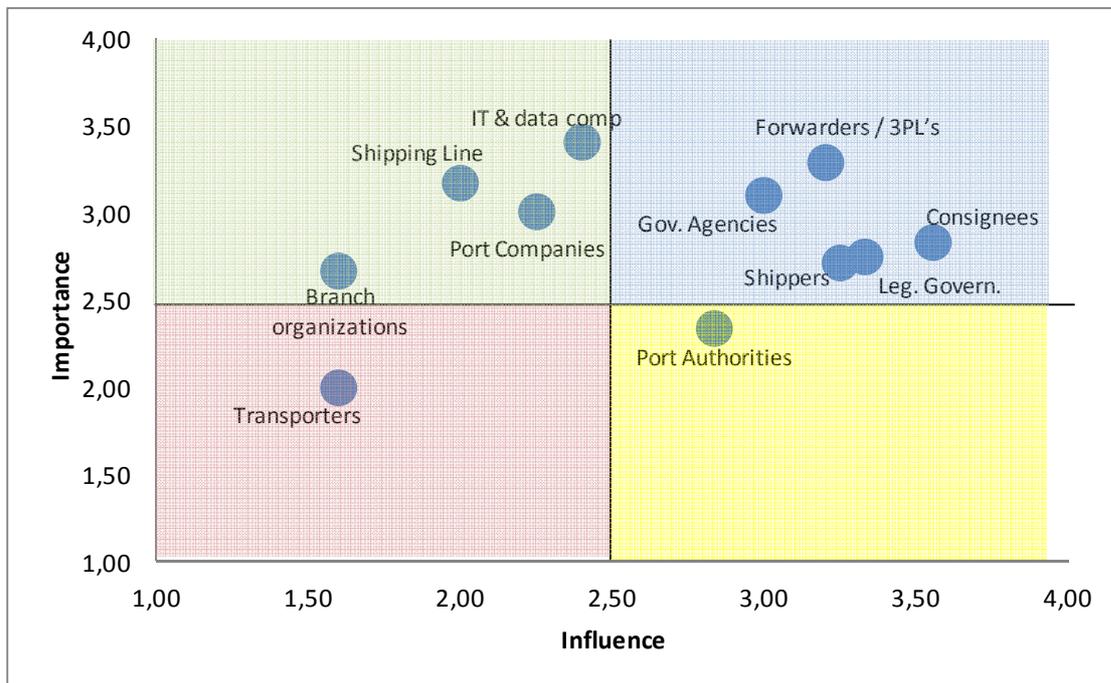
The lower left corner consist of stakeholders with relatively low importance and a low sense of urgency: transporters and port authorities. These stakeholders can be involved in the project for specific issues, but should not be part of the core set of stakeholders for the full implementation.

The lower right corner is empty in this case; it represents stakeholders with a high sense of urgency but low importance for the outcome. Considering the characteristics of the project it makes sense that there are no stakeholders in this group.

5.1.3 Influence and importance

The confrontation of influence and importance shows which stakeholders are absolutely necessary to come to a successful implementation. Stakeholders that are important for the project need to be convinced to participate and stakeholders that have a high level of influence on the outcome need to be involved in many implementation steps.

5-3: Importance and influence of stakeholders



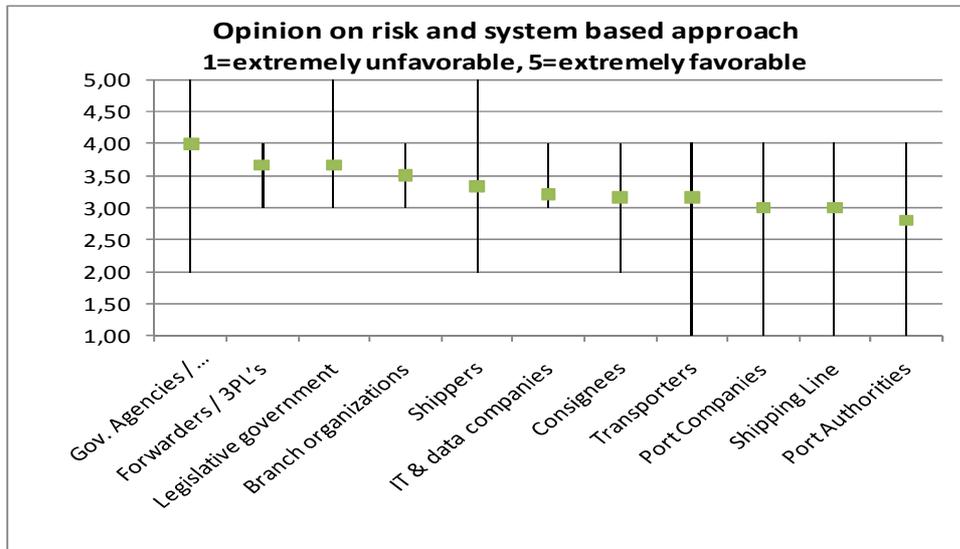
Stakeholders in the top left corner are important, so they need to be on board for the implementation of the project. However, their relatively lower score on influence means that their involvement in the actual implementation might be a bit lower. Good examples of these types of stakeholders are shipping lines and branch organizations.

The top right, blue group, of stakeholders can be considered the core of the project, they need to be involved because of their importance and they need to reach consensus on the way of implementation because they all have a large influence on the actual outcome. Consensus between government agencies, forwarders/3pl's, shippers, consignees and the legislative government will ease the further process, without consensus between these parties implementation is virtually impossible.

5.2 Stakeholder opinions on ‘Cassandra issues’

The starting point of the Cassandra project was to create a system that will enable a risk based and system based approach for customs. Per stakeholder group the opinion on this idea was identified.

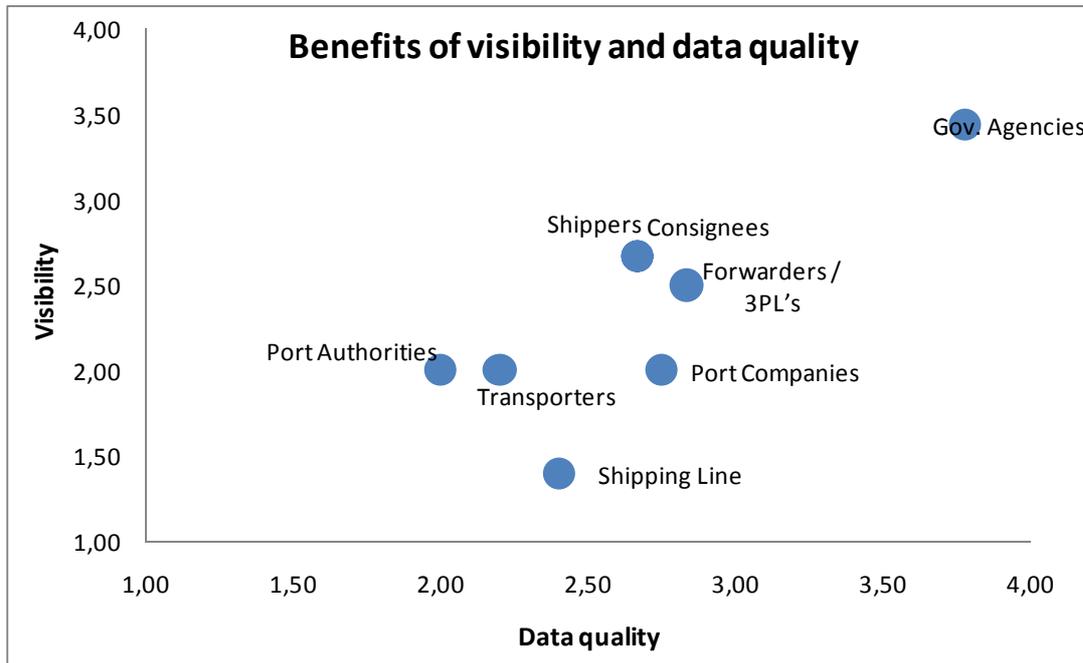
Figure 5-4: Stakeholders opinion on risk and system based approach



As expected, the government agencies are on average the most in favor of this idea. There is however a spread, some inspections show less enthusiasm but most customs organizations are extremely in favor of the new approach. Other organizations mostly in favor are forwarders, government and branch organizations. Shippers are also on average in favor but show a spread; the larger the shipper’s organization the more in favor the company is thought to be. The other stakeholder groups tend to neutral or are slightly positive, but in every group some stakeholders are found that are clearly not in favor of a risk and system based approach, mainly because they think it will complicate their work or increase their liability.

The opinion on the risk based approach is related to the benefits stakeholders think they can have from the implementation of a data pipeline. There are two generic benefits for the parties in the supply chain. First, there are benefits stemming from increased supply chain visibility, this can increase the possibilities to streamline a whole supply chain by eliminating inefficiencies, reducing waiting time etc. The second type of benefit comes from better quality data. After implementation of the data pipeline, organizations in the supply chain will have more complete and more accurate information about the shipments. This can help parties in the supply chain to organize their own work better.

Figure 5-5: Perceived benefits of the stakeholders

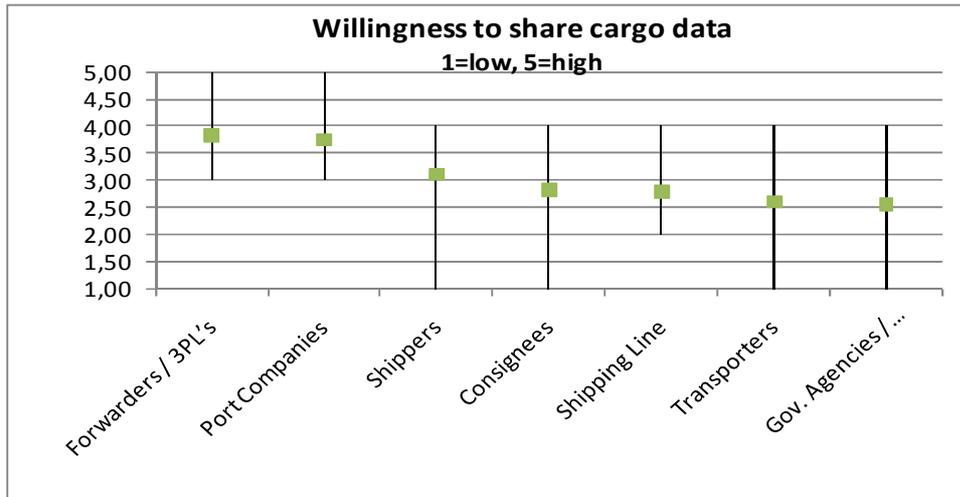


The group of stakeholders that is expected to benefit the most from a data pipeline is the government agencies. Greater visibility of the supply chain enables them to do a system based assessment of supply chains. The data quality enables them to do risk based assessment. Both approaches will make their work easier and more effective. Other stakeholders that expected to benefit are consignees, shippers and forwarders/3pl's. They can use the data to streamline their operations and cut costs. The supply chain parties that are only a link in the transport chain and do not have a direct interest or influence in the supply chain will probably have more limited benefits from visibility and data quality, although port companies might benefit from more precise information about the shipment contents.

5.2.1 Data sharing

An issue that is central to the project is the willingness to share data, because without the right and reliable data in the data pipeline a system based approach is not possible. The most important parties to share data are shippers and consignees, because they are the owners of the cargo. But also all parties involved in transport must be willing to share data that might be of a competitive nature for them.

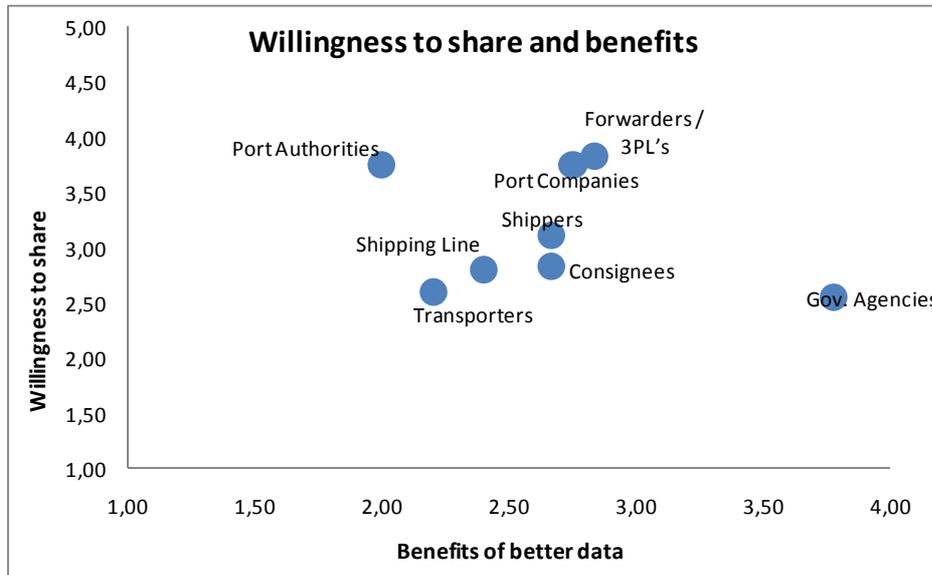
Figure 5-6: willingness to share data in the pipeline



For some stakeholders, the sharing of shipment data might be a problem. Most forwarders and port companies probably are willing, because they can see the benefits for the efficiency of their own operations. Shippers and consignees on the other hand might be a bit more reluctant to share data about their products for competitive reasons. They want to limit the sharing of data to government agencies and some direct transport suppliers, but not to every organization in the supply chain. Shipping lines and transporters are willing to share data in some cases but generally are not very willing to share with all organizations. Government agencies are in many cases limited by legal restrictions to share data, but are willing to share data if it's within legal boundaries.

A comparison can be made between the willingness to share data and the perceived benefit from better data. In Figure 5-7 these two variables are plotted. It's clearly recognizable that the parties in the supply chain that are actually involved in transport and logistics themselves are willing to share data when better data is also giving them an extra benefit. It could be they expect reciprocity from other supply chain parties. Two outliers can be recognized, the port authority and the government agencies. Port authorities are willing to share relatively more data, they do not have large benefit from better data themselves but anticipate 'their' port will function better when better data is available for supply chains that use this port. Government agencies are the foremost beneficiaries of better data but often cannot share the data they receive for legal reasons.

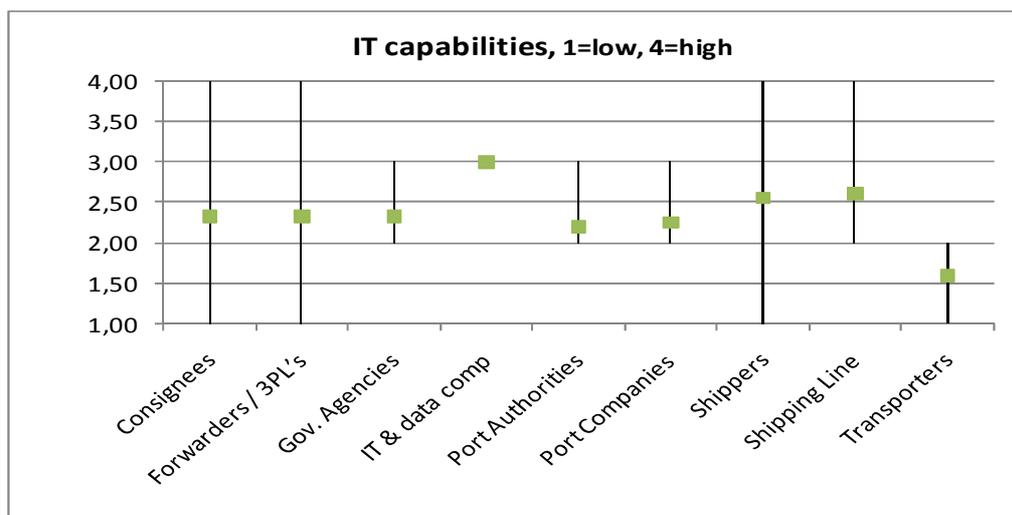
Figure 5-7: relation between willingness to share and perceived benefits



5.2.2 IT capabilities

When cooperating in the creation and use of a data-pipeline, the IT capabilities of an organization are of great importance. Before a large scale introduction, the majority of the parties in the transport chain should be capable of handling the data requests of other supply chain partners and government agencies. They should also be capable of securing and validating the data, so other parties can be confident about the data quality and integrity. According to the Cassandra project members many stakeholders are not yet capable of handling the data in the required way. A score of 4 means the organization has a sufficient IT infrastructure, 3 means slight adjustment is needed, 2 quite some adjustment, and 1 significant adjustments.

Figure 5-8: IT capabilities of stakeholders



On average, most stakeholders need quite some adjustments in their IT infrastructure before a data-pipeline can be introduced. In some important categories there are however already

some parties that have the necessary capabilities. Mainly the larger Consignees, 3pl's, shippers and shipping lines are probably capable of implementing the data pipeline without major adjustments in their current IT infrastructure.

5.2.3 Extra information flows

The stakeholders might take the opportunity of a new system to improve the data they receive and the data that they make available for other parties in the supply chain. Most organizations in the supply chain would like to see more data about the current state and the history of the shipment.

Current data includes the location but also who has the custody of the goods. Further, data about delays would be useful for planning of activities and for shippers and consignees it would be interesting to know what the reasons for the delay are. This could help them optimize their supply chains.

Historical data about the shipment could give an indication of the integrity of the shipment, and the risk that there has been any fraud related to the shipment. This tracing data should include all handlers of the shipment and observations of the physical condition of the shipment. Also a confrontation of planned timing and actual timing throughout the transport chain could help organizations to judge the cargo related risks.

6 Conclusions

The Cassandra project plans to implement a 'data pipeline'. This data pipeline will increase the visibility of the supply chain and data availability for all parties, allow customs and inspections to adapt a risk based and system based approach and will create more opportunities for private companies to improve their supply chain performance. There are many organizations involved in the supply chain, and thus many stakeholders in this project.

Government agencies are the organizations that are most involved in the project, have the highest sense of urgency, high importance and most influence on the outcomes. They should be very involved in the whole project, but attention has to be paid to the connection with other stakeholders to prevent a situation where government agencies, especially customs, end up go-it-alone.

The sense of urgency with several parties in the supply chain is lower than one might expect based on the possible benefits of the system. Most Cassandra partners recognize some reluctance with business stakeholders to be involved in the project. This is mainly because they do not see the benefits of a data pipeline, or they are worried about unwanted data sharing with other organizations for competitive reasons. The stakeholders that expect to benefit the most from a data pipeline are the government agencies. Other stakeholders that can benefit are consignees, shippers and forwarders/3pl's. The perceived benefits for the later organizations are however considerably lower than those of the government agencies.

The relation between government agencies on the one hand and shippers, consignees, and forwarders/3pl's on the other hand is important in this project; without consensus between these parties creation of greater supply chain visibility is virtually impossible.

The table below summarizes the outcomes of positions-analysis. Generally speaking the stakeholder groups with mainly 'blue' positions should be involved in almost every step of the project, stakeholders with 'red' positions should generally not be involved but merely informed. Stakeholders with 'green' and 'yellow' positions should always be informed but involved only for specific issues when their interest is at stake or their cooperation is needed.

Table 2: Summarized position of stakeholder groups

	Urgency/Influence	Importance/Urgency	Importance/Influence
Branch organizations			
Consignees			
Forwarders / 3PL's			
Gov. Agencies			
IT & data comp			
Leg. Govern.			
Port Authorities			
Port Companies			
Shippers			
Shipping Line			
Transporters			

Based on the relative position of the stakeholders we can formulate general strategies about the involvement of stakeholder groups.

Table 3: Generalized approach towards stakeholders

	Actions / approach
Branch organizations	Involve in consensus building and influencing activities
Consignees	Involve in most (all) activities that deal with the practical implementation
Forwarders / 3PL's	Involve in most (all) activities that deal with the practical implementation
Gov. Agencies	Involve in most (all) activities that deal with the practical implementation
IT & data comp	Involve in the technical activities
Leg. Govern.	Inform about developments and involve in consensus building
Port Authorities	Inform about developments and involve in consensus building
Port Companies	Involve in practical activities, when their clients are involved.
Shippers	Involve in most activities that deal with the practical implementation
Shipping Line	Involve in practical activities, when their clients are involved.
Transporters	Inform, only limited involvement in final implementation phase

Besides these general strategies, some specific actions are required to bring the Cassandra project to a successful implementation.

The urgency of some stakeholders has to increase:

Specifically the stakeholder groups 'shippers' and 'consignees' show relatively lower urgency than one would expect based on their importance and influence. Increasing the sense of urgency with these stakeholders will increase the likelihood of a positive contribution to the implementation of a data pipeline by these stakeholders.

The perception of possible benefits has to improve

Apart from the customs organizations the expected benefits of supply chain visibility and the data pipeline are relatively low with other organizations. More specifically the private supply chain parties do not seem to fully appreciate the possible benefits. Improving this perception can also lead to a greater sense of urgency and more active participation of these parties.

The willingness to share data should increase:

The quality of the data pipeline depends for a large part on the data that is shared by the supply chain parties. Specifically shippers and consignees, who provide the actual cargo data, are of crucial importance. With some of these stakeholders the willingness to share data is currently too low to create a broadly use data pipeline.

The IT capabilities need improvement:

Many of the smaller organizations within all stakeholder groups have an IT infrastructure that is not yet sufficient to facilitate the data pipeline functionality. For a successful implementation a broad range of companies should be part of the data pipeline and to make this possible many organizations need an upgraded IT system.

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7 Disclaimer and acknowledgement

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7.3 Acknowledgement

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Appendix

1. Survey form for the categorization of stakeholders

I) For the stakeholder analysis we investigate the following aspects of the stakeholders:

1.1 The Importance for the Cassandra project, can the implementation of the data pipeline take place without this stakeholder or is it of vital importance?

1	2	3	4
Low importance: it would be nice to involve the stakeholder in the project but the project can go on without this stakeholder as well	Slightly important: The implementation of the project is possible without the stakeholder but the majority of the other stakeholders would prefer this stakeholder to be involved	Quite important: The implementation of the project is possible without the stakeholder but it will experience significant difficulties or the project won't be implemented in the full form as envisioned	Highly important: The implementation of the project can't go on without the involvement of the stakeholder

1.2 The level of Influence on the outcomes, is the stakeholder capable of shaping the outcomes, do other stakeholders listen to the opinions, wishes and issues raised by this stakeholder?

1	2	3	4
Low influence	Slightly influential	Quite influential	High influence

1.3 The Urgency of the stakeholder, the degree to which the stakeholders calls for immediate action.

1	2	3	4
Low urgency	Slight urgency	Quite some urgency	High urgency

II) The following opinions of the stakeholders are investigated:

2.1 What is their opinion on the risk and system based approach by customs (as proposed within Cassandra)? Are they in favor of this new way of judging the supply chains by customs?

1	2	3	4	5
extremely unfavorably	unfavorably	neither favorable, nor unforable	favorably	extremely favorably

Specific for businesses

2.2 Regarding supply chain visibility:

To what extent do they expect to benefit from greater visibility in the supply chain?

1	2	3	4
no benefits	<u>slightly</u> benefit	<u>quite</u> benefit	<u>extremely</u> benefit

2.3 To what extent is their business harmed by increasing the information availability in the chain?

1	2	3	4
no harm	<u>slightly</u> harmed	<u>quite</u> harmed	<u>extremely</u> harmed

Regarding information sharing:

2.4 Are they prepared to share information about cargo/consignments with parties in the supply chain?

1	2	3	4	5
No, they are not prepared to share more than is shared at the moment	Yes, but only with governmental organizations	Yes, but only with governmental organizations and the companies that they have contractual relationships with	Yes, but only with pre-specified range of organizations	Yes, with all parties

2.5 Do they expect to benefit from extra or better quality information they might receive from other parties in the supply chain when a data-pipeline is implemented?

1	2	3	4
no benefits	<u>slightly</u> benefit	<u>quite</u> benefit	<u>extremely</u> benefit

Regarding capabilities:

2.6 Do they have the right capabilities for a data pipeline, do they have the right IT infrastructure?

1	2	3	4
no, their IT infrastructure requires <u>significant</u> adjustments	no, their IT infrastructure requires <u>quite some</u> adjustments	no, their IT infrastructure requires <u>slight</u> adjustments	yes

2.7 What supply chain information would they like to receive above the current info level?

2.8 What supply chain information can they share with others that isn't currently shared?