

# THE INTERRELATION OF INFORMATION SHARING LEVELS

Intra-organizational and inter-personal influences on inter-organizational information sharing

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## Abstract

Sharing information occurs daily in many contexts and on many different levels: people in groups share information, departments of organizations share information to achieve their goals, organizations share information with other organizations, and even countries sometimes depend on other countries to share specific information. Literature shows that these different sharing levels are embedded in each other, they are influenced by many factors that are unique and sometimes similar, making the interfaces complex to understand and deal with. In this paper some insights are given into what inter-personal and intra-organizational factors mean for sharing knowledge across organizations. A case-study approach was used to first identify important factors for inter-organizational information sharing. For some of these influential factors it was then further shown how they interrelate through various levels. These have provided some understandings, but these and more factors, with not only their mutual relations, but also their relations on the interfaces of the sharing levels need to be further studied to more thoroughly and scientifically study the interrelation.

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*Keywords: information sharing, knowledge sharing, interrelation of information sharing levels, inter-organizational information sharing, intra-organizational information sharing, inter-personal information sharing*

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## 1 Introduction

In recent years, literature has shown that many organizations, both in the public and the private sector are becoming more and more dependent on information coming from other governments or organizations to have efficient and effective operations. Some examples are: the inter-agency collaboration resulting in many benefits for the health and social sector has been studied intensively. Efficient services, reducing overlap of services and effective care of people who require multiple kinds of

treatment are some of the advantages listed in the literature (Edwards & Miller, 2003; Richardson & Asthana, 2006).

This improvement in level of service is also shown in another, more technical context: information sharing within a supply chain of a company (Spekman, Kamauff, & Myhr, 1998). In the law enforcement sector information sharing has been acquiring a more critical role after the 11 September attacks in 2001. There is an increasing need to coordinate and share intelligence information across all levels of governments involved in this sector (Chermak, Carter,

Carter, McGarrell, & Drew, 2013). Having this information sharing capability, not only nationally, but also internationally can assist in preventing various criminal or terrorism related activities, in turn ensuring the safety of citizens all over the world. This was for example illustrated by the decline of mileage fraud from imported cars in Belgium as a result of information sharing between Belgium and the Netherlands (ANP, 2017). This type of information sharing across countries boundaries is furthermore high on the political agenda, as the recent G7 top showed: various world leaders propose that in light of the recent terrorist attacks in Manchester, countries should further improve the sharing of intelligence information with each other (ANP & NU.nl, 2017).

Above examples have classified information sharing in different levels. Sharing information between agencies, sharing information within an organization and even information sharing between countries. Apart from the level, other classifications are for example the goal of sharing information or the type of information sharing (Talja, 2002). This paper focuses on the classification of information sharing levels: inter-personal, intra-organizational and inter-organizational. In the remainder of this paper the inter-personal level is considered to be the lowest level and the inter-organizational level the highest.

On top of these levels there is, as was shown the sharing of information on a country to country basis. Facilitating this exchange of information is seen as a more complex operation, even more so because sharing information on less lower levels is still not understood completely, and it is still not without its problems (Dawes, 1996; Sun

& Yen, 2005). One of the areas that still need understanding and is a candidate for further research is for example the interrelation of the previously mentioned information sharing levels (Yang & Maxwell, 2011).

This paper tries to provide some general insights into the complexity of this interrelation. It does so by looking at the factors that influence inter-organizational information sharing and placing these factors in the contexts of the other 2 levels (intra-organizational and inter-personal). This is summarized in the following research question:

*“How is information exchange between organizations affected by intra-organizational and inter-personal information sharing factors?”*

The inter-organizational factors are insights gained from a practical case-study in a specific context. Combined with scientific knowledge some of these factors are used to provide insights into the influence of the intra-organizational and inter-personal level. Some theoretical knowledge is needed to understand and interpret the results. Therefore, after this introduction (section 1) and an explanation of the research method (section 2), the relevant literature is studied in section 3. Section 4 introduces the case-study, the research design and the research results. In section 5 a synthesis takes place: a brief discussion of the results is followed by the conclusions and recommendations for further research.

## **2 Research Method**

Apart from studying literature, a case-study was also used to gather some empirical insights. This was done through in-depth interviews with organizations involved in the case-study. These organizations were identified by means of a case-study analysis.

Literature for this article was found on different scientific databases such as Google Scholar, Web of Science and Scopus. Different keywords, as well as combinations of these keywords were used to search for relevant literature. Some of these were: information sharing, information sharing levels, interrelation, knowledge sharing, etc. No specific time period or other parameters were used to constrain the searches.

A literature review by Yang and Maxwell focusing on inter-personal, intra-organizational and inter-organizational success factors for information sharing in the public sector was used as a basis (Yang & Maxwell, 2011). This article does not only list various other useful sources, but also pays some brief attention to the interrelation of the various levels.

## **3 Literature**

In this section the literature is studied. As the case-study will result in factors important for inter-organizational information sharing, the literature of this level is first introduced. After that the influence of the other 2 levels in relation with the inter-organizational level is discussed. In the last sub-section the interface between inter-personal and intra-organizational is also briefly discussed.

### **Sharing information with other organizations (inter-organizational)**

The example of the medical sector in the introduction already illustrated the importance of sharing information between organizations. Even though the benefits are clear, the level of complexity increases in comparison with the lower levels, both for the public and the private sector.

Easterby-Smith et al. make this clear: they begin by stating that it is sometimes difficult to transfer information between units of one organization, let alone between organizations, as there are suddenly more factors that influence the knowledge transfer: organizational boundaries, cultures and different processes (Easterby-Smith, Lyles, & Tsang, 2008). These authors have divided the factors influencing this level into dimensions: factors important to consider for the donor firm, factors important to consider for the nature of the knowledge and the organizational dynamics between the organizations involved and factors important to consider for the recipient firm.

Yang and Maxwell, have grouped the factors important for this level of information sharing in different categories (organization and management, technology and political & policy) (Yang & Maxwell, 2011). Dividing factors into dimensions or categories helps to distinguish between the different stages in the process or the different areas of interests. Most of the factors both authors list are the same. Trust between professionals of both organizations, the availability of adequate information technology capabilities, guarantees that information will not be misused and taking into consideration the appropriate laws and regulations when sharing information are some of the factors that are listed in these

frameworks. For a complete overview of all the factors we refer to the articles that have been mentioned.

Many of these factors can both positively and negatively influence the sharing of knowledge between organizations, some in a lesser extent than the other. On top of that, many of these factors have mutual (causal) direct/indirect relations with each other e.g. trust that has a negative causal relation with concerns for information misuse or a positive causal relation with information sharing itself (Abrams, Cross, Lesser, & Levin, 2003; Ardichvili, Page, & Wentling, 2002) The distinction between important/less important factors, the mutual relations and the direct/indirect nature of these relations make this level of information sharing extremely complex to deal with.

**Interfaces with other lower levels**

However, inter-organizational information sharing does not stand on itself: in most cases information shared between organizations must find its way to the correct department within the company. After that the information must travel within that department or group to the right person. Only then it can be determined that the initial information shared between the organizations has been a success. This illustrates the embeddedness of the different levels in each other, as shown in figure 1.

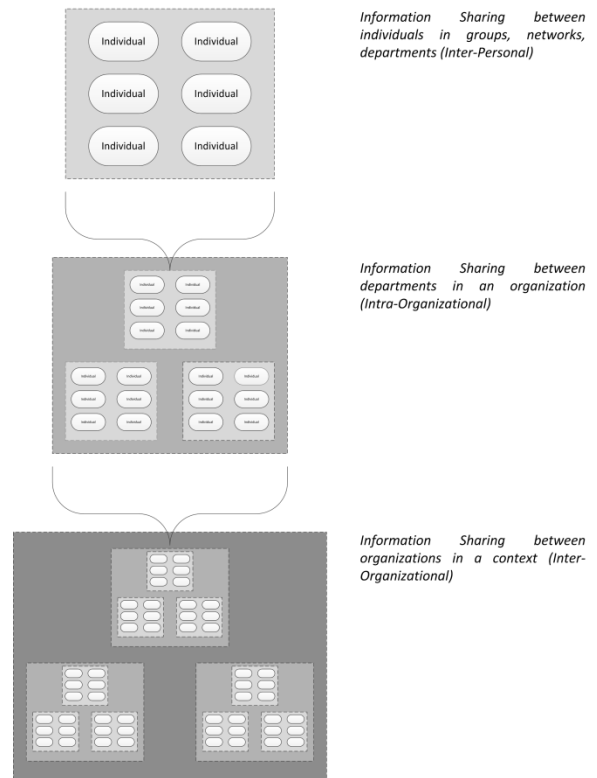


Figure 1 Embeddedness of information sharing levels

*Inter-organizational to intra-organizational*

The first interface to be considered when looking at the process of inter-organizational information sharing is “inter-organizational to intra-organizational”. Intra-organizational information sharing, occurs mainly within organizations themselves, i.e. between different departments both hierarchically and laterally. This level of information sharing has probably been studied the most, especially as information is sometimes seen as a strategic resource of a company. Understanding how information is created, developed, shared and managed is therefore critical in an organizations success (Ipe, 2003). Not sharing information on the right time, in the right form by a department with another department within an organization can lead to poor organizational pay-offs, as Barua and Ravindran show. These authors further argue that apart from improving the level of

communication between these departments, social orientation as well as the adequate information processing capabilities are required to properly facilitate intra-organizational information sharing (Barua & Ravindran, 1996). That this social dimension consists of various important factors is clear: because information is sometimes considered as a source of power, this decreases the information sharing activity, as employees feel that this reduces their influence within the organization or the department (Willem & Buelens, 2007). Other factors that are important are for example the social identification of organization members with the organization. The higher this identification, the more it can facilitate information sharing within the organization (Willem & Buelens, 2007). Apart from these unique factors such as social identification, there are also the same inter-organizational factors: competing interests/self-interests, the level of trust and the information technology are factors recognized at both levels (Yang & Maxwell, 2011). The question lies however in where and what the difference is. This can provide some insights in the interface.

In the context of intra-organizational the factor information technology mostly refers to the use of IT to share information. The easier and more efficient the IT systems are to use, the better the information sharing, according to Kim and Lee (Kim & Lee, 2006). In the context of inter-organizational, the factor mostly refers to an exchange system: shared information should not provide compatibility issues for the organizations.

Trust however is more difficult to distinguish. For this factor as well as social

identity, Tajfel and Turner argue that their importance becomes less when information sharing occurs between departments of one organization or between organizations (Tajfel & Turner, 1986). A lack of trust between organizations departments can also lead to negative effects on information sharing (Ardichvili et al., 2002; Willem & Buelens, 2007; Zhang & Dawes, 2006).

Regarding incentives to share information, a factor that is deemed to be important for both intra- and inter-organizational information sharing, research illustrates its complexity: even though in both intra- and inter-organizational information sharing the introduction of incentives can encourage information sharing, there is also a possibility that if there are incentives or rewards introduced within organizations, this can lead to possible negative impacts as a result of competition between departments (Yang & Maxwell, 2011). On inter-organizational level, the introduction of incentives will positively encourage organizations to share information.

It can be seen that factors identified to be important in the higher level are also important in the lower level: sometimes their importance gets less (e.g. trust), and sometimes their causal relation is subjected to change (e.g. incentives to share).

#### *Intra-organizational to inter-personal*

In the previous section it became clear that inter-organizational information sharing follows a path within organizations. Trust for example ultimately leads to 2 individuals trusting or not trusting each other, making it clear that intra-personal information sharing needs to be considered. This level of information sharing generally occurs between a minimum of 2 people. Research

has shown that a lack of inter-personal information sharing can often lead to sub-optimal decision making by the group members (Stasser & Titus, 1987). This can then have significant effects if it is translated back to the higher levels of information sharing.

As with the previous 2 levels, literature has also identified some important factors that influence this level. Competing/self-interests, willingness to share, information technology, the context, member's goals as well as trust are some of these factors (Rioux, 2005; Stasser & Titus, 1987). The importance of trust is also shown in this level: without trust, the effectiveness of knowledge sharing drops (Abrams et al., 2003). Research by Lewicki has further shown that trust develops by having more information from each other (Lewicki, 1995). On the other hand, research has also suggested that having the information privacy can help to create trust between individuals (Razavi & Iverson, 2006).

Information travels through a group or an organizations department so that the right person gets ahold of this information. It was shown that the importance of trust in sharing between departments is less, but it is also now shown that its importance again increases when sharing occurs within that department. The same can for example be said about the goal of sharing information: in an intra-organizational setting different departments work to reach goals of the organization, but in an inter-personal setting, i.e. within one department, individuals can be reluctant to share information as a result of for example personal goals or personal interests. This shows, that although this level is the lowest,

it is still essential in the success of inter-organizational information sharing.

### **Complexity of the process**

The complexity of this interrelation becomes obvious: different factors that are important for lower levels are not per se equally important for higher levels. On the other hand there are also factors that are totally unique for their level, such as different geographic areas or different operations and procedures. An organization sharing information with another organization usually does this with a certain mutual goal and would want to do this in a successful manner. The literature has shown that this is not as easy as just simply emailing a file to the other organization. The email has to find its way to the right department, and then to the right person. It is often that the information sharing process begins to lack in these stages. In the next section the interrelation of information sharing levels is shown through a practical case-study.

## **4 Case-Study Research**

This case study is centered around the maintenance of critical infrastructures in the Netherlands. Many of these infrastructures are nearing the end of their technical lifespan, and because the functions they perform are extremely important for both society and the economy it is vital that their functioning is guaranteed. However, building new bridges, dikes, water waste systems and roads is simply too costly and logistically almost impossible. That is why researchers are studying the use of some improved maintenance management strategies by looking at different cases. One of these maintenance management strategies is risk and opportunity based asset management, in which management

and maintenance decisions of a particular asset are systematically taken. This for example means that not only the main function of an asset is taken into consideration, but also other indirect functions that the asset performs, resulting in a larger actor field, and thus increasing the need for information sharing. It is estimated that this systematic perspective for maintenance and management can lead to a saving of nearly 20 million euros, a significant increase of efficiency for the ground, road and water sector (Deltares, 2016).

### **Case: maintenance & management of sea lock Farmsum**

One of these cases in which this risk and opportunity based asset management strategy is used concerns an asset that is critical for the functioning of an economically important waterway in the north of the Netherlands: the Lemmer-Delfzijl waterway. The asset in question is a sea lock complex located in the town of Farmsum and the municipality of Delfzijl, see figure 2.



Figure 2 Sea-lock complex Farmsum ("Zeesluis Delfzijl," n.d.)

The issue with this asset is its potential enlargement. Previous assessments had shown that this enlargement was not needed, as the asset is still in a good technical state (Bückmann, Witmond, & Roozenbeek, 2007). However, by

employing the risk and opportunity based asset management strategy and thus taking other functions and factors of the asset into account such as its value for tourism and nature, rather than only its technical state, the results show that enlargement of the asset is an option that should be seriously looked at (Kok, Wessels, De Bel, Van Meerveld, & Van der Wiel, 2017). Enlargement of the sea locks is also needed to accommodate the transit of larger vessels. This as a result of the predicted growth of shipment of goods (Provincie Fryslan, Rijkswaterstaat, & Provincie Groningen, n.d.).

The asset is owned, maintained and managed by Rijkswaterstaat. However, the planning and execution of maintenances activities/expansions and/or modifications involves many organizations, whom are dependent on information from each other to make well-grounded decisions. Most of these organizations are part of the public sector. Coupled with the use of the risk and opportunity based asset management strategy it is even mandatory that other organizations become involved, after all the core of the strategy is to have a systematic perspective of the asset in question. There is an obvious existence of inter-organizational information sharing, but as literature argues, this inter-organizational information sharing is heavily related to first intra-organizational and then inter-personal information sharing.

### **Research Design**

The study was intended to understand how inter-organizational information sharing is being influenced in this context. A thorough case-analysis had first identified the asset and its various functions, making it easier to then name the different organizations that

are involved. By means of desk research the various information needs of these organizations were identified. However, this analysis did not provide the insights into the following: was the identified information actually being shared? What are the important factors influencing this sharing (or lack of sharing)? To gather these and other insights, 7 in-depth interviews were held with individuals from the identified organizations. With the help of a slightly revised version of Yang and Maxwell's inter-organizational information sharing framework the results were interpreted after various coding rounds (Yang & Maxwell, 2011).

### Research Results

The results showed, conform the literature that there are indeed many factors influencing information sharing between organizations. Some of the frequent appearing factors are shown in table 1.

Table 1 Some frequent appearing factors (n=7)

Factor	Number of times mentioned
Legislations and Policies	7
Concerns of information misuse by other organizations	6
Competing interests/self-interests	6
Trust	5
Physical interactions	5

By interpreting above results through the literature provided in section 3 of this paper, they can be placed in the context of the interrelation. This is shown in the following sections. The existence of different levels influencing each other was also seen during the interviews: *“before sharing information*

*with the outside, we should first successfully share information within our organization”*, one respondent stated.

### Legislations and Policies

When sharing information with other organizations, certain rules have to be taken into consideration. This is sometimes not only nationally regulated, but also regionally. Public organizations in the Netherlands have to take the “wet openbaarheid van bestuur” into consideration (“Wet openbaarheid van bestuur - BWBR0005252,” n.d.). Also within organizations there can be certain policies and rules (and to a lesser extent legislations), that departments have to comply with when sharing information with other departments, possibly also affecting information exchange outside the organizations boundaries. These are however different and have different influences on the inter-organizational legislations and policies. This factor is expected to be of a less formal character in inter-personal information sharing.

### Concerns of information misuse by other organizations

Within organizations this is expected to be of a lesser influence, as in most cases the organizational departments operate through a central goal of the organization. In an inter-personal context however, this factor can be of an influence. The influence on inter-organizational information sharing processes is then clear: even though an organization is not concerned with information misuse by the other organization, it can still occur as individuals within departments can have that concern, but this is of course dependent on the goal of sharing information with another individual and the level of trust between



these individuals ((Wittenbaum, Hollingshead, & Botero, 2004).

#### *Competing interests/self-interests*

Information shared by an organization out of self-interest can have serious consequences for the recipient organization: this means that departments will also be sharing this particular information, and employees will be dealing with this information, even though it does not benefit the recipient organization. This can get even more worse, as sometimes departments within organizations can also act out of self-interests. Resources can be lost and this has an effect on the level of trust between the organizations. It is clear that on an inter-personal level, shared interests can encourage and facilitate information sharing between individuals (Marshall & Bly, 2004).

#### *Trust*

This factor was extensively elaborated on in the literature review. It was shown that a lack of trust between members of an organization or a department negatively impact the information sharing process. This factor is one of the foundations that enable information sharing between organizations, but as was shown, gets less important when information needs to be exchanged within one organization. When the process has to be repeated within a department or group, it again increases in importance.

#### *Physical interactions*

This factor perhaps best shows the importance of an inter-personal dimension. Even though most of the information nowadays is shared via innovative media platforms, many respondents still stated that even in an intra-organizational setting, it is important to “*see and speak each other*”.

This positively affects all levels of information sharing. Facilitating these physical interactions are fairly easy in an inter-personal setting, but get logically more complex within the 2 higher levels. This of course depends on various factors such as size of the organization and geographical distances.

## **5 Discussion of the results**

For the above mentioned factors it can be seen how they function in the three levels, how their importance increases or decreases when placed in the context of other levels and how they can influence information sharing in general in their respective levels.

However, there are more factors to consider. These have not been discussed in this paper. Various authors have placed the discussed factors in the separate levels, but not many have discussed their importance or functioning in the broader context of the other levels.

Yang and Maxwell have made the need to understand this interrelation clear, however, they also state that it is a difficult topic for research, because of the consideration of all three levels together (Yang & Maxwell, 2011). More thoroughly understanding this interrelation requires deeper analysis into each interface. Not only should each factor be analyzed separately, relations with other factors from the other levels should then also be taken into consideration. The results of the case-study were intended to study inter-organizational information sharing. But the insights did not yield factors that were unique to this level of information sharing, respondents mentioned factors that play

critical roles in the remaining process of information sharing. The interrelation(s) may seem logical, but as it is shown, it is not as easy to understand how it (they) function(s).

The fact that the data is coming from only one case-study is arguably a weak point of this analysis. The low number of respondents can also have a negative effect on the findings of the case-study. More data from more practical case-studies specifically focusing on how these factors play a role in other levels would provide more results to study and thus give more possibilities to understand the interrelation.

## **6 Conclusions and further research**

Information sharing is an important concept that occurs daily on different levels: between many people, many departments in organizations, between many organizations and even between many countries. This leads to considerable benefits for involved actors, but can also lead to devastating results, in the case of for example the sharing of sensitive information.

All these levels of information sharing have specific factors that need to be taken into consideration. However, apart from these specific factors, the literature has also shown that the levels are heavily interrelated with each other. Not only are there similar factors that influence different levels, the success of information sharing on higher levels is dependent on the sharing of information on lower levels. Furthermore, the similar factors in different levels sometimes also do not have the same influence e.g. competing interests/self-interests. This further complicates the

understanding of the interrelation of information sharing levels. Science can benefit from further research on this topic.

In this paper the aim was to, by means of a case-study research provide some insights. The starting point was inter-organizational information sharing, and based on the important factors for this level, it was discussed how they are functioning in the other 2 levels. This led to the following research question:

*“How is information exchange between organizations affected by intra-organizational and inter-personal information sharing factors?”*

It was already known that there are various factors influencing the information sharing practices. However we saw that their importance is not always straightforward. Some factors get less important or suddenly have a reverse causal relationship with another factor or information sharing in general e.g. trust. Organizations and the responsible information managers should be aware of this, especially as the success of sharing information with another organization can only be guaranteed if the right person within that organization receives the correct information within the correct context and on the correct time.

The insights in this paper and case-study only focused on a small number of factors, nearly not enough to provide grounded understandings into the interrelation of information sharing levels.

It is therefore recommended that to further develop this understanding, the following research areas are identified:

1. Thorough analysis of each interface between the levels, starting with the interface between inter-personal and intra-organizational. Which factors for example are similar? Yang and Maxwell have done this on a global level for intra-organizational and inter-organizational (Yang & Maxwell, 2011)
2. Factors that play a role should not be studied separately, but in the context of the interrelation. Their decline/increase of importance should be taken into account, as well as their relations with each other and from level to level.

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