FLEXIBLE INFORMATION ARCHITECTURES IN DUTCH POLICY IMPLEMENTATION CHAINS: A MULTI-RATIONAL PERSPECTIVE

Abstract. How can the flexibility of an information architecture in e-government chains - defined as a set of multi-rational agreements - be achieved, if one acknowledges the fact that the use of ICT may automate the status quo between organizations which work together in a policy chain? Research shows that flexibility cannot only be achieved by looking at technological requirements and agreements. Also other agreements should be considered which express other (political, legal and economic) design rationalities and values. Moreover, flexibility is also influenced by the structure and dynamics of the power and trustworthiness of the relationships between the organizations involved.

1. Introduction

The execution of rules and regulations and the delivery of public services and provisions are processes in which different public, semi-public and private organizations fulfill specific but interrelated tasks for which they have to exchange information. The dependencies between these tasks can be made understandable by using the metaphors of a policy implementation chain and network. Although other definitions are possible, we will describe in this study a policy implementation chain or network as semi-permanent collaboration arrangements between organizations, in order to produce (in a routine-like way) specific outputs, like the delivery of employment benefits (Rhodes, 1997). In a policy implementation chain the working processes between the organizations involved and the dependencies which stem from them have a sequential character, while in a policy network the dependencies have a reciprocal nature (Thompson, 1967). Chain or network computerization can be understood as the use of information and communication technologies (ICT) to support and/or redesign the working, coordination and information processes between organizations in order to enhance

the efficiency and efficacy of implementation and service delivery programs. ICT makes it easier to share and exchange information across the traditional borders of a fragmented and dispersed government organization, improves cross-organizational communication, increases the transparency of and control over working processes and policy outcomes, and enhances the accessibility of organizations. Simultaneously, there is a shady side. The effective use of ICT presupposes the formalization and standardization of working processes and information exchange relations. Stability and predictability are important conditions for its effective use. ICT may automate the status quo, freezing organizations into patterns of behavior and operations that are difficult to change, once they have been computerized, and thus contributing to a process of bureaucratization (Allen & Boynton, 1991). Hence, flexibility is an important issue in chain and network computerization. Will organizations that collaborate in a policy implementation chain be able to adapt to changing circumstances (like changing legislation or the inclusion of new partners), once they have computerized cross-organizational working and information processing processes? This dilemma can be made visible, if we look at the development of information architectures that support the use of ICT in a policy implementation chain. An information architecture consists of agreements and policies that prescribe the exchange of information between organizations as well as the use of ICT.

This article investigates how flexibility has been achieved in the development of information architectures that facilitate the exchange of information and the use of ICT within three Dutch policy implementation chains. What factors account for the flexibility these architectures? The first step is to explore the notion of an information architecture. In this exploration we will argue that the flexibility of an information architecture is not only determined by information management requirements. Also other requirements should be taken into account. Moreover, it will be argued that the flexibility of an architecture is also dependent on the

structure and quality of the relations between the organizations which participate in chain. Section two and three deal with these issues. Based on these theoretical explorations, a descriptive and analytical framework for study of information architectures in policy implementation chains will be sketched, which will also be translated in a research strategy (section four). In section five we will describe three how the flexibility of information architectures has been achieved in three Dutch policy implementation chains. In section six we draw some conclusions.

2. Designing information architectures

From an information management perspective an ICT infrastructure can be defined as a set of information policies and rules that govern an organization's actual and planned arrangements of computers (hardware), data and databases, human resources, network and communication facilities, software and management responsibilities (Allen & Boynton, 1991:435; Turban, McLean & Wetherbe, 2002: 62). Sometimes a distinction is made between an ICT infrastructure and an information architecture. An ICT infrastructure refers to the existing or actual set of physical facilities, services and management that support all shared computing services within an organization or between organizations. The information architecture is defined as a conceptual framework for the future organizational ICT-infrastructure. It is a plan for the structure and integration of the information resources in or between organizations in order to support the information needs of organization which are related to the specific processes within the organizations and the tasks and (strategic, tactical and operational) goals of an organization (Turban, McLean, Wetherbe, 2002: 62,63). An architecture specifies how and why pieces fit together as they do, where they go, when they are needed and why and how changes will be implemented (Allen & Boynton, 1991:435). The emphasis lies on the

information requirements in order to support these processes, tasks and goals. This is the main challenge for professional information engineers and planners, who predominantly define an information architecture as a neutral set of supportive tools (Martin & Leben, 1989). However, one can question the one-dimensionality of this approach. An architecture can also be perceived as a social and political constructed 'artefact', which embodies different interests and values as well presenting a set of different playing rules (Bijker et al, 1987). Several reasons can be given.

First, information and ICT are powerful resources that actors (i.e. organizations or organizational units) use to protect their domains (Davenport et. al, 1992). This is a unique sphere of influence, ownership and control over information – its specification, format, exploitation and interpretation (Bellamy & Taylor, 1998). The existence of an information domain is signaled by a) a break in flows of information, b) compartmentalization of information resources, c) idiosyncrasy of information specifications, d) the hegemony of specific discourses that shape information and influence in its creation and interpretation and e) cultural and professionally accepted procedures that may not be surrendered so easily (Kumar & van Dissel, 1996; Dawes, 1996; Bellamy, 1998). The development of a cross-organizational architecture implies that the existing information domains within and between organizations are being challenged, because it touches upon existing interests and practices. However, essential is how organizational stakeholders perceive the nature and degree of the uncertainties and dependencies that result from a more intensive and coordinated exchange of information between them (Pfeffer & Salancik, 1978). One the one hand, organizations are rather autonomous and want to protect their interests. On the other hand, organizations are part of the same logistic and administrative implementation chain (or even network) of activities in which each organization fulfils a specific task in the handling of certain cases, requests, assessments etc. While each office controls specific resources - such as information,

knowledge, experiences, authority, money, competences - it is, simultaneously, also dependent on other resources that are controlled by other offices (Van de Ven, 1976; Pfeffer & Salancik, 1978). There is no organization that is able to unilaterally enforce its will. Organizations are willing to set up an information architecture that cross organizational boundaries, if they are able to minimize their dependency on other organizations or maximize the dependence of other organizations on them (Beynon-Davies, 1994). Therefore, chain and network computerization can be understood in terms of 'information politicking' (cfr. Knights & Murray, 1992) or 'resource politics' (cfr. Kraemer & King, 1986), resulting in conflict, competition, exchange, negotiation and co-operation (Homburg, 1999). Secondly, the development of an information architecture in policy implementation chains can be defined a governance challenge (Bellamy & Taylor, 1998; Bekkers, 2005). Governance can be described as the process of horizontal coordination, in which different actors are involved in creating a shared understanding and definition of the problems they are confronted with and of the measures to be taken (Kooiman, 1993; Koppenjan & Klijn, 2004). Chain and network computerization can be defined as the co-production of a common information domain through interaction, communication, negotiation and exchange (Rhodes, 1997). Important is to define a dynamic balance between (qualitative and quantitative) costs and benefits (in the short run but also in the long run), so that a 'win-win' situation emerges based on the recognition of interdependency (Barron, 1994; Uzzi, 1997). In order to achieve this, it is important to respect core values and vital interests (Orlikowski, 1991; 2000; De Bruijn et al, 2002; Koppenjan & Klijn, 2004).). Trust, reputation and social capital within a policy sector seem also to be important to (re-)defining interdependency between the involved organizations in order to achieve productive relationships (Butler & Cantrell, 1994; Uzzi, 1997). Positive collaboration experiences, stemming from the past, influence the degree of trust, which is important to define win-win situations. Experiences with opportunistic

behavior or even ‘power play’ can enhance distrust (Williamson, 1985). Trust can also be a quality that facilitates the preparedness of an organization to re-consider existing information exchange agreements, and thus contributing to flexibility. Moreover, the specification of the agreements, which are laid down in an architecture, can also be understood as the expression of trust or even distrust (Williamson, 1985).

Thirdly, from a political science perspective, it is important to look at the different values which are embedded in computer supported policy processes. These values refer to different design rationalities that compete which each other in the drafting of an information architecture. At least four rationalities, having their internal logic and legitimacy, are important (Snellen, 1988). They stress specific core values, which have to be balanced. The political rationality deals with the question ‘who gets what, when and how’ if we look at the political challenges with which a political community is confronted (Laswell, 1958; Stone, 2002). Information and ICT are important policy instruments that governments use to realize specific political values like efficiency, security, liberty, equity or accountability. Moreover, they use ICT to deliberately influence the information position of actors and their relationships (Hood, 1983; Margetts, 1998). The legal rationality stresses the importance of the rule of the law, which e.g. implies offering legal security, consistency and legality. The economic rationality focuses on cost-efficiency, due to the scarce amount of resources which is available in order to achieve specific goals (in terms of benefits). The technological rationality emphasizes on the question, how to design effective, efficient and trustworthy tools and interventions strategies which are based on the professional knowledge of a specific policy field. In this case of ICT, it refers to professional knowledge concerning the requirements under which ICT can operate effectively and efficiently, like stability, predictability and security.

Hence, we conclude that in the development of information architecture competing design rationalities - and their values - play an important role. Moreover, it is important to recognize that an architecture touches upon existing interests, practices and positions of the organizations in a policy implementation chain.

3. Flexible Information Architectures

From an information engineering perspective, the flexibility of an information architecture is addressed in two ways. Allen & Boynton (1991) make a distinction between the 'low' and the 'high' road. Following the low road, flexibility is being achieved through a highly decentralized approach. Data, computers and networks, applications, programming and all the supporting resources are pushed as far down in the organization as possible. Variety is seen as pre-condition for flexibility. Efficiency advantages are being achieved through a) the definition of a common , but minimal set of standards and definitions for the exchange of information and building networks that link dispersed work stations, data bases etc; b) ensuring that there is full access of information in stead of restricted access, primarily based on trust; c) ensuring the integrity of the data definitions and network standards. Hence, the emphasis is on specification of minimal, but critical standards and interfaces that makes it possible to exchange information between rather autonomous organizational units in order to create a minimum of uniformity in the framework of organizational heterogeneity (Allen & Boynton, 1991:436-437; Mowshowitz, 1994). An information architecture should only regulate those issues, which are vital for the functioning for the organization as whole in order to prevent breaking down (Morgan, 1986; Hastings, 1993).

The 'high road' focuses on creating flexibility and efficiency through uniformity, based on centralization: corporate wide networks, central data collections, common application

systems, standardized hardware, operating systems and databases. Core applications are designed to be organizationally independent , which are immune to the restructuring of an organization. The development of a central imposed, homogeneous information architecture and infrastructure is seen as the road to meet the changing conditions, without fundamentally changing the systems themselves. (Allen & Boynton, 1991:440-442).

At the same time it is important to observe that the nature of the technology itself has fundamentally changed. The technology itself has become more flexible than 20 years ago. A practice has emerged that electronic communication is based on open, thus flexible, and international accepted standards, like XML. For instance, through the rapid development of the internet and the World Wide Web, organizations do not have to rely on proprietary systems to achieve connectivity and communality through a shared infrastructure. The internet has provided a basic and publicly available infrastructure which can be used as a hub for the development of cross-organizational information architecture. These developments facilitate the process of creating new strategic alliances, setting up new collaborative arrangements, are linking themselves to other databases and networks in which the sharing of information is not a real technological issue anymore (Monge & Fulk, 1999).

4. Theoretical Framework and Research Strategy

An information architecture is said to formulate a number of agreements and playing rules which facilitate the smooth exchange of information and the use of ICT between organizations in a policy implementation chain. These agreements do not only reflect information planning and engineering requirements, but also other design rationalities which

play an important role if ICT is used to support policy processes. Therefore, we have to address the different kind of agreements which have been laid down in an architecture.

First, we will focus on the *object of the agreements* which organizations develop to exchange information within a policy implementation chain or network; agreements that reflect different design rationalities and which add, differently, to the flexibility of the architecture:

a) political and administrative agreements, referring to the interests and the information domains that are at stake as well as to the political goals to be achieved. For instance how to deal with the autonomy of the participating organizations?
b) technological agreements, which refer to a) the definition of the (standardized and formalized) information to be exchanged, b) the use of ICT to support this exchange and c) the management and control of the use of ICT;
c) economic agreements, which refer to the specification and allocation of costs and benefits, related to the exchange of information and the use of ICT;
d) legal arrangements, which refer to specific rights and obligations which are laid down in rules and regulations and to more fundamental rights, like privacy.

Secondly, it is important to look at the *nature of the agreements* that have been formulated, which refers to the degree of specification of the agreements (Williamson, 1985) Are the agreements specified in detail or are they are vague? Moreover, the nature of these agreements gives us an indication of the way organizations have perceived flexibility as a relevant attribute of the information architecture. In our view the object and nature of agreements to be studied are rather intertwined and interacting factors that should be taken into consideration.

However, an information architecture does not only consists of technological and operational agreements. The agreements made express also that information and ICT are important powerful resources that organizations use to protect their own interests, domains and

positions, although they are dependent from each other. Organizations value differently the use and exchange of information and ICT in policy implementation chain or network, which can be found back in the contents of an information architecture.

Therefore, and thirdly, it is important to look at the *structure of the policy implementation chain* in which an information architecture is being developed. In particular, it is important to look at the interests, positions of the organizations and the dependency relations between them as well as the resources they can mobilize to protect these interests. An architecture may reflect the power relations and positions within the policy implementation chain or network. However, these relationships are not static, but dynamic due to the interactions between the organizations involved. This implies, fourthly, that also the *quality of the collaboration process* between the organizations that have been involved in the development of an architecture should be considered. Especially the trustfulness of past and present interactions and the way in which a common challenge has been defined, may influence the object and nature of the agreements as well as the way in which flexibility is being perceived as a important characteristic of the architecture (Williamson, 1985). In figure 1 the relationships between the relevant variables have been sketched.

Insert figure 1 here

The first step in our research strategy was to select three implementation chains in which the design of flexible architectures has been a topic; chains that resemble the high and low road of architecture design. The low road has been followed in the design of the vehicle license chain, in which the Vehicle License Agency focuses on the standardization of linkages between different local and autonomous systems. The second case is the Suwinet architecture in Dutch social security which resembles the high road, in which a complete nation-wide standardized

exchange infrastructure has been developed. The third case is a combination of the low and high road. This case is the urban zoning plan chain, in which central and nation wide data exchange and professional data definition standards have been developed.

Secondly, we have selected the case study method as a research method, because the case study method can help us reconstruct the complexity and dynamics of the interactions between organizations (Yin, 1989). This reconstruction has been based on the interpretation of data that has been gathered through studying policy documents, existing research reports and case studies, and interviewing 6-8 key figures by using semi-structured, in-dept interview techniques. Through 'triangulation' of these data sources we have tried to guarantee the validity of our research. Furthermore, in order to assure a valid comparison, we have used the standardized set of items that were on the previous theoretical framework (Yin, 1989). However, our findings do not pretend to be a statistical generalization due to the rather unique character of the cases, the limited number of the cases and the use of semi-open interview techniques. Our aim is to obtain a better analytical understanding of the multi-rationality and dynamics of information architecture development in policy implementation chains.

5. The Practice of Developing Flexible Information Architectures

In this section we will present the results of our comparative case study of the three implementation chains. First, a short description of the backgrounds will be given. Second, we will focus on the object and nature of the agreements made as well as the way in which flexibility have been guaranteed. Third, we explain why these arrangements have been made in relation to the structure and dynamics of the policy sectors in which implementation chains are located.

5.1 A Preliminary Description of the Policy Implementation chains

The first case is the Vehicle License Chain, which resulted from the implementation of the Vehicle License Registration Act. In fact this implementation chain consists of some different sub implementation chains, that share and are linked with each other by New Vehicle License Registry (established in 1995). The Registry is owned by the Vehicle License Agency on behalf of the Traffic Ministry. This registry was established to improve traffic safety by increasing the effectiveness in terms of liability of vehicle ownership (mostly used cars) through a better exchange of information. The registry is a central, common pool database in which information about the status of a vehicle and its owner is stored and can be used by other organizations, such as the Tax and Customs Administration (in order to assess road taxes), garages (when they periodically execute safety checks on cars, older than two years), insurance companies (to assess the legal status of a car in order to handle insurance requests) and post offices (when functioning as the front office of the Vehicle License Agency for citizens to provide information about the status of a car when they sell or buy a used car). On the one hand, the Vehicle License Agency is dependent on private garages, insurance companies and post offices in order to execute a number of tasks on their behalf. On the other hand, the Vehicle License Agency attempts to control the discretion of the organizations through the introduction well specified information processing and exchange procedures and norms, which are based on the legal status of the Agency as owner of the Registry.

The second case is the Work & Income Chain which started in 2002. In order to implement this chain, a technological network (called Suwinet) has been installed. It connects 131 local job employment organizations that are engaged in the assessment and delivery of social benefits to unemployed as well help these people to find new jobs as well as some large

national social security agencies. This network supports the execution of Work & Income Law, which generates a chainlike sequence of operational procedures and actions to be taken different organizations and corresponding information processing activities. There is a joint responsibility of the Ministry of Social Affairs, the association of local job employment centers and national agencies to design an effective and efficient exchange network. In order to implement this joint responsibility the organizations have established a central co-ordination agencies which facilitates and monitor the exchange of information within the implementation chain.

The third case is the exchange of digital planning zone information on which local spatial planning permits are based. The approval of these locally drafted zoning plans is done by the regional and central authorities, which generates a rather intensive exchange of information between different public urban and regional planning authorities. This exchange is based on the sequence of legal procedures that should be followed and which stem from the Spatial Planning Act. In this project - started in 2003 and based on voluntary co-operation - the emphasis was on the development and implementation of information exchange and professional data definition standards. The Ministry of Spatial Planning which is formally responsible, has been the initiator, focusing on boosting the project.

5.2 Architectural Agreements and Flexibility

We have studied several documents referring to the design of the three information architectures and have performed 6-8 in-depth interviews with key-persons (project managers, public officials and ICT experts) which have been involved in a (re-)drafting of these architectures in order to reconstruct the kind and nature of the agreements that have been

made as well to assess how these agreements actually have contributed to architecture's flexibility. In the next table we present the kind of agreements which have been made.

Insert table 1 here

The first step is to reconstruct why these agreements have been made. The most important architectural design principle in the Vehicle License Chain is the fact that the administrative and informational autonomy of participating public and private partners should be respected. It implies that the use of ICT should not immediately intervene with internal working procedures and routines. As a consequence, the Agency uses the exchange network of so-called third parties, like the network of the garage association and the post offices. It will not develop its own networks. The agreements that have been made with e.g. the garages, the insurance companies and the post offices focus on the regulation of the interfaces between the local information systems and the third-party exchange network on the one hand; and between the third-party exchange network and the Agencies information systems on the other hand. In order to establish effective, efficient and reliable links and interfaces, exchange and security standards have been developed as well certification procedures. The Vehicle License Act gives the agency the legal discretion, based on well defined competences, to impose norms and procedures so that a reliable and smooth exchange of information in order to exploit a trustworthy Registry can be guaranteed. The costs for the regular exchange of information are based on an annual price/tariff per message system, while separate agreements will be made if additional investments are necessary, if e.g. application rules and regulations change, that are necessary to guarantee the exchange of information within the implementation chain. All these arrangements, as well arrangements regarding the management of the ICT-interfaces, are elaborated in 'service level agreements'. In the this

chain we see that architectural agreements has been primarily been defined from political perspective, which has been translated in technological requirements.

In the Suwinet information architecture much emphasis has been put on a number of agreements which concern to the establishment of technological infrastructure, like the imposed usage of a data exchange network with XML messaging standards, the compulsory sharing of specific databases, and the definition of specific data. Although one has to respect the intra-organizational informational autonomy of the participating organizations, did this not happen in practice. For the management of the infrastructure different service level agreements have been formulated which address the technological standards which should be taken into consideration as well as the speediness and the reliability of the information to be exchanged. These agreements focus on the implementation chain as a whole as well as on the rights and obligations of a specific group of functional identical links in the chain, like the group of local employment agencies. The most important political agreement is that the chain itself is a self-organizing chain in which the steering of the chain is a joint responsibility of the partners involved. In order to do so a chain coordination committee has been erected. The ministry of Social Affairs is only responsible for the functioning for the implementation chain as a whole as well as for the financing of the chain information infrastructure as a whole. The most important legal agreement is the specification of the data which should be obligatory exchanged. In the this implementation chain we see that architectural agreements has been primarily been defined from a legal perspective, focusing on the codification of the interests of the parties involved, which has been translated in technological requirements.
In the planning zone chain the emphasis is primarily on the definition of the specific technological exchange standards (like GML) and on the standardization of specific geographical data format, based on national and international geographical information

models. For the management of the technical standards an elaborated system of ICT and data model management. Up till now municipalities have not forced to use this the standards which have been developed. An important political rule of engagement was the voluntary participation of local and regional government, based on a bottum-up implementation strategy. The fact that a large number of municipalities did not adopted these standards, has forced the responsible Ministry of Spatial Planning to insert a deadline in a new law on spatial planning, which forces local and regional government to exchange planning zone schemes in a digital way. Up till now there is no specific law with deals with the digital exchange of local spatial plans. Moreover, there is no financial compensation for the local and regional government available for those governments which want to participate, because the potential benefits of digital exchange will compensate largely, the investments which local government has to made. In this implementation chain the technological rationality has been leading.
We have asked key-figures which factors, in relation to the kind of agreements that have been described, have contributed to the desired flexibility of the information architecture; or prevented it? According to our respondents the flexibility of the vehicle license chain was determined by the fact that only very firm agreements have been made between Vehicle License Agency and the garages, the post offices and insurance companies, only specify the minimal and critical requirements that are needed to have reliable interfaces - based on certification - in order to really guarantee a high quality in the exchange of information. The powerful position of the agency makes it possible to impose these requirements and change them, if this necessary. The idea to formulate only minimal requirements does not only reflect technological considerations. From the political rationality this was very important, but is was a way of showing how the internal organizational and informational autonomy of the organizations involved could be respected, which facilitates the inclusion of possible new partners. Moreover, the fact that one has worked with a price system per message also

contributed to the flexibility. Changes in the number of messages, for instance through changing legislation, could be rather easier compensated.

Respondents in the work & income chain officially stated that the use of nation wide and common infrastructure (sec), which is based on only the most critical technological exchange requirements and standards have enhanced the chain's flexibility, because it has only have a limited effect on the internal working and information process procedures and routines. This implies that no complex negotiations have to take place in order to integrate external and internal process and to formulate all kinds of exceptional conditions. This is a view which has also been underlined by our respondents in the previous implementation chain. Moreover, in order to preserve flexibility, the infrastructure has been based on international proven standards like XML. However, in the work & income chain, the conditions under which specific kind of information should be exchanged, have been worked out in detailed mandatory regulations and operational information policy guidelines, which specify which organization should sent and receive which kind of information. This has not stimulated the flexibility of the architecture, because these guidelines actually influence internal working and information processing procedures in detail, especially if they change frequently. These changes have to be translated in internal operational policies, which is costly but also generates resistance. On the other hand, the willingness of the Ministry of Social Affairs to finance the development and exploitation of the network, thereby facilitating the inclusion of new organizations, has contributed to flexibility.

In the urban planning zone chain flexibility has been achieved to use proven, internationally accepted information exchange standards and professional accepted information models. which define the contents of specific professional object-oriented geographical information.

Furthermore, voluntary participation as an important playing rule also contributed to the flexibility of the information architecture. Voluntary participation generates more support to make the necessary changes, because participants are easier to be convinced of the need to change and of possible costs. More recently we observe that the economic arrangements raised criticism. The agreement was that each organizations should pay its own expenses, but it has become obvious that especially the regional planning authorities receive most benefits. This puts the support for the chain under pressure.
However, not only the object and the nature of the arrangements (sec) influences the flexibility of an information architecture. An architecture is not being (re-)designed in a vacuum. Hence, it is important to investigate how the social and political conditions of the network of relations in which a implementation chain is located, influence the agreements made.

5.3 Flexibility as a Social and Political Quality

In this section we investigate the influence of the structure and dynamics of the relationships between the organizations that constitute a implementation chain, influences the perception of a flexible architecture. How can this be demonstrated?

In the Vehicle License Chain, flexibility is also been based on the powerful position of the Vehicle License Agency and the ability of the agency to (re)produce trustful relationships with those organizations that fulfill tasks on behalf of the agency. After all, the agency controls the Vehicle License Registry, which contains authentic and highly reliable information about the legal status of a vehicle which is used for different, but related administrative operations. The agency uses its legal competences and ICT resources to

position itself as the spider in a web of interrelated policy implementation chains, thereby weaving new ties in relation with new organizations and new activities in vehicle safety related sectors, while at the same time trying to respect the internal informational autonomy of the participating organizations. These powerful resources enable the Agency to impose specific agreements which can be altered rather easy, if conditions change as well as to determine which organizations is included or excluded in Agency's chains. On the other hand the agency acknowledges that it is dependent on the co-operation of these other organizations to fulfill a number of tasks on behalf of the agency, like the safety inspection of cars by certified garages. According our respondents, sheer power politics would create resistance and would frustrate the ability to change the architectural agreements. Hence, the agency has explicitly invested in the creation and reproduction of trust. Trustfulness has been defined as a necessary condition for flexibility, because garages, post offices and insurance companies can be seduced to make the necessary changes in their ICT organization, if they are convinced of the good intentions of the agency. This has been elaborated in three ways. First, the agency recognizes the importance of making firm and clear agreements, addressing only the most critical requirements which are necessary to exchange information. The ability to formulate minimal but firm agreements is seen as the expression of trust. Rather detailed agreements in which all kinds of eventualities have been described, are perceived by the agency as well as the other involved organizations as the expression of distrust. Second, if changes are necessary, the agencies and its partners together, analyze and assess the impact of the changes for all the parties involved. These joint impact assessments are being perceived by all the stakeholders involved as important instruments to generate trust. They create an open agenda for negotiation, based on a systematic assessment of possible positive and negative effects through which it is easier to define 'win-win' changes. The allocation of costs and benefits of the ICT-measures to be taken is for instance a recurrent theme on this agenda. Third, the

agency has developed an elaborated system of customer relation management, using account managers as the eyes and ears of the agency in order to detect problems in an early stage.

The key respondents who represent different organizations in the Work & Income chain also define the flexibility of an information architecture as the outcome of the quality of the relationships between the. They perceive the flexibility as limited, because the history of the chain is one of the suspiciousness. Collaboration was imposed through a blue-print, based on the Work & Income Law. The law offered to the participating organizations little opportunities to shape the functioning of the chain according to their own wishes and needs. Our key-respondents define these detailed rules, prescribing which organization should receive or send information and under what conditions, as the expression of distrust. Changes in legislation has led to continuing and difficult negations about the nature of the implementation rules and how to translate these rules in specific information policies, which then has to be translated in the already detailed information architecture and different service level agreements. Suspiciousness has been increased by the fact that the chain lacks as an organization which was actually capable to steer the operational functioning of the chain, although formally the Ministry of Social Affairs is responsible. The chain coordination committee that was foreseen in the law, has limited competences and only grew slowly in significance, once its added value has gradually been proven. In the beginning this has led to an elaborate system of consultation and negotiation arenas, which has frustrated the ability to change. Compromises which have been reached in one arena, were cancelled in another one; or divergent solutions were worked in different arenas. The distrust between the parties involved has also been increased through the fact that the law did lead to a redefinition of the tasks and competences of the organizations involved. This implied that issues that addressed the design an redesign of the information architecture, were defined as a competence question.

Information politicking has been the result. Moreover, the re-allocation of competences among the organizations involved has also influenced the internal working and information processing processes within the participating organizations. Existing working and information processing practices were challenged, which led to resistance; resistance which persisted if, new legal changes were translated in the information architecture.
However, recently the relationships within the implementation chain have improved, which enhanced the flexibility of the information architecture. First, the already foreseen co-ordination committee has acquired more credit and is regarded as an useful mechanism to diminish the intensive consultation rounds. Second, parties have switched their primarily internal focus towards an common external goal: putting clients first. Through this common frame of reference it has become easier to legitimize changes in the information architecture.

The last implementation chain is the planning zone chain. According to our respondents there is a relationship between the flexibility of the information architecture and the political principle that participation of local and regional government in the implementation chain is voluntary. This generates support which makes it more easy to propose and implement changes. They all share the same goals, because they are all convinced of the benefits of the digital exchange and drafting of the spatial plans, although they have to bear all the costs. The voluntary character of the project has also led to specific arrangements for consultation and negotiation. In contrast to the previous implementation chain, these arrangements are perceived as contributing to the flexibility of the architecture, because specific wishes and interest can easier be heard and are not suppressed by the most powerful organization. Tailor-made solutions are possible. Furthermore, this bottum-up process facilitates an evolutionary process, in which the project can develop itself according in its own pace; in this process of 'trial and error' an open attitude towards changes did prevail. Moreover, the fact that

digitalization of the urban spatial plan did no challenged the existing distribution of tasks and competences was also being defined as a contribution to trustworthy relationships.

6. Conclusion

The aim of this article is to investigate which factors account for the way flexibility is achieved in information architectures that facilitate the exchange of information and the use of ICT in policy implementation chains. In order to do so we have stressed that it is important to define an information architecture as a set of agreements which facilitate this exchange. However, these agreements do not only reflect technological requirements, but also refer to other rationalities which are important if implementation processes are computerized. Moreover , it is important to take into account the structure and dynamics of the relationships of the policy sector in which a implementation chain is located, because information and ICT are important resources which organizations use to protect their domains and interests. This implies that flexibility is not only a technological feature of an architecture, but is also a political feature, because it subjected to information politicking or resource politics.
From an information planning perspective two roads of achieving flexibility have been distinguished. Following the ‘low’ road flexibility can be achieved through the specification of minimal, but critical standards and interfaces that makes it possible to exchange information between rather autonomous organizational units. The ‘high road’ focuses on creating flexibility and efficiency through uniformity, based on centralization. Core applications are designed to be organizationally independent , i.e. are immune to the restructuring of an organization. Our case study research show that the choice for one of these roads or the combination of both do not account for the perceived flexibility of the

architecture. Arguing from a technological point of view, all the respondents were rather satisfied about the way technology (itself) did contribute to the flexibility of the implementation chain. However, they stress that in the end flexibility is being achieved through the combination of different kind of agreements, in which, besides technological requirements, also other issues have to be specified.

In the Vehicle License Chain flexibility is achieved through the combination of a technological concept, specifying the linkages between a variety of systems and networks, and the political and administrative agreement to respect the autonomy of the participating organizations and their internal processes. In the Work & Income chain flexibility was frustrated by the detailed legal requirements that have to be translated in detailed information policies and regulations, which, ultimately, influenced the internal working and information processing procedures and routines in the participating organizations. In the Planning Zone Chain flexibility was achieved through the combination of choosing unambiguous, international accepted and proven standards and the political agreement that participation should be based on a voluntary basis.

Economic agreements are also important. Flexibility can be achieved if a tariff structure per message is being used (Vehicle License Chain) or one party takes all the operational costs (Work & Income Chain) and/or the strategic investments (Vehicle License Chain and Work & Income Chain). Complicated budget allocation discussions, focusing on who gets what funds in relation to expected amount of messages, can then be avoided. In the Planning Zone Chain we see that the established economic agreements begin to undermine the flexibility of the chain, because costs and benefits are being perceived as no longer in balance.

The flexibility of an architecture is also influenced by the nature of the agreements made. In the Vehicle License Chain and the Planning Zone Chain one has chosen for unambiguous, firm agreements, specifying only this vital conditions under which the chain could work. In

the Work & Income Chain flexibility was diminished through the use of very detailed agreements, which try to foresee in all kinds of eventualities.

The research also shows the importance to look at the relationship between the perceived flexibility of an information architecture on the one hand and the power relationships between the participating organizations and the quality of their collaboration process on the other hand. These two factors influence the object and the nature of the agreements which are made as well as the readiness to re-consider existing architectural agreements. The powerful resources of the undisputed Vehicle License Agency contributed substantially to the flexibility of the information architecture, but at the same this has not led to the misuse of power, because the agency wants to establish trustworthy relationships, focusing on 'win-win' changes. In the Work & Income Chain there is no powerful, undisputed organization which could impose the necessary changes. The idea of self-regulation by the implementation chain itself has contributed to distrust and to a continuous battle about competences in different arenas, which is expressed in continuously changing and detailed agreements. A dominant chain director is also absent in the Planning Zone Chain, but the fact that all the participating organizations share the same vision how to improve the exchange of zoning plans did contributed to a shared understanding of how to proceed and how to make changes. This was absent in the Work & Income Chain.

These results have important implications for architecture development in policy implementation chains. Successful development, in terms of creating flexible architectures, implies that it is important to recognize the multi-rational kind of agreements which have to made in order to exchange information, while at the same time it is important to take into account the structure of power relationships between the implementation chain partners as well as the quality of the relationships between them.

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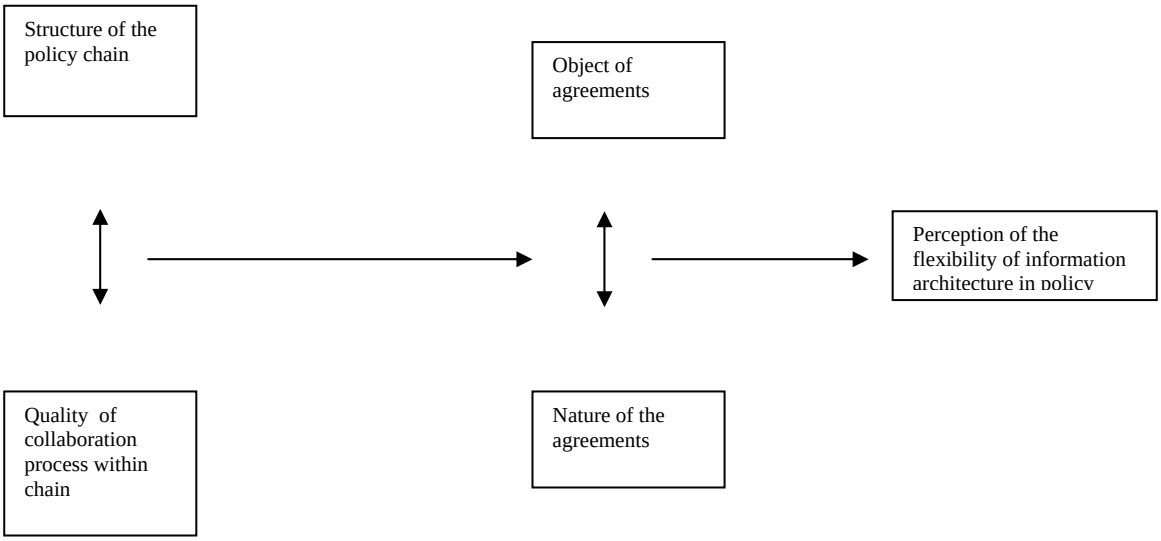

Figure 1. Relevant variables and relationships

Table 1 Architectural agreements in three policy implementation chains

Policy Implementation chain/ architectural agreements	Vehicle Licence Chain	Work and Income Chain	Planning Zone Chain
Political and administrative agreements	• Acknowledgement of the central and legal position of the Vehicle License Agency as guardian of a trustworthy Registry • Respect of the intra-organizational and informational autonomy of participants	• Self-steering of the chain by the participating organizations; • Respect of the intra-organizational and informational autonomy of participants	• Voluntary participation
Technological agreements	• Standardization and certification of interfaces • ICT- Management agreements, laid down in 'service level agreements'	• Legally imposed use of a exchange network and exchange standards, sharing of databases and the shared data definitions • Detailed information exchange guidelines • ICT-management agreements, laid	• Standardization of data exchange and data definition models, based on nation-wide and international standards • Elaborated ICT and data model management

		down in ‘service level agreements’	
Economic agreements	• Annual tariff structure for regular messaging; • Additional agreements for incidental investments	• Ministry of Social Affairs finances the infrastructure and the costs of information exchange	• Each participant should bear its own costs and investments
Legal agreements	• Division of competences based on legal requirements	• Legally based information architecture with detailed specification of data to be exchanged • Detailed regulation division of competences based between parties involved	• Legally fixed deadline of obligation to exchange digitally in a new law on spatial planning