

Governance of shared digital artifacts in the public sector: A multi-dimensional approach

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Abstract

The use of digital artifacts in the public sector goes often beyond one single public agency. Many e-government situations imply a shared digital concern between several public agencies. This means that several public agencies collaborate, in one way or the other, in governance of shared digital artifacts. This paper addresses demands of such collaborative IT-governance. It presents parts of a guide for co-governance of shared digital artifacts in the public sector. This guide consists of 1) a multi-dimensional conceptualization and 2) procedural guidelines for co-governance. This paper presents the multi-dimensional conceptualization behind the guidelines. This conceptualization implies a way of thinking of and categorizing digital artifacts and their governance. The conceptualization is divided into two groups of dimensions. One group concerned with aspects of digital artifacts that needed to be addressed during governance (referential dimensions), and one group is concerned with means of governance (modal dimensions). The multi-dimensional conceptualization consists of the following (referential) dimensions of digital artifacts: Relational, performative, semantic, interactive, architectural and technical dimensions. The multi-dimensional conceptualization consists of the following governance means: Normative governance, regulatory governance, economic governance, knowledge governance, tasking governance and organizational governance.

This conceptualization has emerged through a longitudinal research approach, which has contained a multi-case study of eight shared digital artifacts, interactions with knowledgeable practitioners in focus groups and project committees and the conduct of an empirical study where the guide was applied in a strategic evaluation of a shared digital artifact and its governance.

1 Introduction

The digitization of the public sector faces many challenges. There are regulatory issues that restrict and direct the design of digital artifacts in different ways (e.g. Knackstedt et al, 2013). The relations to citizens and other stakeholders put certain demands on IT design and management (e.g. Axelsson et al, 2013). Many public tasks and services relate to more than one public agency. This means that it is fairly common that a specific digitization is a concern for several public agencies. One well-known example of this is the case of inter-organizational exchange of digital information, which has been a hot topic for a long time (Andersen, 1998; EU, 2010). There are, however, also other situations of digital design, where several agencies might be involved. For example, there exist shared websites (“one-stop government”) that address complex life-events/life-situations of citizens (Vintar et al, 2002; Wimmer, 2002), which cannot be managed within the “stovepipes” of single authorities.

This paper addresses shared digital artifacts within the public sector and especially the governance of such shared digital artifacts. The notion of *shared digital artifact* is broad and inclusive. It covers several appearances of public digitization; those mentioned above (inter-organizational exchange of digitized information, shared websites) and others as well. The existence of common (standard) IT-systems in different public agencies is one other example. This is fairly common for back-office purposes in local governments. The use of similar e-services in local governments is another example. All these cases of public digitization put demands on how IT governance should be accomplished through the interaction among several public agencies. We use the concept of a *shared digital concern* among different public agencies. This implies also that we use the related concept of *co-governance* to denote the involvement of several organizations in the governance process.

A further note on the terminology ‘shared digital artifact’ is needed. We use the word ‘digital artifact’ in singular in this text. In many situations it could be more appropriate to talk about a collection of related digital artifacts. Nowadays, it is not always easy to judge what should be considered as *one* digital artifact or *several* digital artifacts since there is usually a great degree of digital connectivity between different digital artifacts. When we talk about a shared digital artifact below, this might denote what is considered as one single artifact or it might also denote several related digital artifacts that are considered as a shared digital concern. It is not important in this text to distinguish when there is *one single unit* of a digital artifact or when it is a *collective* of several related digital artifacts within a shared digital concern. It should also be noted that we use the word ‘digital artifact’ as a synonym to ‘IT artifact’.

Activities of IT governance are demarcated as *strategizing* and *planning* of such resources that should precede any concrete development and design of those resources. Today, many public practices are more or less digitized. This implies that such an IT governance situation does not start with a clean slate. On the contrary, the existence of IT resources entails some kind of assessment of those resources as one important issue within IT governance. We demarcate IT-governance as activities of 1) evaluation of a focused practice with regard of its current digitization, 2) investigating digital opportunities and restrictions for such a practice and 3) strategic decision making concerning the future direction of such a digitized practice.

The governance of IT resources within one organization is a challenging task. It is an even greater challenge when several organizations are involved in collaborative governance. The

presented research is based on an interest in such challenges of co-governance of shared digital artifacts in the public sector. What is reported in this paper is one part of a larger research endeavor on governance of public digital artifacts. The research has been driven by a general interest in co-governance of public sector IT; more specifically by questions and issues such as:

- How to organize collaboration between public agencies in governance of shared digital artifacts?
- What governance means/mechanisms occur in public sector IT governance?
- How should an appropriate procedure look like for co-governance of shared digital artifacts?
- What aspects of a digital artifact should be addressed in co-governance of such artifacts?

The purpose is to present *a conceptual framework for co-governance of shared digital artifacts in the public sector*. The research started with several case studies of shared digital artifacts and their governance. Based on a cross-analysis of empirical data from these case studies, we started to develop guidelines for IT co-governance in the public sector. There exists an outline of such guidelines. The description of these guidelines is fairly extensive and we will not present them in this paper. We have selected the core of the guidelines, which is a conceptual framework of co-governance. The essence is a *multi-dimensional conceptualization* of shared digital artifacts and their co-governance.

We present the research approach for development of this conceptual framework in the next section. In section 3 we present the multi-dimensional conceptualization. The paper is ended in section 4 with discussion and conclusions.

2 Research approach

2.1 Epistemological determination

We have applied a combined research approach with empirical post-hoc studies and design-oriented studies. The research started in 2014 and is still running although not as intense as the first years. It has been conducted through several phases. We structure the description into three phases:

1. Empirical case studies of shared digital artifacts
2. First development co-governance guidelines
3. Further refinements of co-governance guidelines including empirical grounding

We have developed a guide for co-governance consisting of 1) a multi-dimensional conceptualization and 2) procedural guidelines. The co-governance guide can be interpreted as a practical theory (Cronen, 2001; Goldkuhl, 2007); i.e. a conceptual tool to be used for inquiries. It is intended to be used by practitioners of public administration in *inquiries-as-governance*. By this expression we mean that governance should be (seen as) a knowledge generating and knowledge utilizing activity. Knowledge generation and utilization should be fully integrated with the governance activities. In section 1, we described governance as consisting of the diverse activities of evaluation, investigation and decision making. All these activities relate to knowledge generation and utilization. As a practical theory, the knowledge content of this guide should also be useful for e-government researchers when inquiring IT governance or digital artifacts (Goldkuhl, 2007).

The conducted knowledge development can be framed in terms of design science (Hevner et al, 2004). Research following design science produces artifacts of diverse kinds to be used by different stakeholders. Design science in information systems is probably best known for generation of IT artifacts as result from such research. However, there are other types of artifacts mentioned as possible outcomes from design science research, such as constructs, methods and models (ibid; March & Smith, 1995). These artifact types correspond well with what a practical theory in general might comprise. According to Goldkuhl (2007), a practical theory may consist of conceptualization, patterns, normative criteria, design principles and models. The developed guide corresponds well to the following design science artifacts: conceptualization as constructs and procedural guidelines as a method.

A design science endeavor needs to work iteratively with 1) designing, 2) evaluations in relations to practice and 3) using and producing abstract knowledge (Hevner et al, 2004). In general terms this is what has been done in this research endeavor, which is accounted for below.

2.2 Phase 1: Qualitative case studies on shared digital artifacts

The first research phase was a fairly extensive empirical investigation of shared digital artifacts. Eight qualitative case studies were conducted in parallel with studies of fairly large and complex shared digital artifacts. This is thus a multi-case study approach (Yin, 2014). There were studies of the following shared digital artifacts:

- National health portal.
- National business link portal.
- Digital post from public agencies to citizens.
- E-prescription: information exchange from medical prescribers to pharmacies.
- Information exchange for social welfare allowances.
- Common system for study results within higher education.
- Platforms for municipal e-services (for applications from citizens).
- Joint system for admission to upper secondary schools in one county.

The case studies were conducted mainly in parallel and they were conducted by four different researchers. In order to manage this multi-case research we needed a common investigation guide that was followed in each of these cases. This guide comprised questions and aspects to address during the empirical studies. It was structured into several dimensions that were deemed important for inquiring the shared digital artifacts and their governance. The dimensions were developed from the conceptualization of four interoperability layers (EU, 2010). These layers are legal, organizational, semantic and technical interoperability. These four interoperability layers were expanded into seven dimensions in our investigation guide. The seven dimensions were: normative, regulatory, relational, performative, semantic, interactive and technical; confer figure 2. A description of this transition from four interoperability layers to seven dimensions can be found in Goldkuhl & Röstlinger (2015).

These empirical investigations were conducted as qualitative case studies, which imply a broad inquiry of several different aspects. We conducted interviews with different stakeholders (decision makers, project leaders, designers). We collected and studied documents of diverse kinds; e.g. regulations, policy papers, plans, assignments, design

documentation, evaluation reports. We also studied the digital artifacts as such. This means a study of user-interfaces and documents generated by the artifacts.

The case studies generated extensive qualitative data. These empirical data were analyzed both inductively and informed by the investigation guide with its questions and issues structured according to the seven dimensions mentioned above. The empirical analyses were conducted case by case but also cross-case. In these cross-case analyses we were governed by the seven dimensions. The empirical analyses can be described as a 7 dimensions x 8 cases analysis (figure 1). A summary report from our empirical analyses can be found in Goldkuhl et al (2014). It is beyond the scope of this paper to empirically report from this extensive multi-case study.

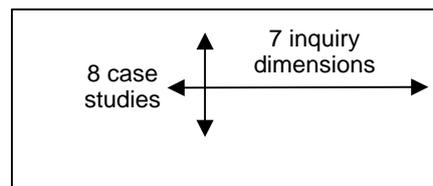


Figure 1. A 7*8 analysis conducted in the research project

2.3 Phase 2: Development of preliminary co-governance guide

A second phase of this research started after the empirical investigations and their data analyses had been concluded. The experiences from the investigated eight shared digital artifacts indicated important aspects to address in collaborative IT governance. There was a potential to transform the learnings and insights from the empirical studies to preliminary guidelines for co-governance. This means a move from *descriptions* to *prescriptions*. We developed an outline of a co-governance guide with intended use by policy makers, decision makers and designers of shared digital artifacts in the public sector. This guide consisted of 1) a multi-dimensional conceptualization and 2) procedural guidelines for strategic evaluation and improvement of shared digital artifacts. There were procedural guidelines for each dimension. The multi-dimensional conceptualization was initially based on the seven dimensions from the investigation guide from phase 1 of our research. These dimensions had been very fruitful and generative for data generation, data analysis and conceptual development. Our assumption was that these dimensions should also be appropriate for a governance guide. However, our investigation guide was based on certain delimitations made for the conduct of our case studies. Certain aspects were excluded from our inquiries; for example economic aspects.

We inspected the dimensions in the guide development and made some additions and some modifications based on the purpose of formulating governance guidelines. We added an economic dimension and we divided the technical dimension into two dimensions: architectural and technical; confer figure 2. This provisional guide was presented for a fairly large group of practitioners and we were encouraged to continue this research. A third phase of the research was initiated.

2.4 Phase 3: Empirical tests and further development of co-governance guide

The third phase consisted of several activities. 1) We initiated and interacted with a reference group consisting of qualified practitioners; persons with interests in policy issues of e-government. 2) We also arranged two focus groups sessions with qualified practitioners. They were instructed to read our guide and reflect on it based on specified questions and issues. Each focus group consisted of five practitioners. For each focus group we had a half-day workshop and the authors of this paper acted as moderators of discussions. The workshops were audio-recorded and notes were taken. Focus groups are considered as an important way of testing emerging artifacts in design science (Tremblay et al, 2010).

Through these focus group workshops and the meetings with the reference group we have obtained many valuable comments on our emerging guide. These have influenced the contents and presentation of the guide. These interactions with knowledgeable practitioners have been one way to improve and empirically validate the guide. Besides this we have 3) conducted an application study where parts of the guide were utilized in a strategic evaluation of a shared digital artifact. We selected a well suited digital artifact to study (digital support for the formulation, storage and transfer of medical certificates). A collaborative case study was set up and conducted together with some qualified practitioners from the studied domain. The digital artifact was studied based on the guide with its multi-dimensional conceptualization. The empirics consisted of group meetings (audio-recorded), extensive documentation and the digital artifact itself (through user-interface inspections). We did not only study the digital artifact, but also the governance processes that had guided its development over several years.

The third phase consisted thus of these different empirical activities, where our ideas about how to view and conduct IT co-governance were confronted with practice. The third phase also consisted of 4) further conceptual development. The dimensions of IT governance were divided into two groups: One group concerned with aspects of digital artifacts that needed to be addressed during governance, and one group concerned with means of governance; confer figure 2. This will be further described in section 3 below. In this conceptual development we also added two governance means, besides the already generated. The two new governance means are knowledge governance and tasking governance (see section 3.2 below). It became obvious from conducted empirical studies that these two dimensions were missing and should be added.

3 The many dimensions of shared digital artifacts and their governance

3.1 The emergence of a co-governance conceptualization

The co-governance conceptualization has emerged through the three research phases described in section 2.2-2.4 above. The emergence of the many dimensions is depicted in figure 2. In research phase 1 (the multi-case study), seven inquiry dimensions were created based on the well-known four interoperability layers (cf. section 2.2). These seven dimensions were in research phase 2 transformed into nine co-governance dimensions (cf. section 2.3). In research phase 3, we made a division of these nine dimensions into six co-governance means and six digital artifact dimensions (cf. section 2.4). This division will be further described in section 3.2-3.3 below.

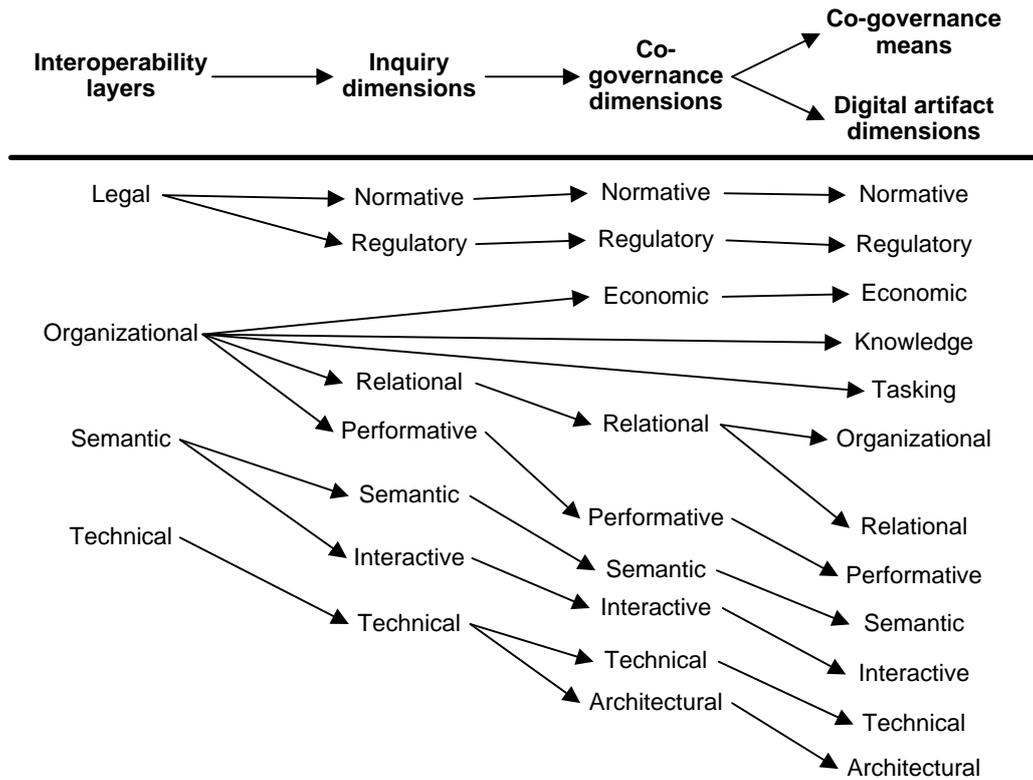


Figure 2. The emergence of a co-governance conceptualization

The trajectories of the emerged dimensions can be followed in figure 2.

We do not claim that any of these dimensions (as categories) are generated through this research. They are all known from practice and research. The knowledge contribution from this research is the way these are put together as dimensions for governance and in governance. This conceptualization is part of the co-governance guide that also contains procedural guidelines for each dimension. This means that the conceptualization is further operationalized through these guidelines. It is however beyond the purpose and scope of this paper to present the procedural guidelines.

3.2 Co-governance means for shared digital artifacts

Governance of public digitization is conducted by political bodies (parliament and ministry) and public agencies (such as national authorities, counties and municipalities). The political bodies create directives of diverse kinds with relevance for e-government development. Our focus in this paper is how public agencies interact in co-governance of shared digital artifacts. It needs to be noted that those agencies receive and are dependent on “governance signals” from political bodies. Such directives (governance signals) are transformed, translated and refined during the governance processes of the public agencies (see figure 3).

Through our research we have arrived at a division into the following kinds of governance exercised by public agencies in their collaborative efforts to govern shared digital artifacts:

- *Normative* governance (through expressed values and goals)
- *Regulatory* governance (through codified regulations)
- *Economic* governance (through economic principles and decisions)
- *Knowledge* governance (through developed knowledge about practices and digital artifacts)
- *Tasking* governance (through explicit assignments, plans and decisions)
- *Organizational* governance (through collaboration forms, roles and relations between public agencies)

‘Governance’ significates here the influence on the digital artifact in a desired direction. Different governance directives influence the work of development, change and maintenance of digital artifacts in order to make them functional and attractive for their different users. Those six governance means¹ mentioned above can be found in figure 3. The first five are explicitly mentioned in figure 3 as governance means as they imply different types of *communicative actions of directive kind* (Searle, 1969). The sixth (i.e. organizational governance) is the way that cooperating agencies interact in the governance process. It can, of course, exist documentation concerning this cooperation as for example agreements and committee directives.

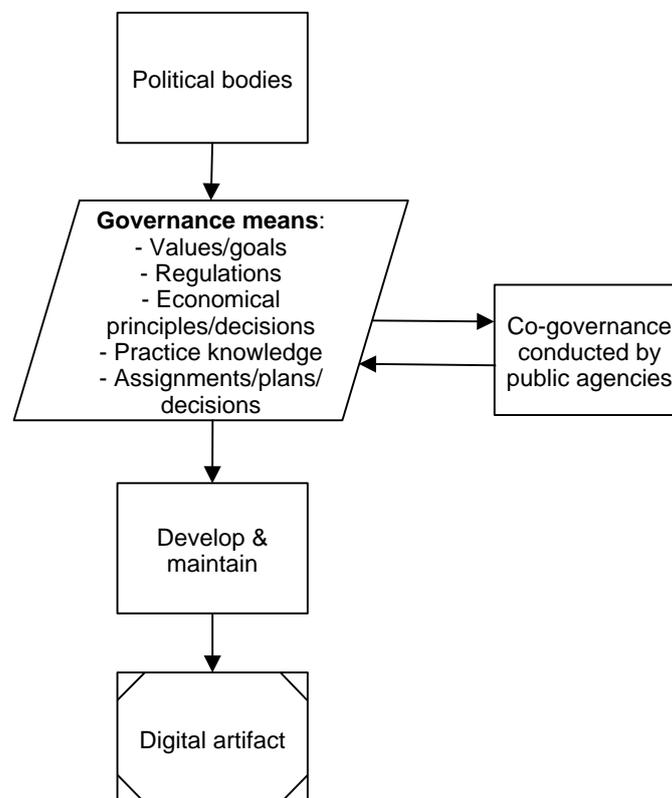


Figure 3. Governance and governance means concerning shared digital artifacts in the public sector

¹ We use the terminology ‘governance means’. Another way to denote this is through the word ‘governance mechanism’. We avoid this wording due to its mechanical connotations.

Normative governance signifies governance through expressed values and goals. These can be stated in different kinds of policy documents. There is a growing recognition that normative aspects are very important in e-government (e.g. Rose et al, 2015; Cook & Harrison, 2015). *Regulatory governance* signifies governance through regulations as laws or other statutes. This can also comprise the governance through standards or official guidelines. The great influence from regulations on e-government development is recognized by many scholars (e.g. Allouache & Khadraoui 2011; Knackstedt et al, 2013; Hasan et al, 2017). *Economic governance* signifies how digital artifacts are financed in stages of investment/development and continual operation. Costs for shared digital artifacts are often divided in some way between responsible agencies. Economic aspects do not seem to be high priority in e-government research. One exception is Gupta & Jana (2003). *Knowledge governance* signifies the use of developed knowledge on digital artifacts and their use. This may comprise different kinds of evaluations and benchmarkings (e.g. Heeks, 2006; Mosse & Whitley, 2009; Luna-Reyez et al, 2012). This can also comprise the use of theoretical knowledge that might be of relevance for the actual digital artifact. *Tasking governance* comprises specific assignments, plans or decisions concerning the shared digital artifact. These can be fairly detailed concerning time and specified tasks. *Organizational governance* signifies the way that cooperation and decision-making has been arranged among public agencies that involved in the governance process. This includes what kind of roles different agencies have in relation to the shared digital artifact. This may comprise issues of ownership, power and authority, responsibilities, cooperation forms and division of work in committees and project groups concerning a shared digital artifact.

The six governance means are summarized in table 1. In the second column, different workpractice aspects are mentioned that relate to each governance means.

Dimension	Workpractice aspects	Quality aspect of digital artifact
Normative governance	Goals and values	Normative compliance and clarity
Regulatory governance	Regulations (laws/statutes, guidelines, standards)	Regulatory compliance and clarity
Economic governance	Economic principles and decisions; financing/investments, assets, costs, benefits	Cost/benefit efficiency
Knowledge governance	Use of digital artifacts in workpractices; sometimes cross-organizational comparative knowledge	Compliant with designerly knowledge of workpractices
Tasking governance	Assignments, plans and decisions concerning shared digital artifact	Compliant with designerly intentions
Organizational governance	Stakeholders, roles, social relations, responsibilities	Accountability, director visibility

Table 1. Six dimensions of governance means for governance of digital artifacts

The third column describes quality aspects of digital artifacts that relate to each governance means. A digital artifact should be intentionally influenced by these different governance

means and it should thus be possible to trace such governance influence: In what ways a digital artifact is considered good with reference to a specific governance means?

A digital artifact is good if it complies with stated normative values: such a digital artifact has *normative compliance and clarity*. When inquiring a digital artifact, from a normative perspective, it should be possible to find different normative traces. The digital artifact should be considered a normative carrier (Goldkuhl, 2016). A similar reasoning can be applied concerning the regulatory dimension. A digital artifact should have *regulatory compliance and clarity*. It should be seen as a regulatory carrier (ibid).

A digital artifact can be seen as an economic asset. Time and money are invested into its development and operation. The quality dimension of economic governance is *cost/benefit efficiency*. Knowledge governance significates that considerations are made concerning established knowledge about the specific digital artifact and/or related digital artifacts. There might not be any direct traces of such knowledge in the digital artifact, but there may exist designed measures that are *motivated by this established knowledge*. Different plans and decisions (as elements of tasking governance) may be possible to trace in a (re)designed digital artifact. This means that the digital artifact is *based on certain change intentions*.

Organizational governance is concerned with how different public agencies participate in collaborative decision making. These public agencies are those responsible for the digital artifact; i.e. the “directors” that are providing the digital artifact (as a resource) to its users. This aspect of resource responsibility can be expressed as an issue of *accountability*; i.e. the public agencies (the directors of the digital artifact) can be held responsible for the properties and performance of the digital artifact. One condition for this is that there exists some *visible notice* that these agencies are those responsible for the digital artifact.

3.3 Dimensions of digital artifacts to address in co-governance

These six governance means, described above, imply *how* governance is exercised; a *modal aspect of governance*. The main object of this co-governance is the shared digital artifact. This means that different aspects of the digital artifact need *be addressed* strategically during governance processes; i.e. *referential aspects of governance*. Such aspects have been structured, within our conceptual framework, in six dimensions: *Relational* dimension; i.e. what user groups employ the digital artifact in their roles as information suppliers or information recipients. Public sector digital artifacts are used by citizens in front-office contexts and by public administrators in back-office contexts. Digital artifacts are used as supportive tools for communication between such different user groups. Within the e-government research community there is a great interest into citizen roles and the roles of governmental users (e.g. Hamid & Sarmad, 2008; Holgersson et al, 2010; Scott et al, 2011; Axelsson et al, 2013). *Performative* dimension; i.e. what functionality does the digital artifact contain? This dimension involves what types of e-services and other digital functions that the digital artifacts comprise in relation its different user groups. Especially, the character of e-services has been high on the research agenda in e-government (e.g. Layne & Lee, 2001; Goldkuhl, 2007; Lindgren & Jansson, 2013; Jansen & Ølnes, 2016). *Semantic* dimension, i.e. what information resources are managed within the digital artifact; and how this information is related to work languages in public administration practices. Issues of information quality have surprisingly not always been high on the e-government research agenda; however, there

are exceptions (e.g. Gil-Garcia et al, 2007; Klischewski & Scholl, 2008; Detlor et al, 2013). *Interactive* dimension; i.e. how is the user–artifact interaction designed and working? Aspects of usability and HCI are not highly prioritized in e-government research, but there exist some relevant studies (e.g. Bertot et al, 2006; Clemmensen, 2011; Tan, 2013). *Architectural* dimension; i.e. what relations exist between different digital artifacts. How do different digital artifacts interoperate? Issues of digital architecture, systems integration and interoperability are well addressed by e-government scholars (e.g. Lam, 2005; Guijarro, 2006; Klischewski & Scholl, 2008). *Technical* dimension; i.e. what technologies are used to realize the digital artifact?

These dimensions are further described in table 1. In column 2 of this table, the dimensions are explicated through what workpractice aspects they relate to. Each dimension holds some specific quality aspect of digital artifacts, which can be seen in the table (column 3).

Dimension	Workpractice aspects	Quality aspect of digital artifact
Relational	Stakeholders, communicator roles, social relations	Target group clarity, information originator clarity, availability/security for users
Performative	Work processes and procedures, digital functionality	Functional repertoire & quality, workpractice efficacy
Semantic	Information and language use (workpractice language)	Information quality, workpractice language compliance & clarity
Interactive	Presentation and interaction through user-interfaces	Usability, availability
Architectural	Relations and interplay between digital artifacts in digital landscapes	Co-functionality, interoperability
Technical	Technologies for software & hardware, technical realization	Robustness, technical efficiency & security

Table 1. Six dimensions of digital artifacts to be addressed in governance

Most quality aspects can be related to users of the digital artifact, since these are the ones that should benefit from the use of the artifact. However, there are some issues that explicitly relate to the user dimension. It should be clear to potential users that they belong to the category of stakeholders that should, in one way or the other, use the specific digital artifact. This is called *target group clarity*. This concept comprises not only the *intended digital artifact users*, but also intended *information users*, i.e. those users who should receive and potentially use information generated from the digital artifact. Our conception of a digital artifact builds on communication view, i.e. a digital artifact is used for communication in workpractices (Goldkuhl, 2007). This entails that not only the intended recipients (as information users in target group clarity) should be visible, but also the originators of the information. This is called *information originator clarity*. The relational dimension comprises also another quality aspect: *availability/security for users*. This means the capability of a digital artifact to let the intended users have access to the digital artifact and its functionality and information; and to secure that no non-authorized actors get access to the artifact's functions and contents.

The performative dimension covers the functionality of the digital artifact; that it has an *appropriate functional repertoire*. The use of such digital functionality should contribute to *workpractice efficacy*. The information content of the digital artifact should be of high quality (*information quality*). The linguistic categories that are used for storage, transfer and presentation of information should be well aligned to language that is used in the workpractice context of the digital artifact. This is called *workpractice language compliance and clarity*.

Quality in interaction is often labelled as *usability* and *availability*. The architectural dimension highlights relations between digital artifacts in networks; i.e. the artifacts should function well together (*co-functionality, interoperability*). Quality aspects of the technical dimensions are *robustness* and *technical efficiency and security*.

Some of these quality aspects are well-known and also applied for design and in evaluation; e.g. information quality (semantic dimension), usability (interactive dimension) and interoperability (architectural dimension). Other quality aspects do not seem to be known to the same degree as e.g. information originator clarity (relational dimension) and workpractice language compliance and clarity (semantic dimension).

4 Discussion and conclusions

This multi-dimensional conceptualization should be considered as *ways of thinking* in co-governance of shared digital artifacts in the public sector. This covers how to *strategically assess* existing digital artifacts in a defined public domain and to *strategically direct* the future of digitization in this domain. Strategic planning of IT is well covered in the literature. There exist many textbooks and articles on this matter; one example is McKeen & Smith (2015). We use this publication here as a typical example of strategizing in IT governance. This book has many benefits and covers much research in this area and it definitely tries to present useful guidelines for practice. However, it is not oriented to e-government and the specific features of the public sector. In this sector, IT governance principles and procedures are dependent on the specific character of its political, administrative, regulatory and normative orientation. The different governance means, as described in section 3.1 above, are results of our in-depth qualitative case studies and the reading of many policy and evaluation reports in e-government. The general business character of IT strategizing in McKeen & Smith (2015) does not capture the specifics of collaborative IT governance in the public sector as we have tried to achieve through our conceptualization of different governance means.

We have also another key message in our co-governance conceptualization: Policy-makers should think strategically about the “governance object”, i.e. they should strategically address different aspects of shared digital artifacts in the co-governance process. This is why we have elaborated the different dimensions of digital artifacts to address during co-governance (see section 3.3 above). It is a bit surprising that a strategically oriented publication on IT governance, such as McKeen & Smith (2015), devote so little focus on the IT artifact. Sometimes, we think that their text could concern governance and management of any technological object. A lot is said about collaborative practices between IT units and business, IT leadership and IT portfolio management and similar issues; but not so much about the

specifics of IT artifacts. A key contribution from our hands is the conceptualization of digital artifacts (as expressed in section 3.3), with the intent that this framework should direct and structure the co-governance discourse among cooperating public agencies.

The knowledge contribution, presented in this paper, is a multi-dimensional conceptualization of 1) digital artifacts and the 2) co-governance of such digital artifacts. The epistemological character of this kind of conceptualization is *not a matter of truth*. It is not possible to judge this conceptualization to be true or false. The primary validity claim for this kind of multi-dimensional conceptualization is *adequacy*. An appurtenant validity claim is *usefulness* in co-governance. When assessing its validity claims (Habermas, 1984), questions and issues, like these, need to be posed and inquired: Are the different constructs (dimensions) adequate categories to use for understanding of digital artifacts and their governance? Are they useful for how to arrange and conduct the co-governance of digital artifacts? It is an issue that each category (dimension) should be conceptually clear and that the different dimensions taken together give a comprehensive and coherent view of digital artifacts and co-governance.

The main emphasis, so far, in our research has been towards 1) conceptual clarity and congruence and 2) practical relevance and usefulness. The emerging conceptualization should be well founded in the empirical reality of co-governance of shared digital artifacts. It should be considered adequate and useful for practitioners in the field. Our validation of this conceptualization has so far had such an orientation. It was developed founded on a thorough empirical basis (eight in-depth case studies). During its continual development, with different alternative categorizations (confer figure 2), there has been many and extensive discussions with our cooperating practitioners (in steering committee, reference group, focus groups). These discussions have contributed to sharpening the conceptualization and its intelligibility among practitioners. Responses from practitioners are positive, especially concerning its coverage of different aspects. When compared to other e-government guidelines, this guide/conceptualization is found more comprehensive and covering. This strength is also considered as its main weakness. Since the guide covers many aspects, it consists of many issues to address. It is thus considered heavy to apply. These comments on heaviness concern mainly the different procedural guidelines and not the multi-dimensional conceptualization.

The development of this conceptualization has so far been oriented to discourses with practitioners. This presented paper can be considered as an attempt to engage in a more scholarly discourse on its adequacy and potential usefulness. A more thorough conceptual investigation is needed concerning the different dimensions in relation to scholarly literature. This is one important future research task.

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