Towards Electronic Governance – Gaining Evidence for a Paradigm Shift in Governance from Federated Identity Management

Thomas Zwahr, Pierre Rossel, Matthias Finger

Ecole Polytechnique Fédéral de Lausanne, College of Management of Technology, Chair MIR, Lausanne

thomas.zwahr@epfl.ch
pierre.rossel@epfl.ch
matthias.finger@epfl.ch

Abstract: The paper is conceptual in nature and provides insight into the ongoing research on electronic governance. The core argument developed in this paper is that the rapid development of information and communication technologies in the last twenty years has given rise to a paradigm shift of how collective problems are being solved in the future. The research presented in this paper builds on the Electronic Market Hypothesis developed by Malone at al. (1987) and provides empirical evidence from federated identity development. The paper thus contributes to academic theory development of electronic governance and reduces the current confusion of what electronic governance is or might be.

Keywords: institutional change, governance, information technology, federated identity management

1. Introduction

The claim we want to make in this paper is based on two assumptions. First, governance is regarded as the process of collective problem solving, which involves various kinds of actors and which takes place across multiple hierarchic (e.g., organizational, political) levels. Second, governance issues arise within or across corporate boundaries and are thus embedded in an institutional environment, which provides the formal and informal rules of how social, political, and economic interaction is executed. (North 1991) Although there is no clear empirical evidence available, the following paragraph thus claims that due to the rapid rise of information and communication technology a governance paradigm shift can be observed.

2. The traditional governance paradigm

2.1 About Markets and Hierarchies

Back in 1987, Malone et al. have developed the Electronic Market Hypothesis (EMH). They have studied the two basic economic mechanisms of coordinating flows of material or services and concluded that the increasing use of information and communication technology leads to a shift towards more market use to coordinate economic activity. The reason for that lies in the capability of information technology to significantly reduce coordination costs, which were considered as being the key determinant regarding the form of organizing economic activity. In the EMH Malone et al. identified two key variables of coordination costs, namely *asset specificity* and *complex product description*. While asset specificity refers to the degree of complexity which needs to be coped with when a particular asset is subject of transaction, complexity of product description refers to the degree of information required to specify the attributes of the product. The two variables have been chosen since they are very likely to be affected by information and communication technology. They argue that coordination is mostly about communication and processing information, which obviously is the core of information and communication technology. Accordingly, Malone et al. state that "coordination costs include the transaction (or governance) costs of all the information processing necessary to coordinate the work of people and machines that perform the primary processes" (1987:485).

The transposition of this argumentation from the impact of ICT on coordinating economic activity to the impact of ICT on governance brings up the following results.

2.2 Complexity of product description

In the Electronic Market Hypothesis, complexity of product description is referred to as the complexity of gathering the information which are required to identify the attributes of the product or asset which is subject of transaction.

In governance, the subject of transaction is the collective problem which is being worked on in order to solve it. Attributes of such problem solving are per definition *actor* and *level*. While the actor-attribute represents the values such as companies, government agencies, trans-national corporations, or simply citizens, the level-attribute contains values such as regional, national, or above-national in the political sense of levels. A third attribute of governance is *function*. The objective of introducing the function-attribute is to stress the fact that collective problem solving processes are always embedded in a functional context. (Finger and Pécoud 2003) This means that collective problems can for instance occur in the delivery of public services or in the regulation of such service delivery. The function-attribute thus refers to three distinct values, namely policy-making, regulation and service delivery.

In summary, the original variable of *complexity product description* can be applied to characterize governance, or in other words collective problem solving, in the same manner as it is applied in the Electronic Market Hypothesis. The complexity issue remains the same as well. The more actors and levels are involved in collective problem solving, the more difficult it is to uncover the fundamental architecture of the problem.

2.3 Asset Specificity

In terms of asset specificity, the Electronic Market Hypothesis refers to the degree of complexity which needs to be coped with when a particular asset is subject of transaction. The objective of this section is to examine how asset specificity is reflected in collective problem solving.

According to Williamson (1981) asset specificity is high, if a manufacturing firm cannot simply make use of machines or resources used in the production process of a third party manufacturing firm. The asset would thus be physically specific. Another kind of asset specificity mentioned by Malone et al. is time specificity (1987), which means that the value of an asset is strongly dependent on time. In transaction cost theory, Williamson (1981:568) stated that "transactions differ so greatly and efficiency is realized only if governance structures are tailored to the specific needs of each type of transaction." Therefore, when looking at governance, complexity of product description refers to the complexity of describing what the collective problem is all about, while asset specificity refers to the approach of solving the collective problem as a function of the collective problem's specificity. In other words, the more specific the collective problem is, the more is it difficult to solve the collective problem. The approach of collective problem solving, which is presented in this paper strongly relies on the concepts of organizational and institutional theory, as well as in transaction cost theory. (Malone et al. 1987, Williamson 1991, Roberts and Greenwood 1997) According to the second assumption mentioned earlier, we therefore identify two key approaches of how collective problems can be solved, namely *organizational* and *institutional change*.

Currently, organizational change is the standard approach of collective problem solving within organizations, because such problems are strongly related to the operational processing of transactions within and across corporate boundaries. As argued in transaction cost theory, the basic unit of analysis is the transaction within the organization where at least two actors are involved. When it comes to a disturbance of such transactions, collective problems emerge. Such problems are usually solved by locating the disturbance, identifying alternative designs, and finally adopt promising organizational designs. (Williamson 1992, Klein and Shelanski 1995)

A major critique of the transaction cost approach towards collective problem solving is that it does not take into account the institutional environment of an organization where such collective problem solving occurs. Therefore, institutional theory provides an alternative approach for collective problem solving, which, albeit being in the same dimension, is independent from the transaction cost theory approach. Oliver (1991) argues that institutional theory in contrast to transaction cost theory has a greater focus on the impact of non-choice behavior, such as the exercise of habit, convention, convenience, or social

obligation, on the organization. Roberts and Greenwood (1997) thus argued that by integrating transaction cost and institutional theory the shortcomings of both theories can be overcome. They outline that collective problem solving is strongly influenced by pre- and postconscious institutionalization. According to their theory, decision-making is either influenced by the institutional environment where formal and informal rules are taken for granted (preconscious) or by tangible forces that lead to a strong dependency of decision-making from powerful institutional rules (postconscious). Hence, institutional change is the second promising approach next to organizational change to accomplish collective problem solving. Institutional change is hereby referred to as the change of pre- and postconscious formal and informal rules of social, political, and economic interaction.

2.4   Nomenclature Verification and Wrap Up

Although derived from the Electronic Market Hypothesis, the two key variables asset specificity and complexity of product description are renamed in the following. These name change is necessary to make the analytical framework of the new governance paradigm presented later in this paper more self-explanatory. *Asset specificity* thus turns into *problem specificity* and *complexity of product description* turns into *complexity of problem description*. The attributes of each variable though remain the same. The attributes of problem specificity are organizational and institutional. The attributes of complexity of problem description are actor, level, and function.

2.5   The analytical framework

The key argument of the Electronic Market Hypothesis (EMH) is that information and communication technologies are decreasing costs of coordinating economic activities (Malone et al. 1987). While markets are preferably used to coordinate economic activities with a relatively low level of coordination costs, hierarchies are the major means to integrate economic activities with a high level of coordination costs. Hence, a shift toward proportionally more market use can be observed, since operations are becoming more efficient and less coordination effort is required.

The analytical framework to describe and explain the new governance paradigm closely builds on the analytical framework of EMH. As mentioned earlier, governance is characterized through the two variables problem specificity and complexity of problem description. The two variables are independent and taken together they represent the framework to analyze governance, or in other words collective problem solving.
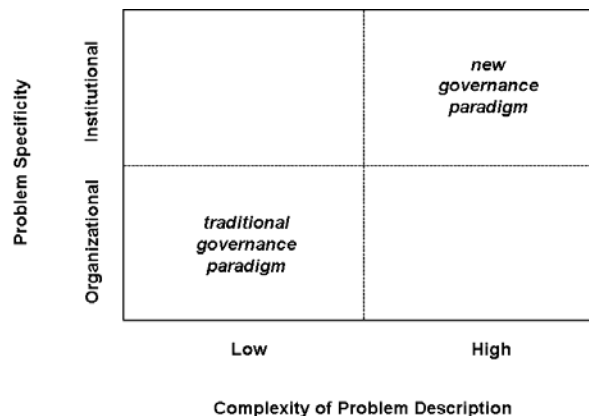

Figure 1: Problem Attributes Affect the Governance Paradigm

As described in Figure 1, the key difference between the traditional and the new governance paradigm is that the complexity of problem description and the specificity of the problem. In the sense of collective problem solving, the traditional governance paradigm is characterized by a relatively low level of problem complexity, which can be solved by applying means of organizational change or design adoption, while the new governance paradigm emerges from complex collective problems which are embedded in the institutional environment of the organization. Problem solving can thus only be achieved by touching the institutional framework in general, and the formal and informal rules for interaction in detail.

The classical question of "make or buy" represents a problem statement which is relevant for all stakeholders of the firm. It is thus a collective problem involving various actors (e.g., employees and managers), interacting on and across different hierarchical levels (e.g., lower, middle, upper and top management), and possessing various functions (e.g., controlling, manufacturing, corporate strategy). Although it is an important issue to decide on, the collective problem can be solved purely by changing organizational processes and structures. The institutional environments of the firm or the formal and informal rules within the company are only slightly affected. In contrast, the implementation of sustainable change in the public sector requires a new paradigm of governance. As current research and experiences from the "field" have broad up, public sector reform is a complex issue. It involves a multitude of actors on diverse levels across all the functions of the state. (Finger 2003) Although the problems and issues have been localized, the approach of solving them is not found on the organizational level. It is rather the institutional foundation of the public sector which needs to be subject of change.

3. The New Governance Paradigm – Empirical Evidence from Federated Identity Management

The objective of the following paragraph is to develop the foundations of the new governance paradigm. This will be done by studying the case of federated identity development closely aligned to the analytical framework developed in the previous chapter.

3.1 The Development of Federated Identity Management

Both in government and business, data exchange is gaining importance and thus the relevance of usernames, passwords and other personal data that users have to enter into a variety of inter- and intranet pages. The interacting entities are challenged to create more intimate and highly secure relationships. A rapidly emerging approach to ensure a consistent exchange of personalized data is known as Federated Identity Management (FIM). FIM is the management of identities between corporate boundaries and aims at providing the possibility to conduct business transactions in a secure and seamless environment. Through FIM, organizations can cost-effectively manage the myriad of corporate and individual identities that are essential to accomplish such transactions – both within corporate boundaries as well as with external partners or customers.

3.1.1 From Intra-Firm Organization to Circles of Trust

According to insiders, the evolution of federated identity can be compared to the evolution of the Internet. (Hofmann, 2005) They stress that the current state of Federated Identity Management is very close to the early days of the Internet, where electronic collaboration between organizations was a very costly and rigid business. If two companies wanted to share data, they needed to purchase a leased line from a service provider between the two of them. If even more companies wanted to join the resulting mesh of connections was complex, extremely costly, and difficult to manage. The next development step of networking collaboration was the existence of bundled offerings form telephone companies across their private switched networks on a per collaborative project basis. Today, there is an open cloud of the Internet with Virtual Private Networks (VPNs) that provide secure networking tunnels to allow far simpler and cheaper collaboration between organizations. However, the whole construct only works due to the fact that Internet Service Provider (ISP) agreed on common standards (TCP/IP).

There is a direct analogy between the current state of federated identity development and the early stages of the internet. If resources shall be shared on a network with different applications and people from different organizations, their identities have to be managed either directly or federated. Hence, the resulting identity mesh is very similar to the mesh created through the early stages of collaborative networking. Federated identity helps to overcome this problem. Instead of maintaining discrete identity stores, collaborating organizations can choose to trust one another's users by establishing explicit one-to-one trust relationships between each other. Hence, identity management separates from resource management. The result of this separation process is a federated identity mesh, which is called a *Circle of Trust (CoT)*. It is composed of organizations providing resources and organizations managing the digital identities, the so called Digital Identity Providers (Project Liberty 2005).

Among experts, the final step of identity management evolution is the creation of the so called federated identity internet. Albeit not yet existing, experts are convinced that this new form of federated identity management will emerge. So far, the federated identity internet is foreseen as a cloud, which is based upon standards that are transparent to end-users, but rely on the collaboration of the Digital Identity Providers (IdP) in the same way as Internet Service Providers collaborate today. (Nesbitt, 2005) The important shift from the CoTs to this new form of Federated Identity Management is the consolidation of multiple CoTs into one single entity. Instead of having the digital identities of the users stored in one database of the Circle of Trust's IdP, they are simultaneously spread over and federated across the data storage of each IdP in the resulting federated identity internet.

The organizational form, resulting from this development, cannot be distinguished clearly as a hierarchy, a network, or a market. The resource providers have a network form of relation to the identity providers, while at the same time the exchange of identity information among the identity providers leads to the development of a more market-oriented relationship between the IdPs. To close the sketch, the further development and exploitation of Federated Identity Management will remain in the hands of a hierarchical organization, such as the Liberty Alliance.

3.2 Theorizing Practice – The New Governance Paradigm

The objective of the following paragraph is to examine the case of federated identity development according to the analytical framework. The analysis will be focused on two transformation steps: (1) the step from intre-firm organization of identity management to the creation to the circles of trust, and (2) the step from the circles of trust to the development of the federated identity internet. In the analysis the coordination cost argument will be applied according to the argumentation in the Electronic Market Hypothesis.

3.2.1 From Hierarchic to Networked Organization of Identity Management

Coming back to the definition of governance, the collective problem in this step is securing seamless web transaction users and service providers. The problem is collective because it affects not only the providers of such web transactions, but also the users demanding more efficient handling of identity management. Collective problem solving is thus the approach of how the issue of secure and seamless identity management is achieved.

In order to not complicate the analysis the analytical framework will be applied to the question of what are the various interests of the actors involved in shaping identity management in terms of coordination costs. The analysis is restricted to the study of how the different development statuses affect the coordination costs of the identity provider (IdP), the service provider (SP), and the end user (EU).

Status		Complexity of The Problem Description	Problem Specificity
"Silo" Solution	IdP	n/a	n/a
	SP	The service provider has to cope with a relatively high amount of production and coordination costs, since he has to take care of research, development, maintenance, security provisioning and bug fixing. In terms of trust development, service providers have to take big efforts to build trust with their clients.	Although the provision of identity management can be improved/efficiency increased through organizational (e.g., process) change, the bigger impact can be achieved through externalization of identity provision. (→ institutional change)
	EU	Coordination and transaction costs are high for the end-user. The end-user has different identities for different kinds of web-transactions. The costs of maintaining and	In terms of operational change, the end-user has not options. He is forced to cope with the high diversity of digital identities. The only choice he has is "institutional". He can either cope with the situation or

Status		Complexity of The Problem Description	Problem Specificity
		safeguarding the digital identities are thus high.	reject web-transactions in total. In doing so, he avoids having diverse digital identities.

The driving force of change is thus the pressure of service providers to significantly reduce their costs of managing digital identities. The costs are both, coordination and production costs. Due to information and communication technology that enable a secure, seamless, and efficient exchange of digital identity data, the Circles of Trust can be realized as a reaction to the increasing costs of maintaining "silo" solutions for identity management.

Status		Complexity of The Problem Description	Problem Specificity
Circle of Trust	IdP	The costs of managing digital identity in the IdPs are lower than the costs the service providers had in the stage of "silo" solutions. However, with an increasing size of a Circle of Trust, the coordination costs are rising for IdPs, since the various standards and requirements of each service provider has to be taken into account.	The rise in coordination costs can mainly be lessened through effective organization of identity management. The key issue of the problem is thus rather operational design adoption than institutional change.
	SP	Due to centralized identity providers, the service providers can tremendously lower their costs of identity management. However, the coordination costs of maintaining the quality of the circle of trust in terms of partners, security standards are increasing.	The newly emerging coordination costs are due to the organizational set-up of Circles of Trust and to the underlying rules and regulations (e.g., trust and security). Such coordination costs can thus be reduced through institutional change, because operational change is more related to increasing efficiency of transactions among the partners in such as circle of trust.
	EU	Due to the circles of trust, the end user can reduce his coordination costs, since for a group of web-transaction only on digital identity is required.	The specificity of the collective problem the end-users no have is much less specific. Through operational change in terms of personal digital identity management, the coordination costs can be reduced significantly. The costs of institutional change, in other words the costs of rejecting web-based transactions, are much higher than simply optimizing the organization of their personal digital identities.

The value proposition of organizing into the so called Circles of Trust is mainly about the reduction of coordination costs in terms of identity management development, provision and maintenance. Due to the development of information technology this institutional change from hierarchic organization to a more networked form of identity management is possible. Information technology provides the tools and means to on the one hand provide secure and seamless identity management and on the other hand information technology provides the means to strengthen the relationship among the partners of the network.

In summary, the change from internal organization of identity management to the externalization of identity management was due to institutional change. The driver of this change was the capability of information and communication technology to significantly reduce the coordination costs of identity and service providers on the one hand and on the other hand to maintain the fundamental requirements end-users are having in terms of security, trust, and convenience. Looking at the institutional change, the following observation can be made.
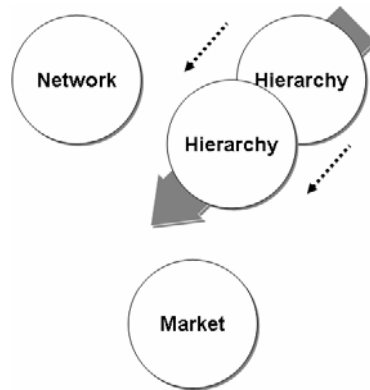
Figure 2: The Paradigm Shift from Hierarchy to a Biased Hierarchy

The starting point was a strong hierarchic organization. Identity management was internalized within the service providing organizations. The new organizational form (Circle of Trust) represents a thus a governance shift. The total amount of coordination costs for identity management could be reduced significantly, although the central IdP is faced with new forms of coordination costs. The resulting construct is though not a network, but a much less strict hierarchic organization. While the relationship of the Circle of Trust partners is characterized by network governance, the overall governance of such a Circle of Trust is still hierarchic, although in a less rigid manner compared to the "silo" stage.

3.2.2   Towards an Amorphous Form of Governance

According to the case study the second step in the development of a identity management is the transformation of the Circles of Trust into the so called Federated Identity Internet. Although this transformation has not started yet, there is some coordination cost based evidence observable.

Status		Complexity of The Problem Description	Problem Specificity
Circle of Trust	IdP	While both the size of the Circles of Trust and the amount of the Circles of Trusts are growing steadily, various new forms of coordination costs emerge. On the one hand, the IdPs of each Circle of Trust are challenged to provide secure, seamless, and performing identity management solutions. On the other hand the growing size of such Circles of Trust increases the costs of coordinating varying standards and requirements of each service provider.	In terms of coordinating the various formats, standards, and requirements which the service providers are asking for, organizational changes (e.g., standardization) can reduce costs. Although such changes correlate positively with the performance in the emerging competition among the Circles of Trust, it is only institutional change (e.g., creating networks, alliances or partners), which significantly reduces such competition related costs.
	SP	The driving force of coordination costs in circles of trust is the continuous effort of the service providers to maintain the quality and the reputation of the Circle of Trust they are member in. Identity management and trust is a very user sensitive topic. Service providers are thus highly interested in keeping the reputation and the quality of services high. This in turn drives coordination costs.	Although organizational optimization can enhance the quality of services, the overall reputation and the quality of the Circle of Trust in total strongly depends on the competitive performance. The costs of maintaining this competition are thus very high. A cost reducing approach can only be found in institutional change. When the different service providers in the different Circles of Trust team up to become partners in terms of competitor, the costs of maintaining the competition can be reduced to almost zero.

	EU	Albeit being on a low level, the costs of managing their digital identities for end-users still remain on a considerable level. The diversity of Circles of Trust requires having various digital identities.	From an end-user perspective, the organizational change approach is most likely. By effectively managing the digital identities, the costs of switching between various Circles of Trust is much less high then the costs of rejecting web transactions.

The complexity of the problem description is becoming higher. The driver of change is thus the reduction of coordination costs in each Circle of Trust. Competition within and across the Circles of Trust is even increasing such coordination costs.

Status		Complexity of The Problem Description	Problem Specificity
Federated Identity Internet	IdP	In this final scenario, the objective of each IdP is to outsource the costs of federated identity management to the markets among the IdPs. Each IdP is further interested in getting remunerated for the quality of digital identities he is bringin into the market according to the mechanisms of supply and demand.	The collective problem of IdPs in this scenario is a different one as in the circle of trust scenario. IdPs are more interested in effectively participating in the emerging market of identity federation. The major means to solve this problem is organizational design adoption according to comparative-efficiency competition.
	SP	In this scenario, service providers are less interested in having a strong IdP. They will put there effort in their core business, which is the provision of web-transaction. The coordination costs of establishing effective identity management have thus been reduced to almost zero.	The collective problem of service providers in this scenarios has shifted from how to organize identity management, back to the question of how to team up with other service providers in order to use synergies for the core business.
	EU	In a federated Identity Internet the end-user has zero coordination costs in terms of managing his personal digital identity.	There is no need to change for end-users.

In summary, the shift from Circles of Trust to a Federated Identity Management reveals an interesting phenomenon.
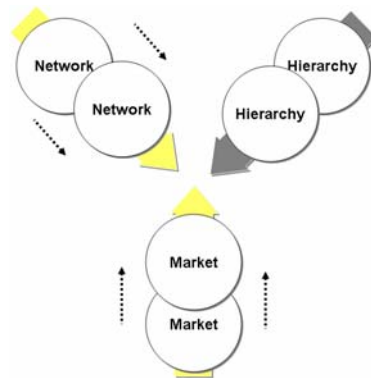

Figure 3: From Market to Biased Market and From Networks to Biased Networks

While the Federated Identity Internet emerges as a market among IdPs, the former members of competing circles of trust are creating networks and partnerships to improve their core business. Albeit being connected to the former ties of the Circle of Trust, the relationships among the services providers

becomes more network oriented. The whole system as a total though, can be looked at as a hierarchic organization. This organization is characterized by a clear separation of identity management and service provision, which only work as a whole (Figure 4).
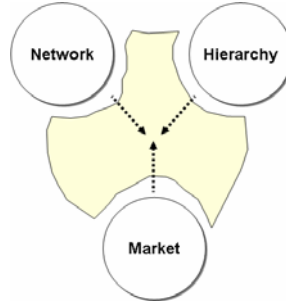

Figure 4: The Blurring of Markets, Hierarchies, and Networks

The claim this paper wants to make is thus funded in the blurring of the definition of markets, hierarchies, and networks.

4. CONCLUSION

The paper conceptually drafted the further development of the Electronic Market Hypothesis (EMH) developed by Malone et al. (1987). The derived analytical framework claims that the use of information and communication technology in governance will lead to a paradigm change in collective problem solving. To provide empirical evidence for this claim, the case of Federated Identity Management evolution was studied. Each step in this evolution process was studied according to the two key variables of the analytical framework, namely problem specificity and complexity of problem description. The issue of managing federated identity was identified as the collective problem. The question of how to organize Federated Identity Management from a coordination cost point of view represented the approach of solving the collective problem. The analysis has thus revealed that the active use of information technology in governance, leads to the blurring of the traditional institutions of governance. Hierarchies turned out to be only biased hierarchies, because they contained elements of markets and networks at the same time. The same observation was made for markets and networks.

In summary, the paper claims that information and communication technology is not only driving organizational design adoption as it was state by various scholars (Malone et al. 1987, Roberts and Greenwood 1997, Williamson 1991). If collective problems are becoming really complex and the approach to overcome the collective problem is no more of pure organizational nature in the sense of organizational design adoption, then a new governance paradigm is required to solve the collective problem (Figure 5).
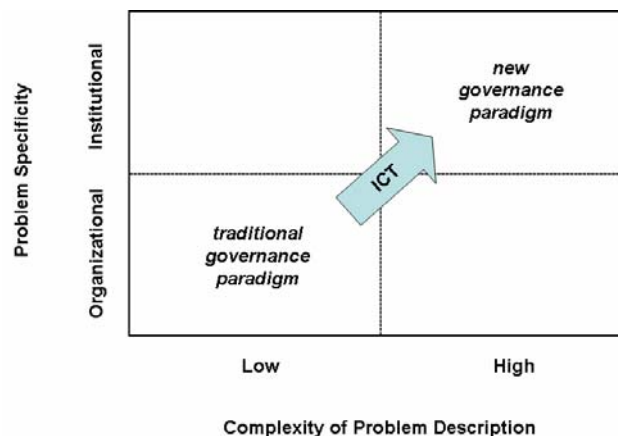

Figure 5: Revealing the New Governance Paradigm

As shown in the case of federated identity development, the answer for what this new governance paradigm is all about has been an amorphous form of hierarchy, market, and network governance.
To conclude, we want to state that much more systematic and empirical research is required to confirm this claim, although we are convinced that information and communication technology have a transformative potential not only in terms of organizational design adoption, but also in terms of institutional change.

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