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## Information governance in smart grids: A Common Information Platform (CIP)

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## Information Governance in Smart Grids – A Common Information Platform (CIP)

June 2014

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# **Information Governance in Smart Grids – A Common Information Platform (CIP)**

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## *Abstract*

The commercial value added in electricity distribution networks and smart grids is increasing. Concerns about competition on a level-playing field are raised and the debate on vertical network unbundling is beginning to address the level of the distribution networks. With regard to the unbundling discussion for distribution networks, we introduce a new approach: the Common Information Platform (CIP). The CIP tries to balance better between competition and coordination. The CIP adds two new dimensions. First, it “unbundles” information and data management as the key step in the value chain, not network ownership or system operation. The other stages of the value chain can remain integrated. Correspondingly, the CIP avoids such drastic measures as network ownership unbundling. Second, it does not “separate” information and data management from the sector, but rather involves third parties in the rule-making process; the governance structure is “common” instead of “independent”.

*Keywords:* power systems, power distribution, information and data management, smart grid

*JEL-classification:* L43, L51, L94

# 1 Introduction

With large-scale integration of decentralized renewable electricity generation, the value added to the distribution network is rapidly increasing. Accordingly, concern whether competition is on a level playing field intensifies; in other words, the debate on unbundling of monopoly parts from commercial stages, which dominated the EU directive 2009 for the transmission networks, has now reached the distribution level (cf. Pérez Arriaga 2013). However, how should unbundling of smart distribution grids look like? How do we balance between competition and coordination in smart distribution grids? We argue that governance of information and data management is key and propose a Common Information Platform (CIP).

Distribution networks are becoming smart grids<sup>1</sup> driven by advanced information, communication and automation technology. Incorporating the network users (i.e. generators, consumers), service operators, and traders we refer to the smart grid as smart system. Commercial transactions in a “smart market” gain importance in optimizing network management. System information has an enabling function, both for the network operator and the commercial (supply) side. Hence, information and data management (IDM) builds the interface between network and commercial side. The management of information exchange is the heart of the coordination in smart systems. This has a technical and organizational component. We focus on the organizational part.

IDM should provide access to the existing data to those actors within the smart system that need it and are entitled to it. Notably, these are actors from the regulated business of network operation as well as commercial service operators. IDM is thus the interface between the unbundled activities of network operation and power supply; between competitive and regulated activities. The governance of IDM in smart systems mainly needs to balance between coordination needs across the electricity value chain and

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<sup>1</sup> Smart grids are also emerging in other sectors such as health, living, and production logistics, which is not discussed in this paper. We focus on electricity distribution networks.

competition. Competition is desired at the commercial stages. Concerns primarily relate to equal access to IDM and non-discrimination, e.g. of new market participants that enter the market-based on information in smart systems. Some form of unbundling seems to be necessary at distribution level to ensure a level playing field. In the context of Directive 2009/72/EC, unbundling was intensely debated for the transmission network level. We argue that distribution networks and the corresponding unbundling debate are different from the debate on transmission networks.

The Common Information Platform (CIP), which we propose in this paper, focuses on IDM as crucial stage in the value chain of smart systems and key step for an optimal governance structure. The CIP is a rule-making institution for IDM. The CIP ensures neutrality by involving all eligible stakeholders at the rule-making level; there is no need for independent, separate actors to level the playing field because of the common structure of the CIP. The CIP unbundles information and data management, not the network. Hence, network and commercial business might stay integrated, securing coordination and alignment of incentives of the network and commercial businesses. The main idea of the CIP is to balance between competition and coordination.

The paper is structured as follows: in section 2 we define the information layer in smart systems. Section 3 describes potential governance models for IDM, as currently discussed in Europe and the US and evaluates them against four criteria. In section 4 we discuss the Common Information Platform (CIP) as a new governance model for IDM in smart systems in more detail. Section 5 concludes.

## **2 Information and data management in Smart Systems**

The decentralization in smart systems, the development of a smart market and the diffusion of information and communication technology (ICT) create a growing amount of

information available in distribution networks<sup>2</sup> (cf. Friedrichsen et al. 2014). This information is not only relevant for network planning and operation, but also for competitive actors. The management of this information creates a new, separate stage in the value chain in smart systems. IDM has to serve different actors. The different recipients of information in smart systems are as diverse as network operators, service operators, retailers, aggregators, generators or traders. Since they use the information for different purposes, these users have different requirements concerning its type and quality, e.g. with regard to real time availability and aggregation level.

First, network operators use information on local system condition, generation and consumption to manage the network, track down failures and activate targeted counter measures (Morgan et al. 2009). These activities are part of the original tasks of network operation and hence belong to grid operation in a narrow sense. The information required for this task is technical information on the system and will most likely stay with the network operator. The information is needed in real time, with low latency, and supreme availability. Yet, the aggregation level can presumably be high: network operation does not require customer specific data, but can rely on aggregated values by network node or branch.

Second, in situations of scarce network capacity, network operators use information on demand and supply side flexibility for market-based balancing. In this case, technical information has to be coupled with price signals for the smart market or bilateral agreements on flexibility provision such as smart contracts (cf. Brandstätt et al. 2011). These activities concern the network operator, respectively the regulated realm, but involve competitive actors and market elements as well.

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<sup>2</sup> We focus on electricity distribution networks. The link to heat and gas supply networks is growing since these can provide flexibility to the electricity system via intelligently operating heat pumps, combined-heat-and-power or power-to heat installations.

Third, information is used to offer, realize, and bill (new) energy services. On the one hand, this contains price information from the network operator and/ or supplier. On the other hand, it is information on the consumption or production of contracted producers or consumers as well as on their potential flexibility. Recipients of this data are retailers, virtual power plant operators, demand response aggregators or other (energy) service companies.

Fourth, information can be used for consumer information. The European directive 2006/32/EC requires metering entities to install meters that provide time of use information on actual consumption. Such intelligent metering systems shall assist the participation of end users in electricity markets and enable them to adapt their behavior based on price information. Hence, technical information on individual consumption will have to be complemented by price information.

In view of the diverse actors and their data demands, the task is to provide each user with the relevant information, i.e. information that benefits him and that he is entitled to receive, in the quality needed. Importantly, customer specific information is sensitive data due to privacy concerns and since it is competitively sensitive. Hence, IDM also has to guarantee data security and privacy.

IDM can be separated into three aspects a) infrastructure for data transmission (which is described under the headline of advanced metering infrastructure e.g. in Römer et al. (2012)), b) data management and c) access for stakeholders. So far, it is not clear how these activities should be governed and who should carry them out.

### **3 Options for Organization and Governance**

Different concepts for the governance of IDM are currently discussed and address several aspects of the emerging challenge in smart distribution systems.<sup>3</sup> In the paper we assess different governance approaches mainly according to their effect on competition

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<sup>3</sup> The following criteria are partially based on the evaluation of Pérez-Arriaga et al. (2013).



and coordination within the distribution system as well as the regulatory effort they induce.

First, it is central for fair competition that IDM ensures equal access for all eligible parties and guarantees non-discrimination in operation. This ensures a level playing field for service operators and may thus encourage competition. Competition is expected to motivate incumbents and new entrants to develop innovative services and to exploit new opportunities offered by smart systems to enhance customer benefit and system efficiency.

Second, efficient operation of the power system requires coordination of generation, demand, and other flexibility options. Most importantly, network operators need to carry out balancing as a critical technical function in the electric power system to ensure reliable power supply and system stability. Coordination means efficiently integrating all actors across the electricity value chain with respect to system and network operation. This includes the coordination of competitive actors and network management. In addition to this vertical coordination across the power system, we consider horizontal coordination between several network areas (i.e. distribution network areas operated by different DSOs).

The third challenge lies in the administrative and regulatory effort that is necessary to administer IDM in smart systems. It has a user component, for example when consumers are switching supplier or service provider or when suppliers seek to offer their products in another area. It also has a public authority component, such as regulatory or supervisory effort.

Governance of IDM should address the challenges of coordination and competition simultaneously, while at the same time minimizing administrative and regulatory effort. Table 1 summarizes these criteria on information governance in smart systems.

**Table 1: Criteria for an institutional framework of IDM in smart systems**

Criterion	Short description
Equal Access	Open access to information for all eligible parties, especially non-incumbents
Non-Discrimination	Non-discrimination in daily operation
Coordination	Horizontal and vertical coordination of related operations (generation, network, consumption, etc.) within the electricity supply chain
Administrative and regulatory effort	Minimize effort that is necessary to administer IDM in smart systems both for the users and for regulators

### 3.1 Presently discussed approaches for IDM

The debate within the European Commission's expert group on smart grids so far centers on two regulated and a market-based approach to govern IDM (EU SGTF 2013). The regulated concepts delegate the responsibility for IDM either to the legally unbundled DSO (DSO as market facilitator – short DMF) or to a new regulated institution that manages the information as a central monopoly separated from the electricity supply chain (Central Data Hub – short CDH).<sup>4</sup> In contrast, the market-based approach builds on standardized interfaces that are installed with each consumer and allow storing and accessing the data locally (Data Access Point Manager – short DAM).

Importantly, the institutional environment (e.g. the unbundling regime of the distribution networks) has a strong influence on the respective governance approach of IDM, especially in the case of the DSO-centered model. Here, the DMF-model is primarily discussed for legally unbundled DSOs. However, roughly 90% of all DSOs in Europe have less than 100,000 costumers (CEER 2013). These small DSOs can be excluded from the unbundling regime (this is the so-called de-minimis exemption). For those

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<sup>4</sup> This approach is currently applied in the UK. Here, a new monopoly was established which is independent from the regulated electricity networks and other stages of the electricity supply chain.

smaller DSOs the DMF model results in an integration of IDM with competitive activities, such as generation or retail. A similar approach is discussed in the US under the headline “energy service utility” (ESU) (Fox-Penner 2010). In the following we apply the terminology of Fox-Penner (2010) to differentiate IDM by integrated DSOs (Energy Service Utility) from that of legally unbundled DSOs (DSO as market facilitator - DMF).

A further extension of the DMF concept is a pure network operator owning the network assets and operating the IDM system. Generation and retail activities would then take place in a separate entity. For the US Fox-Penner (2010) discussed such a concept as “smart integrator” (SI). The smart integrator owns only the network. Therefore, the smart integrator represents a solution based on ownership unbundling. According to Fox-Penner (2010) a smart integrator is “a utility that operates the power grid and its information and control system but does not actually own or sell the power delivered by the grid.” (Fox-Penner 2010, p. 175)

Another approach is an independent system operator (ISO) for both system operation and IDM. It thereby avoids ownership unbundling. The ISO needs to be unrelated to activities in generation and retail and unrelated to the firm that owns the network assets. No ownership unbundling is necessary, network ownership can stay with an integrated firm, which might also own generation assets. The ISO ensures non-discriminatory system operation (Friedrichsen 2012; Balmert & Brunekreeft 2010). Even though the ISO is one option to fulfill unbundling requirements (for transmission networks) according to EU regulation, most of the European networks are not managed by ISOs. They are more common (at transmission level) in the US.

**Table 2: Characterization of governance models for information in smart grids**

	integrated with other stages	network ownership	network operation	data processing	regulated business	central data storage
Energy Service Utility	x	x	x	x	x	x <sup>5</sup>
DSO as Market Facilitator	x <sup>6</sup>	x	x	x	x	x <sup>5</sup>
Smart Integrator	-	x	x	x	x	x <sup>5</sup>
Independent System Operator	-	-	x	x	x	x <sup>5</sup>
Central Data Hub	-	-	-	x	x	x
Data Access Point Manager	-	-	-	-	-	-

### 3.2 Discussion of selected options for information and data management

In case of a DSO that is integrated with other supply stages, coordination occurs within the firm at low transaction costs. Hence, the DMF and ESU model can secure a high level of vertical coordination along the electricity supply chain in smart systems. Coordination with third parties may be lower, which may cause inefficiencies. Theoretically, market signals could provide for coordination along the electricity supply chain reducing the benefits from vertical integration. Yet, this requires an adequate regulatory framework, e.g. with cost-reflective pricing. Particularly for distribution networks this is not yet in place.<sup>7</sup> Horizontal coordination between several network areas is a challenge, too. There are strong concerns with respect to the interoperability of the decentralized IDM systems based on the current experience with the DSOs' network management tools.<sup>8</sup> Diverging systems can (intentionally or unintentionally) significantly hinder the development of services offered in several regions. Standards could be set to ensure

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<sup>5</sup> Not exactly specified in the proposal but the impression of central storage arises.

<sup>6</sup> Assuming that the respective DNO is legally unbundled the integration with the competitive realm is rather low.

<sup>7</sup> Households and small commercial customers in Germany are typically billed via standard load profiles. Prices are not dynamic, neither in locational nor in temporal dimension. Yet, few examples exist and there may be a trend towards more cost reflective pricing. In the United Kingdom, locational pricing is used to send signals to demand and generation at transmission and extra high voltage distribution level (cf. Ofgem 2011).

<sup>8</sup> These tools differ on a very basic level, e.g. with respect to the granularity of information (15 minutes vs. hourly-approach). It is therefore questionable whether DSOs would build up interoperable IDM systems without respective incentives or regulation.

interoperability and avoid adverse effects on competition. As the integration of network operation and IDM in the hands of the established DSOs builds upon the current responsibilities, regulation needs only few adaptations. Most likely there is no need for regulatory supervision of additional parties. Adjustments are likely necessary to provide network operators with incentives to build up the desired IDM.<sup>9</sup>

The primary criticism against DMF and ESU focuses on the potential incentives to discriminate against competitors. This applies especially to those DSOs that are still integrated and will be providing services to consumers based on the data from the IDM (Pérez-Arriaga 2013). In other words, the competition concerns depend on the effectiveness of existing unbundling regulations.

Smart Integrator and ISO establish a solution to the competition challenge. Ownership unbundling, as required for the Smart Integrator, eliminates all incentives to restrict access to information for specific parties or discriminate against participants within the IDM, since the smart integrator has no stakes in the competitive stages. The same can be expected from the ISO concept, as the ISO only focuses on network operation and has no commercial interest. At the downside, ownership unbundling within the smart integrator model requires a divestiture of integrated firms. The acceptability and adequacy of such a measure may well be questioned and raised a debate during the discussion of unbundling at transmission level (e.g. Pielow et al. 2009, Talus & Johnston 2009). The ISO avoids ownership changes, yet both Smart Integrator and ISO bring about a separation of network operation from the commercial activities, which might forego synergies in the vertical supply chain. Hence, the drawback of increased independency is weak coordination.

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<sup>9</sup> Standard incentive regulation of electricity networks focuses on efficiency and cost reduction and gives only weak incentives for innovation and application of smart solutions (for the example of Germany see dena, 2012). Therefore, significant adaptations of the existing incentive regulation are likely necessary. Yet, this question is more general than the topic of this paper.

In contrast to the solutions described above, the third party approaches (Central Data Hub and Data Access Point Manager) are based on the separation of IDM from all other areas of the electricity supply chain. Therefore, incentives to either restrict access of market entrants or to discriminate against other parties in the daily operation of the IDM should be low. Since new players such as telecommunication firms might also have commercial interest in smart grids, the CDH should also be independent from these operations.

Coordination is the weakness of the market-based approaches. In the case of the data access-point manager, vertical coordination will be low as the IDM will be very decentralized and independent from the electricity supply chain. This is similar in case there are many central data hubs. If there were only one central data hub responsible for IDM of a large area, like an entire country, then horizontal coordination could reach a high level because of a de-facto monopoly. In a decentralized set-up horizontal coordination will require a detailed set of standards.

## **4 A Common Information Platform in Smart Systems**

The central aspect in the debate as outlined above is the responsible party in charge of IDM. Arguments in the discussion evolve around a trade-off between discrimination concerns and synergies from having one integrated supply chain, i.e. coordination vs. competition. Actors that are not financially involved in other steps of the value chain are assumed to be more neutral. In contrast, adding IDM to the tasks of experienced actors such as the DSO or telecommunication companies has certain integration synergies from combining IDM with an existing network operation or ICT business.

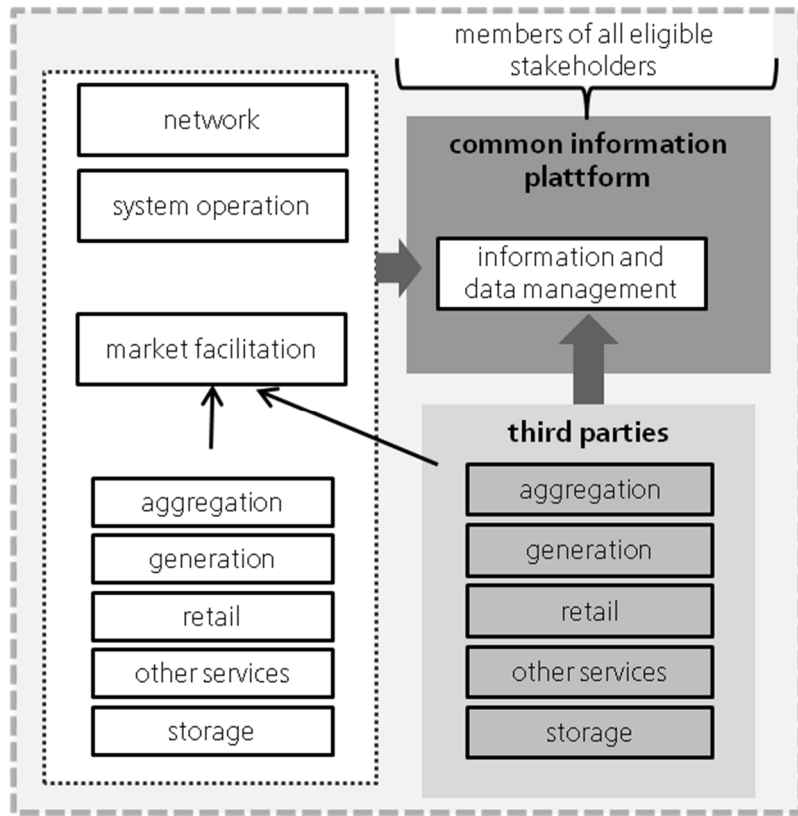
We argue that the benefits of neutrality and efficiency need not be mutually exclusive. Discrimination can be avoided, while at the same time securing neutrality by pooling responsibilities in an institution that represents not just one but all interested stakeholders. The know-how of a larger group of stakeholders may even surpass that of just one,

albeit long experienced, company. Following this logic, we suggest a CIP that represents all eligible stakeholders rather than assigning the task of IDM to just one party. Thereby, the CIP creates institutional neutrality and ensures efficiency.

Within the unbundling debate, the approach resembles the Independent System Operator (ISO) (cf. for more detail Balmert & Brunekreeft, 2009), but the CIP adds two new dimensions. First, it “unbundles” IDM as the key step in the value chain, not network ownership or system operation. The other stages of the value chain can remain integrated. Second, it does not “separate” IDM from the sector, but rather includes third parties; the governance structure is “common” instead of “independent”.

In more detail, the CIP has the following key characteristics:

- It is a decision-making and rule-setting body; it does not actually operate the smart systems itself. It designs the rules for IDM.
- It defines and delegates the necessary tasks for IDM to different parties (e.g. for data storage, information infrastructure etc.). There will be different instruments to assign these tasks, most prominently tendering.
- It consists of (representatives of) all eligible stakeholders that are affected by smart systems.
- Rule-making and task-assignment are supervised by all stakeholders, which ensures non-discrimination.



**Figure 1: The common information platform**

With the CIP we propose to separate the operational part of IDM, i.e. development of necessary infrastructure and reliability for the system, from the organizational level, which focuses on the institutional process to decide about specifications and requirements. The CIP is a cooperative, not-for-profit organization constituted by the relevant stakeholders of smart systems, namely generators, consumers, network operators, state agencies, consumer associations, service providers, information and telecommunication companies and others. Network and system operation can remain in the hands of the incumbents. The CIP takes over responsibility for IDM. It is important to note that the CIP does not have to carry out the functions of information processing and data management or operate any assets itself. Neither does the CIP require a central data storage system. It is merely a rule-making body. It sets the framework and delegates operation. It can also be the CIP's responsibility to coordinate the specification of privacy and data protection requirements.



By involving all eligible stakeholders, the CIP serves technology and supplier neutrality as well as non-discrimination with regard to access to and operation of the IDM. It will have to ensure non-discriminatory access to information through certain processes and rules. The CIP thereby will enable both new and incumbent actors to provide services based on this information. Hence, the CIP is an important foundation for competition on a level playing field. In case of disputes, the CIP can offer arbitration and mediation.

Delegating decisions to stakeholders and thereby empowering decentralized actors and activating their knowledge has several benefits. First, the smart system benefits from the creativity and innovation of competitive actors. Second, the information layer remains institutionally neutral. Third, the need for regulation of the operational part reduces.

Based on the stakeholder approach the CIP secures neutrality. Including the interests of eligible stakeholders at an early stage of rule-making secures a system of checks and balances. While some members of the CIP will be biased against competition, others such as the consumers will support competition. Given that decisions are consented by all interested stakeholders the need for regulation decreases: a system of checks and balances supports self-regulation; the stakeholder committee can mediate in case of disputes without intervention of the regulator. Regulation can likely be reduced to oversight of the design and implementation of the CIP as such. While the CIP will not be unregulated, it allows a lighter, retracted role for regulation: stakeholders get the chance to take over responsibility to negotiate agreements among themselves and self-defend their individual interests. This fits the idea of smart grids as enabling platforms for a diverse set of interlinked services and solutions. Negotiations can foster relations among the stakeholders, strengthen cooperative outcomes and tap the different parties' creative potential. Furthermore, cooperation and coordination of stakeholders are necessary, as system development no longer depends solely on the network operator. By including case-specific preferences and circumstances as well as joining different perspectives, a common stakeholder decision may enable tailored, individual solutions that one single actor could not have come up with or would not have realized.

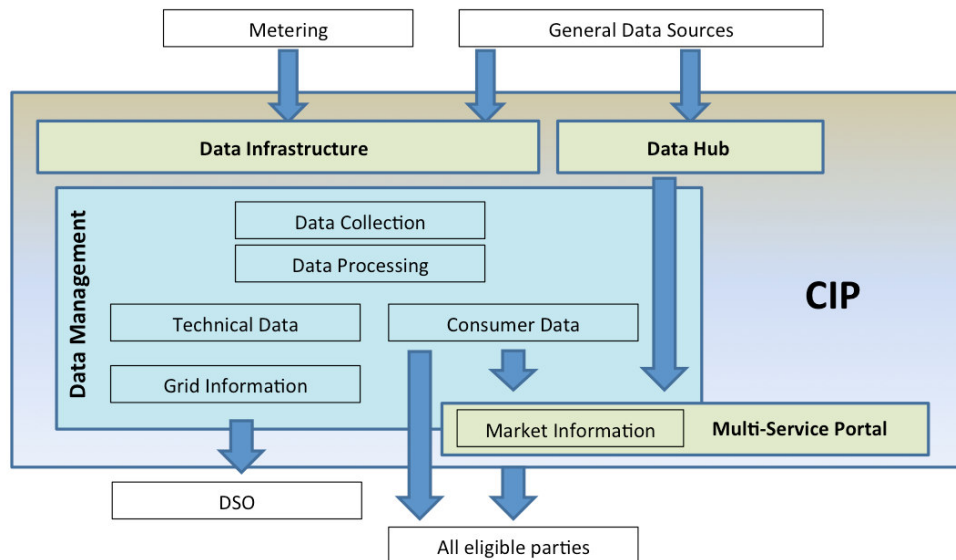
Given the general concept of a CIP as presented so far, there is some scope for the design of a specific CIP. This paper gives an impression of the design options. We discuss

- demarcation of roles and responsibilities within the CIP,
- membership and eligible stakeholders,
- decision-making and voting rules,
- scale and scope of the CIP, and,
- regulatory effort.

This set of options is not exhaustive but sums up those aspects most relevant in the present debate.

#### 4.1 Roles and responsibilities

The CIP combines different tasks that may well require different approaches. Figure 2 illustrates one possible inner structure for a CIP.



**Figure 2: Inside the CIP**

Here, we have distinguished four fields: 1) data-infrastructure, 2) the data-hub interface, 3) data-management and 4) a multi-service platform. Within the field data-management we distinguished different types of data or information as briefly sketched in section 2. It is beyond the scope of this paper to go into detail here; it should be stressed though, that these fields differ in many respects and require a different approach in decision-making and task-assignment (for further details see (Bremer Energie Institut 2014)).

Since the CIP is a decision-making body that tenders tasks, it can organize IDM efficiently. Tendering serves provider neutrality since the tasks can be allocated to the best bidder, be it a stakeholder or a third party. Decisions on tender conditions are taken co-operatively and non-discriminatorily. This also applies to the definition of requirements on the specific technologies that are applied. The stakeholders in the CIP will have to define technological requirements such as latency, bandwidth, or security, but not define the technology to be offered per se. Technological neutrality, that serves to allow the market to discover and offer the best technological option or a mix of technologies depending on the specific needs with respect to location, users, and purpose, is likely high in the CIP.

## **4.2 Membership**

Membership should be open to all eligible stakeholders. All stakeholders should have a say in the requirements and desired outcomes of the IDM in order to make their interest count. Eligible are all those actors, which either provide information or require the information for their business. The exact number of stakeholders depends on the size of the CIP. While the membership structure requires a more detailed analysis, it seems reasonable from today's perspective that at least the following stakeholders should be represented in the CIP, independent from its size: residential consumers, industrial consumers, generation companies, network owner, distribution companies, metering entities, retailers, ICT companies, service developers. Each group might have more than one representative, depending on the size of the CIP and the importance of a stakeholder group.

### **4.3 Decision-making and voting rules**

Another central design aspect is the decision-making process and voting rules. Designing representation while at the same time maintaining the capacity to act and decide is a challenge. With an increasing number of stakeholders the necessity to establish a democratic system of representation for each stakeholder group gains relevance. The representatives then participate in the negotiations within the CIP. Hence, with regard to the design of the CIP, membership rules as well as voting and decision rights need to be specified. Importantly, depending on the precise CIP-field (see figure 2 above), membership and voting rules may differ; it is easy to imagine different working groups for different fields. In total, the design of the rules on decision-making is a wide and complex field; yet, the basic notions on voting rules are well-known from political theory.

### **4.4 Scale and scope**

Each service area could have a CIP on its own. Sometimes this will be inefficiently small and cooperation or merger with another service area may be efficient. On the other hand, one nationwide CIP covering all service areas may also be inefficient. In particular, it would not take regional particularities into due consideration. For example, the optimal choice of data-infrastructure depends on local parameters. These should be reflected in the optimal size of the CIP.

The number of CIPs influences several efficiency criteria: the CIP concept fosters efficiency by tendering the different tasks within the IDM to those actors best suited to realize them. These providers on the other hand can specialize on the respective tasks and potentially reach economies of scale by supplying several CIPs. Synergies between the ICT and electricity sector can be reaped since both sectors are represented in the CIP. This is likely to lead to lower cost. Yet, since each CIP tenders these tasks, transaction costs increase with the number of CIPs. The number of CIPs also reflects in the need for

coordination: with fewer CIPs less coordination is necessary.<sup>10</sup> One single, large CIP can also help to maintain the interoperability of different local smart systems and the mobility of service concepts between them. Interoperability is important for service developers, since only one system area might not offer enough market potential. However, as long as the different information systems are compatible, the potential to attract service providers increases. Generally, interoperability benefits when suitable standards are set (regionally, nationally, European, global) by regulation or by the CIP(s).

Coordination within the traditional electricity system is likely high in a system with a CIP since the DSO and other actors are actively involved in the CIP and ownership unbundling of networks is avoided. Importantly though, a large part of coordination is determined by market design and price formation, which influence incentives and behavior of market participants to a large degree.

In case the DSO is a small municipal company that is also active in other utilities such as gas or water, multi-utility aspects are present in the CIP. More generally, the CIP concept offers the chance to foster such multi-utility synergies since gas operators, water network operators, and ICT firms can be included in the CIP if desired. This has to be weighed against the increasing complexity of coordinating the group of stakeholders. The larger the group and the more diverse the stakeholders become, the more difficult it will become to reach a consensus. Generally, in small network infrastructures stakeholder involvement in decision-making and organization is considered desirable (CEPA 2011) while it has been questioned for larger and more complex systems (Muzzini 2005).

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<sup>10</sup> Self governance is likely easier in smaller CIPs that cover more homogeneous stakeholders.

## **4.5 Regulatory effort**

Likely, the regulator needs to set the general framework in which the CIP can act, supervise the CIP and provide for dispute settlement. Furthermore, end-consumers, especially small ones who are unlikely to get involved, the interests of future generations and other unvoiced concerns need to be carefully considered when designing the CIP. The decision-making process within the CIP needs to ensure that these interests are duly considered. Likely, the regulator has to retain the responsibility to check whether this is the case. Furthermore, it needs to be secured that the CIP does not discriminate with regard to membership (e.g. deny membership to future new market participants). In particular self-interests pushed forward by a small group of stakeholders within the CIP should not result in discrimination of non-members of the CIP.

## **5 Conclusion & Outlook**

In this paper we have presented a novel governance approach for information and data management (IDM) in smart electricity systems: a Common Information Platform (CIP). Our proposal emerges from the debate on network unbundling at distribution level and the responsible party in charge of IDM. Arguments in the discussion evolve around a trade-off between discrimination concerns and synergies from having one integrated supply chain, i.e. competition vs. coordination.

Governance models, which currently dominate the discussion, are unbalanced between coordination and competition. Adding IDM to the tasks of the distribution system operator has benefits for coordination, but may compromise non-discrimination. Keeping IDM and system operation together, but jointly separated from the competitive activities is an alternative. At the upside, this creates independent network operators for information and electricity benefiting non-discrimination. At the downside, this requires either ownership unbundling or a separation of network ownership and management. In both cases, this is to the disadvantage of coordination. A third class of models, i.e. Data Access-Point Manager and Central Data Hub, suggests IDM by third parties. While this

can also be expected to effectively guarantee independence and neutrality, it is likely to result in weak coordination and efficiency losses in the smart system.

We argue that the benefits of neutrality and efficiency need not be mutually exclusive. Neutrality can be secured by pooling responsibilities in an institution that represents not just one but all interested stakeholders. The know-how of a larger group of stakeholders may even surpass that of just one, albeit long experienced, company. Following this logic, we suggest a CIP that represents all eligible stakeholders rather than assigning the task of IDM to just one party. Thereby, the CIP creates institutional neutrality and ensures efficiency.

The proposed CIP balances between competition and coordination with two central features: first, it focuses on “unbundling” of IDM, not unbundling of network ownership or system operation; all other activities can remain to be integrated. Second, it does not “separate” the IDM, but rather “involves” third parties on rule-making level. The CIP is a club in which members collectively determine the rules for IDM. The CIP:

- secures non-discriminatory access to data
- allows third party stakeholders to have a voice
- determines the rules and the players of the game
- secures data security and privacy
- can be arbitrator and mediator in cases of conflict
- demarcates and tenders the various tasks of data-processing

We briefly discuss design options for a CIP approach. This includes (1) the demarcation of roles and responsibilities within the CIP, (2) the question of membership and eligible stakeholders, (3) the design of decision-making and voting rules, (4) the scale and scope of the CIP and (5) the regulatory effort that comes with the CIP. Within the scope of this paper we could only touch upon these issues and clearly a lot more work is required to work out the details of these design options.

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