

TITLE PAGE

Title: Digitizing criminal justice: A Qualitative Comparative Analysis of supply-chain integration across four EU Member States

Summary: Drawing on Qualitative Comparative Analysis (QCA) techniques, we formally analyse four cases of supply-chain integration within the European Union (EU). Our findings demonstrate the causal asymmetry between successful and unsuccessful digitization of inter-organizational information flows. While unsuccessful digitization requires poor project management skills, successful digitization is much more demanding because it also requires compatible technologies which are implemented either by means of a small-scale, bottom-up approach to standardization or a single, centralised architecture developed in a top-down fashion. Theoretical and practical implications are discussed by highlighting the key role of coordination by feedback in a context of increasing digitization of criminal justice systems.

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INTRODUCTION

Nowadays, the majority of products and services, both in the private and public sectors, are produced by chains of organisations instead of individual organisations. As such, organisations increasingly have to rely on effective supply-chain management to survive in the networked economy. Supply-chain management helps organisations to integrate and coordinate systemically the processes that take place across organisational boundaries to help organisations improve their long-term performance (Mentzer et al., 2000). Information technology (IT) is essential for supply-chain management since it is capable of processing large amounts of data in short-time intervals and enables long-distance communication. Therefore, (chains of) organisations need to invest in IT and are often tempted to spend more and more money on IT (Zhang et al., 2011).

Given the pronounced IT investments of many (Western) European countries, in this paper we endeavour to analyse integration and coordination issues within the public sector from the perspective of information systems impact. By focusing on the criminal justice systems of four purposefully-selected European Union (EU) Member States, namely Austria, Denmark, England & Wales (hereafter referred to as England for simplicity) and Estonia, we ask the following questions: what are the causes that lead to positive consequences (or impacts) when criminal justice chains are being digitized? And how do such causes combine to determine a positive impact (or the lack thereof)? Using a supply-chain perspective for studying criminal justice systems (de Blok et al., 2014a), we view them as ensembles of IT-embedded work practices and information-sharing workflows aiming for criminal law enforcement. Subsequently, we deploy Qualitative Comparative Analysis (QCA) techniques to compare the four EU countries under investigation and distil commonalities within the same types of cases and differences across distinct types of cases (Ragin, 1987; Yin, 2009).

Despite the small number of cases under investigation, our findings are eye-opening because they reveal the causal asymmetry between positive and negative cases. While unsuccessful digitization among criminal justice chain partners revolves around poor project management skills, successful digitization is much more taxing because it also requires compatible technologies that enable the criminal justice chain partners to communicate between and among each other seamlessly. Thus, the removal of a necessary and sufficient condition for failure, i.e., poor project management skills, may be a necessary condition but hardly a sufficient condition for a successful digitization strategy. A recipe for success goes further and entails in our context compatible technologies that enable seamless information exchanges whether by means of a small-scale, bottom-up approach to standardization (see England) or a single, centralised architecture developed in a top-down fashion (see Estonia). In this paper, we discuss the theoretical and practical implications stemming from our findings.

The remainder of the paper is organised as follows. Section two highlights the role of IT in supply-chain integration. Section three introduces QCA as a research approach and a set of techniques for conducting data analysis. Section four analyses the empirical data at hand by producing four short summaries concerning the four cases under investigation. Section five discusses our key findings by highlighting the role of coordination by (technological) feedback conceived of as the dynamic exchange of information between and among the criminal justice agencies in a back-and-forth manner (Gosain et al., 2004; March and Simon, 1958). Section six brings the paper to a close with theoretical and practical implications emerging from our findings.

THEORETICAL BACKGROUND

ITs are playing a key role in terms of integrating and aligning partners in any supply-chain (Christopher, 2000; Malhotra et al., 2005). As such, ITs are seen as an important or even indispensable aid to improve supply-chain performance (Zhang et al., 2011). IT can be deployed to improve the various individual steps, activities or sub-processes of a supply chain, such as planning of supply and demand, sourcing of products and services, production, delivery and return (Simchi-Levi et al., 2004). Furthermore, ITs have enabled a more integrated approach to manage the entire supply-chain (Thomas and Griffin, 1996). For example, Christopher (2000) has argued for the need to use ITs to share data between and among supply-chain partners. The intensive use of ITs should foster process integration whereby supply-chain partners work collaboratively using common systems and shared information (Ibid). Following the same train of thought, Fawcett's et al. (2011) findings support the argument that IT investments make their greatest contribution to firms' performance when they are combined with an information sharing culture aimed at building dynamic collaboration within the supply chain. Similarly, Ngai et al. (2011) have emphasised the role of IT, operational, and management competencies in enhancing supply-chain agility and firm performance. Lastly, and related to this study's central concerns on e-Government, Sawyer et al. (2013) have developed a framework that embodies the organisational, operational and technological dimensions that are key to understanding the role of ITs in digital government and identified two core configurations of successful IT-enabled information sharing revolving around data management issues (Courts) and integration and interoperability issues (Police). Taken together, these studies point to the critical role that ITs play in enabling supply-chain integration. ITs support seamless information sharing between and among the supply-chain partners, thus fostering the pursuit of mutually-acceptable outcomes.

Given the pivotal role that ITs play in the integration of supply chains, it is remarkable that only a handful of studies have taken a holistic perspective to study the criminal justice systems in a context of increasing digitization (de Blok et al., 2014a). Yet criminal justice systems may be regarded as complex networks of organisations that work together towards a common goal, namely the enforcement of criminal laws (Ibid). Typical partners in the criminal justice chain are the Police, the Public Prosecution Service, the Courts and organisations involved in the execution of sentences. These organisations are all jointly in charge of law enforcement (Ibid). Whether revolving around pooled, sequential or reciprocal interdependences (Van de Ven et al., 1976; Thompson, 1967), ITs can foster the management of interdependences between and among the criminal justice chain partners. Given the prominent role that ITs play in the coordination of criminal justice chains across European countries, this paper investigates the key components of supply-chain integration within the criminal justice systems of four EU Member States. It specifically aims to study the way these components interact to determine whether such countries are experiencing a successful or unsuccessful digitization strategy in their ongoing transformation of paper files into digital case files.

METHODOLOGY: THE SET-THEORETIC APPROACH

Given our interest in the causes leading to successful and unsuccessful digitization of supply-chain integration within the criminal justice systems of four EU Member States, we deployed QCA techniques that revolve around an approach that articulates our causal expectations in set-theoretic terms (Goertz and Mahoney, 2005; Ragin, 1987). Set theory is the theory of sets. It aims at separating a group (or set) of elements from everything else on the basis of a

criterion of membership (Mingers, 2006). For example, based on whether the country under investigation has experienced an extensive (or non-extensive) use of electronic case files, we identified two separate groups of cases, namely cases with successful digitization strategies and instances of non-successful digitization strategies.

We designed our study by using the indirect method of difference which consists of a double application of the method of agreement (George and Bennett, 2005; Ragin, 1987). Essentially, we first searched for similarities across cases that might account for similar outcomes in terms of successful digitization. We then searched for differences across cases that might account for differences across outcomes (i.e., successful vs. unsuccessful digitization). Thus, we deemed cross-case commonalities to be irrelevant when moving from positive (i.e., successful digitization) to negative cases (i.e., unsuccessful digitization) because conditions present in both types of cases cannot account for differences in case outcomes. Hence, we deployed an approach that mirrors the replication logic (Yin, 2009). The search for similarities helps one predict similar results (i.e., literal replication). The search for differences helps one predict contrasting results in terms of successful vs. unsuccessful digitization but for anticipatable reasons (i.e., theoretical replication).

QCA is simultaneously a context-oriented research approach and a set of techniques aimed at unravelling causal complexity. As a context-oriented research approach, QCA interweaves the context-sensitive logic of process theories with the variance-oriented logic of quantitative research seeking explanations in terms of independent (or causal) variables causing changes in the dependent (or outcome) variable (Markus and Robey, 1988; Romme, 1995). QCA's context-sensitive logic is both deductive and inductive. It is deductive because causal relations are informed by prior theory, as well as a research design that mirrors the quasi-experimental logic (Rihoux and Ragin, 2009). It is inductive because coding revolves around the substantive knowledge of the empirical cases at hand.

THE ANALYTICAL TECHNIQUES

QCA techniques are based on a specific template for undertaking data analysis. This template requires the following steps (Rihoux and Ragin, 2009).

- Step 1: Calibrating data. The first step consists of transforming rich contextual detail into set membership. Drawing on van der Vaart and van Donk's (2008) three categories of supply-chain integration, we identified three core dimensions of integration across the criminal justice chains: 1) Compatibility: this variable explains whether the supply-chain partners are able to communicate between and among each other seamlessly. It refers to tangible (hardware) and intangible (software) technologies that play a key role in supply-chain practices; 2) Project management skills: this variable explains whether IT projects are successfully managed by the supply-chain partners regardless of whether such projects are outsourced or developed in-house. It reflects whether (or not) the different phases of IT development are organised in properly-managed projects which account, for example, for user requirements, training and acceptance; 3) Concerted approach: this variable explains whether the supply-chain partners have developed a large-scale, top-down approach to IT strategy. It mirrors the underlying attitudes towards supply-chain integration in terms of setting up a grand vision and specifying a target-driven IT strategy. Subsequently, based on de Blok's et al. (2014a/b) study, we regarded the extensive use of electronic case files as an indicator of successful digitization because we

conjectured that digital case files ensure cost-efficient and timely information sharing within the criminal justice chains. Next, given the small number of cases, we coded each causal variable and the outcome of interest as being either present (coded as 1) or absent (coded as 0);

- Step 2: Building a dichotomous truth table. This table lists all logically-possible combinations of causal conditions with their associated outcomes (see Table 1);
- Step 3: Minimizing the truth table. We used the fsQCA software programme to derive three solutions ranging from the most complex to the most parsimonious solution with an intermediate solution striking a balance between the two extremes. This programme aims at simplifying complexity by using empty truth-table rows as potential counterfactuals which can be deployed to remove redundant causal conditions (see, for instance, “Concerted Approach” and “Compatibility” within the negative cases)¹;
- Step 4: Interpretation of findings. Finally, we returned to the cases to interpret our findings and make sense of the pathways leading to the presence of successful digitization (or the lack thereof).

ANALYSIS

Based on primary and secondary data that was collected using a mix of semi-structured interviews and reports, our analysis of the interaction effects between and among the causal components of supply-chain integration of the criminal justice systems of four EU Member States produced the following truth table:

Table 1

Country	Compatibility	Proj_Managemen	Concerted_Appro	Successful_Dig
Austria	1	0	1	0
Denmark	0	0	0	0
England	1	1	0	1
Estonia	1	1	1	1

Austria was coded as a negative case of successful digitization (i.e., absence of successful digitization) because of the heavy use of paper files in spite of pronounced IT investments. Though Austria may be regarded as a frontrunner when it comes to e-Government projects, overall its criminal justice chain is yet to be successfully digitized because of the lack of a shared culture revolving around the use of electronic case files (de Blok et al., 2014a). The striking thing about the Austrian case is that Austria is endowed with a government-wide communication system (i.e., Electronic Legal Communication) that enables the automatic allocation of cases based on legal expertise, thus promoting a more balanced distribution of cases between and among Prosecutors (Ibid). Its government-wide IT system coupled with a concerted approach steered by the Ministry of Justice and a variety of consultative bodies and

¹ fsQCA stands for Fuzzy-Set Qualitative Comparative Analysis. Compared to crisp sets using binary (present/absent) variables, fuzzy-sets allow for degrees of set membership (Rihous and Ragin, 2009). Since fuzzy sets are an extension of dichotomous crisp sets (Ibid), one can use the fsQCA software to analyse dichotomous truth tables.

committees should have given a head start to Austria's digitization strategy. However, Austria is yet to use the electronic case files as the default option for various reasons. First, it was mainly the government's internal IT organisation that was involved in the development of its digitization projects. Yet the Austrian government (and its IT Unit) essentially endeavoured to transpose paper-based processes onto the digital medium, thus leaving the existing (manual) processes fundamentally unchanged (Ibid). Second, several IT projects were deployed with an overall lack of support from trainers in terms of training facilities and test environments (de Blok et al., 2014b). Hence, the lack of training for end users meant that Police Officers, Prosecutors and, to a degree, Judges reverted back to using paper files in spite of the availability of a wide range of tools, applications and IT artefacts. Third, and last, the Austrian government in general and the Ministry of Justice in particular undertook too many IT projects in a very short time span. The latest project being Justiz 3.0, a new IT initiative striving for a more efficient way of handling, representing and administrating court files, as well as setting a roadmap with the necessary steps to be taken for the transformation of the current IT architecture into a more secure architecture (Ibid). By overriding previous IT efforts and enhancements, Justiz 3.0 has re-engineered the Austrian criminal justice chain from scratch. It has disrupted pre-existing work patterns and routines to such an extent that Police Officers, Prosecutors and Judges have reverted back to their old habits.

Denmark too was coded as an instance of unsuccessful digitization because the Danish criminal justice chain is mostly paper based (Ibid). Only in very few cases is the paper file scanned to be used in the Courts. Yet the lack of national agreements setting out which organisation has to undertake the scanning process coupled with the lack of legislation enforcing the use of digital case files has meant that all parties involved (i.e., Police, Prosecution, Defence and Courts) regard the digital file as a simple supplement of the paper file (which is instead considered the original file). There are multiple causes that work synergistically towards the intensive use of paper files in Denmark, thus accounting for an unsuccessful digitization strategy. First, in the past each digitization project was mostly approached from an intra-organizational perspective, thus creating many disjointed projects that lacked an underpinning vision. Second, outsourcing was the default option for the management of these IT projects. Yet the dubious choice of IT suppliers coupled with the lack of training initiatives and budget overruns meant that these projects were often mismanaged. The POLSAG project is instructive in this regard. The Police chose the same IT supplier that developed the previous system (POLSAS). However, not only did this supplier lack an awareness and understanding of the new work processes that the new system was meant to support. It also mismanaged the project because it did not provide enough documentation and training to the end users. Third, and last, the lack of compatibility between and among IT systems meant that hard copies had to be printed and posted to the relevant parties. Given the failure of previous IT initiatives, a new digitization strategy has recently emerged which is based on a "small wins" philosophy whereby small projects will be rolled out on a national scale only if they prove successful on a local scale (Ibid). To promote a more holistic approach to digitization of the criminal justice chain, new performance measures will be created to drive cross-organisational integration and synergy (Ibid).

England instead was coded as a case of successful digitization because the criminal case file used in the English criminal justice chain is digitized until the court door (de Blok et al., 2014a). Once again, there are multiple causes in England that work jointly to explain why this country is experiencing an extensive use of electronic case files. First, the IT systems are broadly compatible especially between the Police and the Crown Prosecution Service (CPS) thanks to shared data standards creating a "multitude of links" (Ibid). Though the Courts still

work on paper, the Police and CPS exchange electronic documents either by means of a two-way interface or a one-way interface depending on whether (or not) information flows from one party to the other in a reciprocal fashion (Iannacci, 2014). Second, there is evidence of good project management skills in England. Though each IT initiative is very fragmented within the criminal justice chain, the CPS, the Courts and, to a degree, the police forces use long-term contracts with their IT suppliers to ensure that they have a long-term interest in the IT solutions being provided. Furthermore, both Police and CPS set out Working Groups aimed at developing and validating shared data standards at the technical and business level. Several User Assurance Groups were also created in the deployment of the Case Management Systems to gather feedback from users and tailor their development accordingly (Lindsay 2005). However, each supply-chain party has historically taken a piecemeal approach to IT implementation. The CPS started the digitization of information with their programme before 2010. Consequently, the Police introduced new ways of gathering digital evidence and exchanging criminal case files with the CPS electronically. Yet the police were not able to digitize their processes at the same pace and speed partly because each police force is an independent, locally-funded, regional body. The Courts did not start digitizing their processes before the CPS and the Police were able to exchange information electronically. Overall, England is characterised by a highly fragmented and piecemeal approach to IT strategy. There are many initiatives taking place at once ranging from trialling tools that enable the bundling of structured data within the Courts to developing an integrated digital repository (i.e., Collaborative Digital Information Store) (de Blok et al., 2014b). In spite of its disjointed approach to IT strategy, England has experienced a more extensive use of digital case files than its counterparts (especially Austria) because it is not re-inventing the wheel and starting all over again. On the contrary, England is laying out common data standards that structure the exchange of information between and among the criminal justice agencies.

Lastly, Estonia too was coded as an instance of successful digitization because of its extensive use of electronic case files. With the exception of the Courts whose ITs are still under development, the other criminal justice chain partners exchange information digitally thanks to a centralised IT architecture (i.e., E-File). This is so because of a variety of reasons. First, from the very start, there was a clear vision of where Estonia wanted to be in the future, with requirements and conditions that the IT architecture under development had to meet (Ibid). The roles of the various parties in the development and implementation were also clarified explicitly beforehand. A large number of Working Groups were set up under the direction of the various collaborating Ministries, one for each phase in the development and implementation of the IT architecture. A deliberate decision was made to develop and implement this architecture over a long time span by stating specifically what types of information should be digitally available for whom and how it should be handled (Ibid). The concerted approach to digitization worked alongside the decision of having a single, centralised architecture that links the IT applications of each supply-chain party by sending automatic messages in a seamless fashion (Ibid). Last but not least, Estonia struck a balance between outsourcing and in-house development in that it used both an internal IT organisation and external companies in an efficient and effective fashion, thus showing good project management skills. The external suppliers were brought in based on the argument that this would avoid the need to develop new systems completely from scratch. If new systems were needed, they were going to be purchased from these private companies, but they were also modified by the internal IT organisation when necessary. If a system that was needed was not available off the shelf, it was going to be developed internally (Ibid). Thus, Estonia encouraged both private and public sector organisations to work together in the development

of a centralised IT architecture and a messaging system that links all supply-chain parties thanks to shared input-output processes.

DISCUSSION

The comparative analysis of the four country-cases leads to several eye-opening insights. First, the extensive use of electronic case files is a much more demanding feat than its opposite scenario characterised by little or no use of digital case files. While poor project management skills are bound to create setbacks by default (see Austria and Denmark), good project management skills are necessary but not sufficient conditions for successful digitization strategies. A successful digitization strategy goes well beyond good project management skills and entails in our context compatible technologies that enable seamless information exchanges whether by means of small-scale data standards (see England) or shared process standards based on a large-scale, top-down IT architecture (see Estonia). The intermediate solution for positive cases reveals that:

PROJECT MANAGEMENT AND COMPATIBILITY are individually necessary and jointly sufficient conditions for **SUCCESSFUL DIGITIZATION**

The figure below captures this recipe for successful digitization. It shows that a concerted digitization approach is a redundant causal condition provided that the countries under investigation have compatible technologies and good project management skills.

[Insert Figure 1 here]

As reported by an informant:

After four years of analysing, developing, implementing and testing [the centralised IT architecture], E-File went live for the whole criminal justice chain. Looking back, this approach was not the best way to go. It took too long. It would have been better to use smaller steps for the development and implementation of E-File and to make it available to parties earlier in time by means of a step-by-step roll out instead of one big bang (IT Project Leader, Police).

Conversely, the intermediate solution for negative cases can be captured with a single ingredient:

The lack of **PROJECT MANAGEMENT** is necessary and sufficient for the lack of **SUCCESSFUL DIGITIZATION**

The above solution reiterates the fact that even in the presence of a concerted approach and compatible technologies, criminal justice agencies may revert back to paper-based work routines if, for example, their members do not get proper training.

Second, the analysis of the two success stories shows that England and Estonia did not choose to fit new technologies into pre-existing work practices. Rather, through carefully tailored training sessions and meticulous standard-setting negotiations following either a prescriptive or emergent plan, these countries have endeavoured to create new work processes and routines. As reported by an informant:

Digitization should not mean making a paper form into a PDF [file] and emailing it across to someone else in the criminal justice chain. Specifically, it should not imply that poor [manual] practices and processes are just made digital (Crown Prosecutor).

The standard workflow in the criminal justice system consists of a sequential chain of activities where the output of one organisation becomes the input of the next organisation in

line. For example, the output of Policing Organisations (i.e., evidential material) becomes the input of Prosecuting Organisations (i.e., raw materials for a charge). By the same token, the output of Prosecuting Organisations (i.e., charges) becomes the input of the Courts for their sentencing decisions and so on and so forth. Figure 2 below captures this sequential flow of activities.

[Insert Figure 2 here]

According to coordination theory (Malone and Crowston, 1990), these sequential interdependences should be managed by means of plans which schedule the workflow of the interdependent parties (Thompson, 1967; Van de Ven et al., 1976). Yet our evidence shows that concerted and prescriptive approaches are redundant factors because “it may take too long” to implement the grand vision and meet all planned requirements. On the contrary, good project management coupled with shared data or process standards are the core ingredients for an extensive use of digital case files because they simultaneously eradicate old habits through intensive training while enabling seamless information sharing. This, in turn, entails a morphogenetic process (Archer, 1995) whereby sequential interdependences are gradually but steadily transformed into reciprocal interdependences where information flows in a reciprocal, back-and-forth manner between and among the criminal justice agencies (Van de Ven et al., 1976; Thompson, 1967). As reported by an informant:

We only need to enter the information once in the connected systems. Anything else that is then being done is effectively adding value because information is automatically populated into the IT Systems. Nobody spends any efforts manually recording information. There is no manual re-keying of information (Crown Prosecutor, Criminal Justice System Efficiency Programme).

This, in turn, suggests that the criminal justice chains are gradually re-configuring their activities to become value-adding networks (Christopher, 2011). The two success stories point to separate ways by which the criminal justice agencies can add value to each other’s efforts, namely by means of a shared repository (Estonia) or through directly inter-connected systems (England). Figure 3 below sketches these two types of value-adding networks.

[Insert Figure 3 here]

Third, and last, value-adding networks rely on coordination by technological feedback to manage their interdependences (Gosain et al., 2004; March and Simon, 1958). Coordination by technological feedback is suitable for the management of reciprocal interdependences because it involves the transmission of new information between the parties in a back-and-forth manner (Ibid). Our two success stories show that coordination by technological feedback presupposes some form of IT strategy whether prescriptive (Estonia) or emergent (England) and some form of standardization based either on input-output process standards (Estonia) or data standards (England).

CONCLUSION

Notwithstanding the small number of cases analysed in this paper, several insights emerge from our study. From a theoretical angle, it has been argued that coordination by (technological) feedback is an efficient way of coordinating activities and information flows in the most variable and unpredictable contingencies (March and Simon, 1958; Thompson, 1967). For example, the supply-chain literature has established that dynamic adjustments (i.e., coordination by feedback) through IT-supported learning and adaptation enable supply-chain partners to quickly reconfigure their inter-organisational processes to keep up with a

changing business environment (Gosain et al., 2004). By the same token, other scholars have claimed that industry-wide data and process standards combined with a shared IT-coordination hub are necessary conditions for widespread adoption and improved information transparency in global supply chains because they enable dynamic adjustments through simultaneous information sharing between and among disparate parties (Steinfeld et al., 2011; van Liere et al., 2004). In light of these arguments, our findings are quite perplexing because they highlight the pivotal role of coordination by technological feedback within highly-stable environments characterised by clearly defined business processes and activities (Allen et al., 2014). Thus, our findings run counter to conventional coordination theory and show that coordination by technological feedback is a viable coordination mechanism even within highly-stable environments provided that one agency's rewards depend on the other agency's performance (e.g., the Police performance depending on the number of charges or the Prosecutors' performance depending on the number of sentences, etc.). Furthermore, the pronounced role of coordination by technological feedback adds nuance to our original conceptualisation of criminal justice systems as supply chains. A supply-chain perspective rests on the assumption that the criminal justice system partners work in a sequential fashion (Kumar and van Dissel, 1996). Yet the information flows can be sequential, bilateral or even simultaneous within digitized criminal justice systems. Hence, our study enhances the supply-chain perspective in that it regards the criminal justice systems as value-adding networks that aim at transforming raw data (e.g., a charge) into (valuable) information (e.g., a sentence).

In addition, coordination theory has identified three coordination mechanisms which are suitable for different contingencies (March and Simon, 1958; Thompson, 1967; Van de Ven et al., 1976). Coordination by standardization is suitable for managing pooled interdependences, that is, contingencies where all parties make a contribution to a whole while being supported by it. Standardization is required because it constrains each parties' action along paths that are consistent with those taken by the other parties, thus minimizing variation around the standardised path. Coordination by plan is appropriate for managing sequential interdependences, that is, contingencies where tasks and activities flow in one direction so that the output of one party becomes the input of the next party. Planning is required because it entails the establishment of schedules by which the actions of the interdependent parties flow sequentially. Coordination by feedback (or mutual adjustment) is ideal for managing reciprocal interdependences, that is, contingencies where work and activities flow in a reciprocal, back-and-forth manner over a period of time. Feedback is required because it involves the transmission of new information between the parties in a back-and-forth manner (Ibid). Coordination theory argues that these types of interdependence form a Guttman-type scale whereby reciprocal interdependence presupposes both sequential and pooled interdependence (Ibid). Our findings extend coordination theory. Not only do our success stories exhibit a new Guttman-type scale of sorts applied to coordination mechanisms where coordination by technological feedback presupposes some form of prescriptive or emergent planning and, ultimately, some form of standardization. They also show that when tasks and activities are embedded in the technology, coordination by technological feedback may even entail the transmission of bilateral information in a synchronic fashion. The England case is quite telling in this respect considering that the two-way interface enables bilateral information flows taking place at one point in time (i.e., synchronically) rather than over time (i.e., diachronically) (Iannacci, 2014).

Furthermore, and in synch with Gosain's et al. (2004) findings, our results reiterate the role of IT strategy as an ongoing process rather than a grand plan. The fact that England, as opposed to Estonia, stumbled upon the digital case file suggests that a country can experience an

extensive use of electronic case files even when the criminal justice system parties work in a disjointed and piecemeal fashion. Thus, these parties can still work together because they rely on data standards that are shared on a small-scale basis. These small-scale standards, in other words, lay the foundation for future digitization projects. They serve as small pockets of structure in the making (Lanzara, 1999). They simultaneously enable and constrain future efforts towards nation-wide digitization because they support the pursuit of new standards in a path-dependent fashion (Hanseth and Lyytinen, 2010).

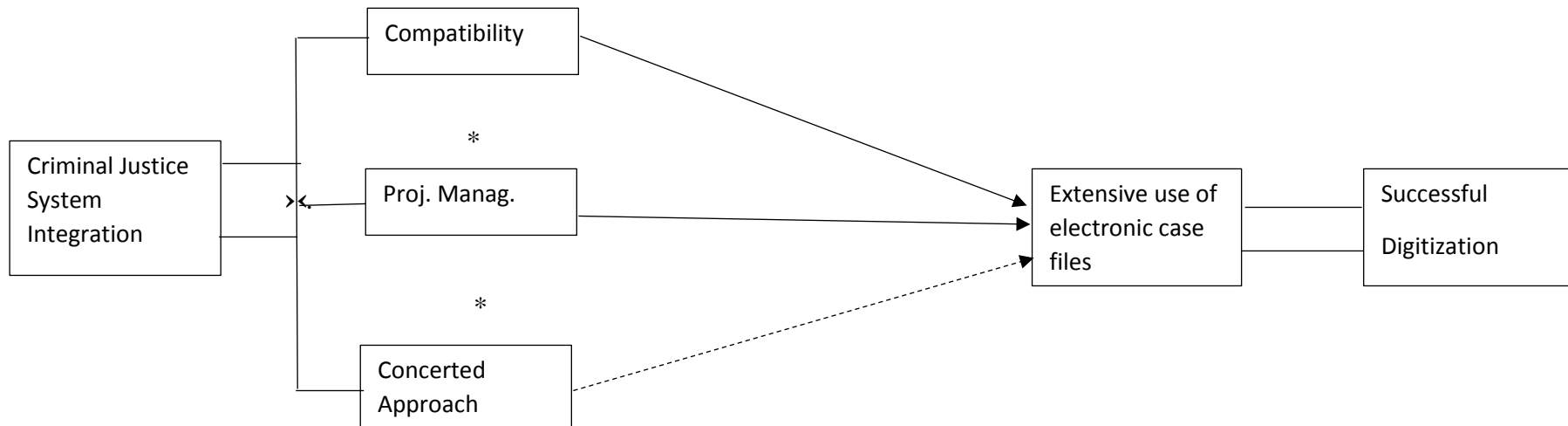
Lastly, this study makes also a contribution to practice. The causal asymmetry between positive and negative cases reminds practitioners that failure is much easier to attain than success. The Austrian case is telling in this respect. Despite being a frontrunner in e-Government projects, the Austrian government mismanaged its IT projects because of the lack of end user training (de Blok et al., 2014a). Likewise, in the Danish case supply-chain integration was pursued as if this was simply an IT project. Too much outsourcing and poor project management skills spelt out the failure of its supply-chain integration endeavours (Ibid). Yet good project management is not a silver bullet for successful digitization. A recipe for success goes further and entails in our context compatible technologies that enable seamless information exchanges whether by means of a small-scale, bottom-up approach to standardization (see England) or a single, centralised architecture developed in a top-down fashion (see Estonia).

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Figure 1: A model of successful digitization of criminal justice system integration



Legend (Adapted from Goertz and Mahoney, 2005)

— \times — = Non-causal conjunction of necessary causes which are jointly sufficient for conceptual membership

* = LOGICAL AND (Intersection)

----- = Ontological relation

—————> = Causal relation

- - - - -> = Redundant causal variable

Figure 2: Criminal justice chains as supply-chains with sequential interdependences and one-way interfaces

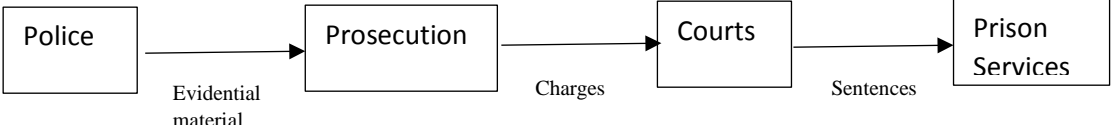
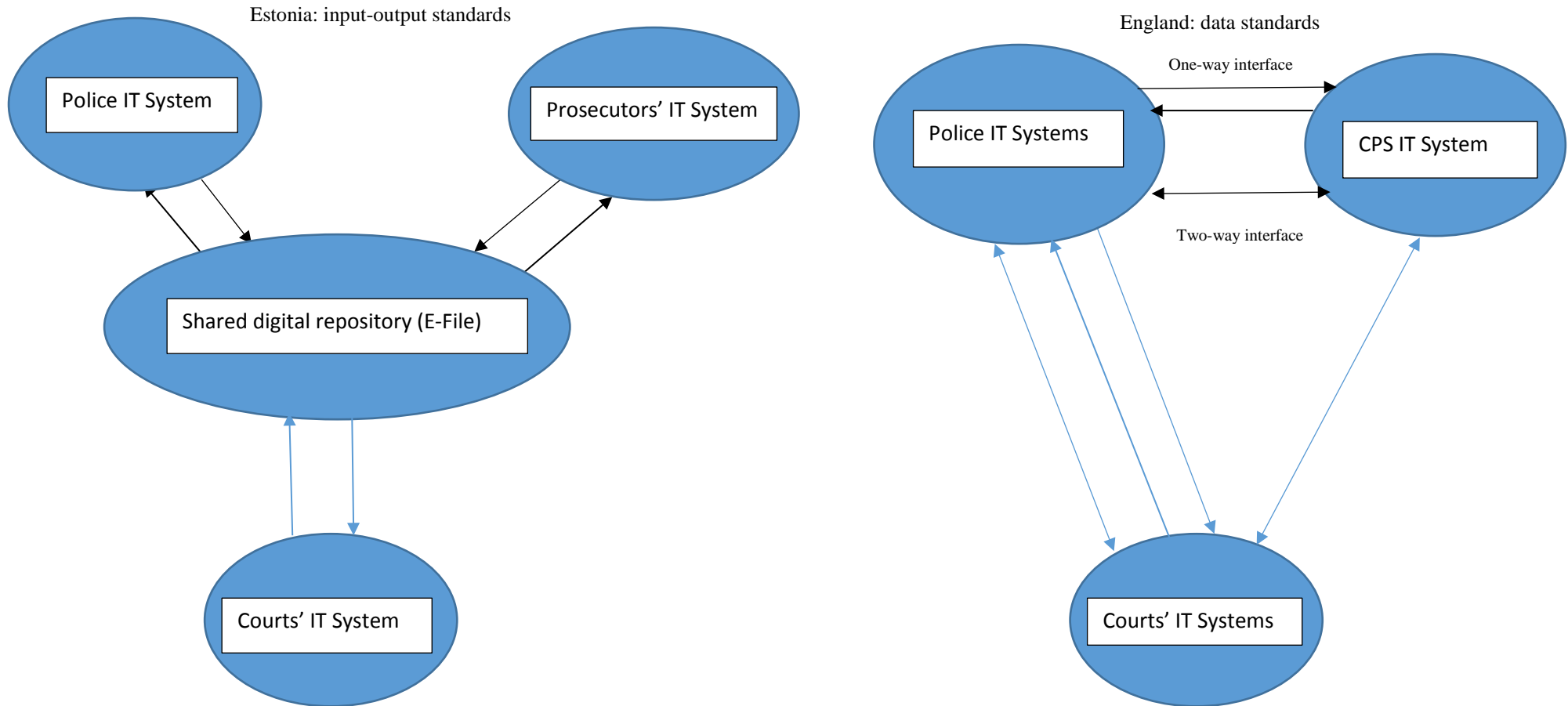


Figure 3: Criminal justice chains as value-adding networks relying either on process standards or data standards



Legend:

Black arrows: links already developed; Blue arrow: links under development