BRIEFING

Requested by the IMCO committee

European Parliament

Systems and e-Procurement - Improving Access and Transparency of Public Procurement

KEY FINDINGS

- EUR 2000 billion are spent through public procurement in the EU every year,
- **e-Procurement** is the **end-to-end digitisation** of the traditional public procurement process,
- **access** is improved through centralising dispersed procurements,
- one or few central, electronic platforms, significantly reducing the search efforts for potential bidders,
- transparency and integrity is increased via e-Procurement,
- visibility and traceability of procurement process for the whole public,
- improved data quality by both enforcing the provision of required information and through the use of structured and validated forms,
- reduced search costs by sharing common catalogues,
- reference cases are Estonia and Portugal,
- the analysis of private sector e-Procurement projects and successful public e-Procurement projects led to the **following recommendations:**
    - necessity of **processes redesign** to accommodate electronic support,
    - ensure that the e-procurement process is **digital from end to end,**
    - **integration of all involved/affected IT systems,**
    - **train end-users** to ensure efficiency and acceptance,
    - **supplier side adoption** of equal importance as internal acceptance,
    - **state-of-the-art security** for legal compliance and trust building,
    - e-Procurement tools have to excel in **usability and accessibility,**
    - **top management support** increases the likelihood of transformation success.

Introduction

Public spending through public procurement sums up to about 14% of the EU GDP (European Commission 2017a)—which equals to roughly EUR 2000 billion—making it one of the most substantial components of public budgets. Already in its 1996 green paper on "Public Procurement in the European Union" the European Commission (1996) pointed out that "[a]n effective public procurement policy is fundamental to the success of the single market in achieving its objectives". Even though the internet was still in its infancy, electronic procurement was already considered the future of public procurement.

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In the following years, this has been underpinned by several additional EU communications and directives (Henriksen and Mahnke 2005). Even despite the active pursuit of the EU, several successful national cases of electronic procurement realising savings of ≥10% and the common acknowledgement of the deficiencies of paper-based procurement (legibility, delays, validation, …), electronic procurement only slowly spreads throughout the EU (Buyse et al. 2015; European Commission 1996, 2010; Henriksen and Mahnke 2005). Given the growing maturity of electronic and internet-based tools and the general advent of e-Government in Europe, e-Procurement remains an important challenge with an increasing level of urgency to be addressed.

The presented briefing and the associated presentation have been prepared for the IMCO workshop on the "Public procurement strategy package" which took place on the 19th February 2018[1]. Contextual frame for the workshop is the own-initiative report 2017/2278(INI)[2] on the "Public procurement strategy package" which deals with the Commission Communications COM(2017) 572[3] and COM(2017) 573[4] as well as the Commission Recommendation C(2017)6654[5]. It provides a short introduction into the concept of e-Procurement before outlining how it helps to achieve the strategic priorities stated in COM(2017) 572. To round off the briefing six critical success factors (recommendations) are presented that have been identified in prior (public) e-Procurement projects.

1. (Public) e-Procurement

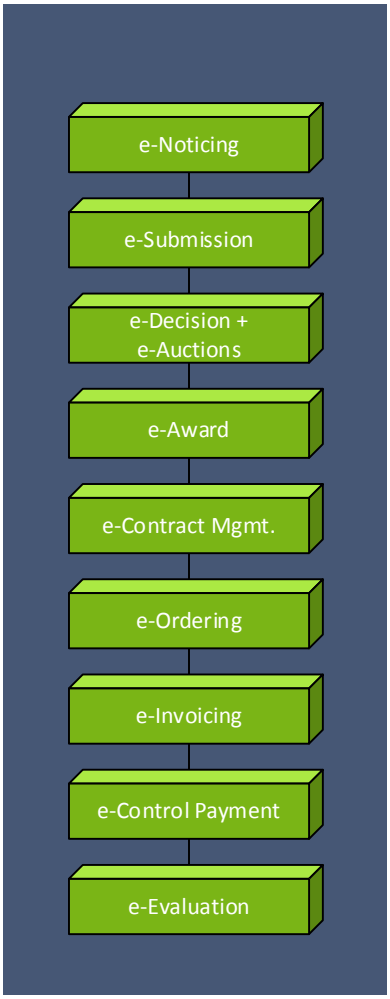
When discussing the term **e-Procurement** an important step is to differentiate it from the often synonymously used term **e-Purchasing** (MacManus 2002; Moe 2004; Vaidya et al. 2006). Here e-Purchasing is typically understood as the narrower concept of determining needs, supplier selection, negotiation and contract preparation (MacManus 2002). e-Procurement subsumes e-Purchasing including additional phases such as subsequent receipt and evaluation of goods (see Figure 1) as well as background operations such as inventory control and disposal operations (Moe 2004). Hence, e-Procurement is often understood as an "end-to-end" process—a notion that is also explicitly targeted by the EU (European Commission 2013a).

The general e-Procurement process for public administration (see see Figure 1) as outlined by Costa et al. (2013) or Tavares et al. (2010) is typically subdivided into two broader steps: **e-Tendering** and **e-Execution**[6]. There **e-Tendering** subsumes **e-Noticing**, **e-Submission**, and **e-Decision + e-Auctions**, whereas **e-Execution** covers the remaining steps.

At the level of individual steps, **e-Noticing** refers to the publication of procurement notices via an electronic platform (e.g., the Ted [tenders electronic daily] system of the EU). A necessary prior to or component of this step is the ex-ante determination of procurement needs and an adequate procurement strategy (Costa and Grilo 2015). Here different foci can be pursued including cost-efficiency, ecology or innovation (European Commission 2017a).

Once published, potential suppliers and contractors can place their offers during the so-called **e-Submission** phase. This unambiguously includes the submission of the so-called technical and financial tenders (Costa and Grilo 2015). However, it also covers handing in all further legally required documents such as but not limited to legal entity or financial identification forms (European Commission 2017b; European Defence Agency 2016).

Figure 1: Public e-Procurement Process



From an implementation perspective, this process step is usually realised via structured online forms and/or via the possibility to submit digital documents such as XML or PDF files.

Once the announced submission phase has been concluded, the **e-Decision + e-Auctions** step is triggered. Its inherent purpose is a multi-objective analysis of the submitted tenders. The three considered objectives are compliance with imposed (technical, legal, …) requirements, scoring of each tender based on the chosen strategy and a subsequent ranking (Tavares 2010). Given the optimal case of an end-to-end implementation of the e-Procurement process, the e-Decision + e-Auctions step can directly access the tender data from the previous step. In case of structured, form-based submissions, an initial assessment can even be automated. e-Auctions are especially outlined by Tavares (2010) as a suitable tool to increase competitiveness among the suppliers. These online B2B auctions are typically organised as so-called "Dutch auctions" or reverse auctions (Davila et al. 2003).

With the conclusion of the **e-Decision + e-Auctions** step the **e-Tendering** phase (or pre-award phase) is finished and the **e-Execution** (or also post-award) stage starts which serves the enactment of contracts and execution control.

Within this stage, the first step is the so-called **e-Award**. There supplier(s) with the best proposal(s) selected in the **e-Decision** phase are notified and awarded the respective contracts.

As the contract awarding marks the beginning of the actual contractual relationship between procuring authority and supplier, **e-Contract Management** has to be initialised next. Even though modelled as an individual step, the contract management can rather be understood as a continuous activity of monitoring contract performance and document management (Costa and Grilo 2015). For this purpose workflow-supported e-Contracts can be used to, e.g., automatically trigger orders or payment (Krishna et al. 2005).

With the triggering of orders, the next step, **e-Ordering**, is initialised. Here the focus is on all activities related to the (electronic) submission of order documents to the (electronic) transmission of delivery instructions from the procuring authority to the suppliers. Since business and financial data are involved in this step, it is crucial to satisfy privacy and security requirements such as authentication and confidentiality.

Subsequent to the e-Ordering the e-Invoicing step is listed—inheriting its restrictive privacy and security requirements (European Parliament and Council of the European Union 2014a). It comprises the electronic creation, sending, receipt and processing of bills for ordered items from the contractor to the contracting authority (Buyse et al. 2015). With the Directive 2014/55/EU the European Parliament and the Council of the European Union (2014a) already specified several requirements: For example, it has been ruled that electronic invoices must be in a machine-readable format (e.g., XML) whereas mere digital images are insufficient. Furthermore, the European legislation requires e-Invoicing systems to work across borders and to be sufficiently simple to use also for SMEs.

Based on the **e-Invoicing** the **e-Control Payment** step is concerned with managing and executing agreed upon electronic payments (Costa and Grilo 2015). Here again, the use of standard machine-readable exchange data formats is crucial to enable automated payment processing (Stoll 2008). Especially for low-value items with high order frequency Stoll (2008) points out a large saving potential by automating the payment process.

The procurement process is concluded by an ex-post **e-Evaluation**. During this step, the contract execution is evaluated based on a set of evaluation criteria that have been defined beforehand (Costa and Grilo 2015). The goal is a KPI (key performance indicator) based assessment that should help to find potential weaknesses and issues to support and improve future tendering processes.

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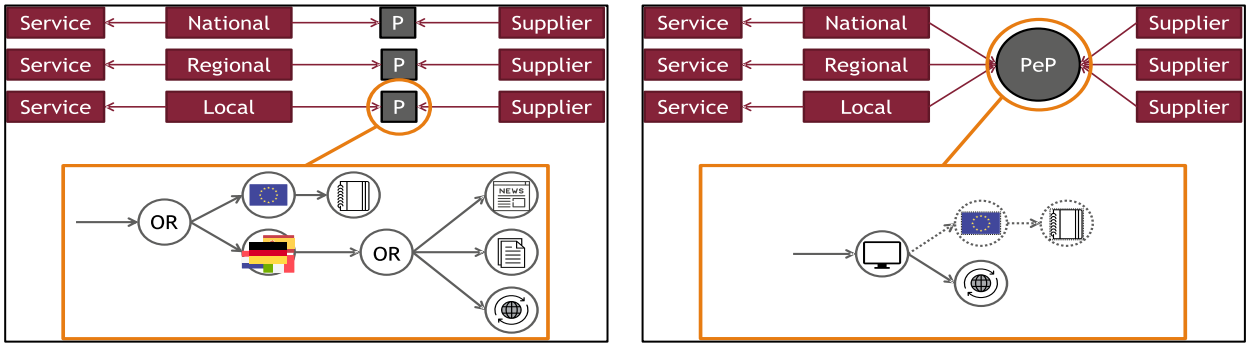
2. Reasons for e-Procurement

After briefly introducing e-Procurement, the following section shall motivate, how e-Procurement can help to achieve the strategic priorities the European Commission (2017a) postulated in their communication on "Making Public Procurement work in and for Europe". Given the spatial constraints of this briefing and following the workshop presentation7 associated with this briefing, the focus will be on the aspects of **improved access, transparency,** and **integrity** as well as the **quality of procurement data.**

Improved Access

To understand one of the most prominent advantages associated to the usage of e-Procurement, one has to look back at how public procurement processes traditionally worked (see left part of Figure 2): As visualised in Henriksen and Mahnke (2005), all different levels (national, regional, local, …) of the administration structure usually conduct their own procurement processes—including individual publication of tenders. In Germany for example, the situation has even been more complicated. There the public procurement law currently (until October 2018) allows publishing procurements online, in publication sheets or even newspapers (Bundesministerium für Umwelt, Naturschutz 2016). To make things even more complicated, all procurements with a contract value above a specified threshold have to be published in the Supplement to the EU Official Journal. Consequently, interested suppliers had to check several publications for different levels and in the worst case for different authorities on each level. This led to an impervious amount of information and search work—especially for SMEs with often limited personnel.

Figure 2: Procurement Process Schematics (compare Henriksen & Mahnke (2005))



As a solution, Public e-Procurement (PeP) helps to centralize all procurements into either one central, electronic platform (compare right halfof Figure 2) or at worst a limited number of competing platforms (see European Commission (2016a)). So, instead of having a diverse set of publishing options and publishing authorities, the suppliers are presented an integrated platform—a concept which is also known under the name "one-stop shop" (Wimmer 2002). This means that potential contractors do no longer have to track hundreds or thousands of different newspapers and publication sheets, but can login to one website and find all procurements from the local to the national level. Especially for SMEs, which often lack the personnel to monitor all open calls for tender, the improved access through a central platform is an important support factor to increase their possibilities for participation. Beyond this, ensured online publication of calls for tender increase accessibility for international, cross-border bidders (European Commission 2012; Vincze et al. 2010).

Transparency and Integrity

Two of the pivotal advantages linked to the introduction of e-Procurement are transparency and integrity. One of the driving forces creating the necessity for both is the issue of corruption (Neupane et al. 2012) given the substantial financial volume of public procurement (See section 1). Especially the direct human interaction as well as the lack of options for monitoring enabled government officials to get bribed or use their power for personal enrichment (Neupane et al. 2012). Hence, centralizing procurements within a publicly available electronic platform is hoped to create sufficient publicity to discourage contracting authorities from opening unnecessary tenders or hiding relevant information due to the elevated likelihood of detection (compare, e.g., Neupane et al. 2012). Beyond fighting corruption, transparency, e.g., in terms of process transparency, is also important to keep the public informed about decisions and performance—and through this to finally establish trust (Armstrong 2005). While the public as one, if not the major stakeholder of public administration has a right to be informed about procurement decisions and performance, transparency also simplifies supplier participation and increases trust. Here the digitisation, e.g., in terms of the above mentioned central platform, helps to provide an easy real-time access to procurement information ("Is a tender still open for participation?", …).

Figure 3: List of Procurements in the Estonian e-Procurement Platform

No	Ref no	Title	Contracting authority	Contract type	Procedure	Published ▼	Submission deadline	CPV	EU	Status		
1	190664	GoPro uuendus- ja tugiteenuslitsentside pikendamine	Riigi Kaitseinvesteeringute Keskus - Riina Krall	T	A	01.10.2017	06.11.2017	72253200-5		täitmisel	e D	
2	191378	Kaugseire teenuste arenduskeskuse ESTHub baastaristu loomine	Maa-amet - MAILI HIRLAK	T	G	01.10.2017	31.10.2017	72200000-7		teostatud	e D	
13	191365	Konguta valla teede remonttööd	Konguta Vallavalitsus - AGU KASETALU	E	LM	29.09.2017	16.10.2017	45233142-6		lepingu ootel	e D	

A real-world example of how these advantages could manifest themselves is the "E-Procurement Estonia" platform (see Figures Figure 3 and Figure 4). The first aspect furthering transparency and integrity is the full public availability of all procurement documents and tenders (compare Figure 3)—aggregated from a diverse list of public authorities. This implies that every potential supplier (but also every interested citizen) can access and evaluate tenders with little to no search effort (and without registration) realizing the desired public disclosure. With the additional display of status information (current status, submission deadlines, ...) and contractual details even including all communications between public authorities and potential suppliers as well as participants , utmost process transparency can be ensured (compare Figure 4).

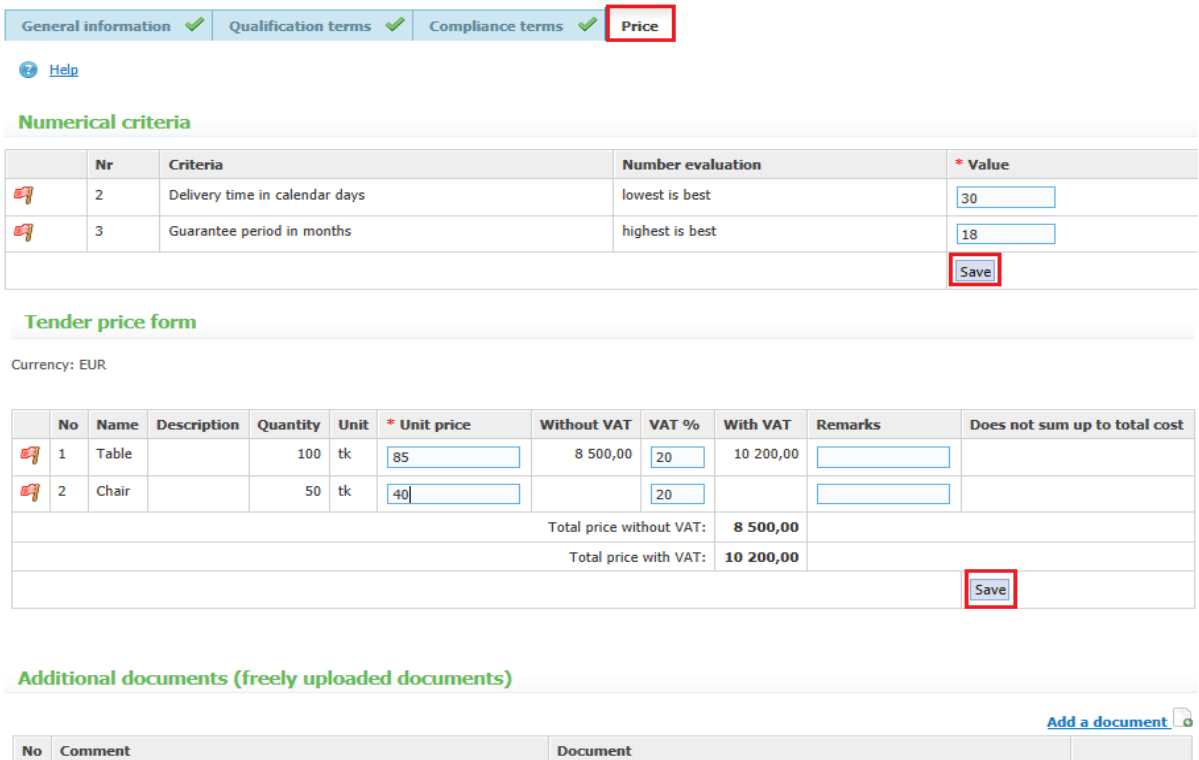
Figure 4: Procurement Detail View in the Estonian e-Procurement Platform

Quality of Procurement Data

In its 2017 communication on "Making Public Procurement work in and for Europe" the European Commission (2017a) points out that public administrations are in dire need of larger quantities of data exhibiting a higher quality to enable a better assessment of procurement practices. Furthermore, traditional procurement often suffers from erroneous or missing data due to media breaks (e.g., entering data from paper-based submissions into a computer system) (compare, e.g., Stoll 2007).

Through the establishment of an end-to-end electronic procurement process, such media breaks can be prevented, ensuring that all procurement data is always available in digital format. This already guarantees the availability of higher quantities of data, since all created data artefacts are logged automatically and can no longer get lost by not being transferred from paper into the computer system. Avoiding media breaks is also an essential first step into increasing the quality of procurement data, as it avoids conversion errors such as typos and overlooking parts of the given information.

Figure 5: Procurement Detail View in the Estonian e-Procurement Platform



However, the avoidance of media breaks is only one component. E-Procurement further helps to reduce errors and to enhance data quality by gathering data through structured and validated

forms. An example for this is depicted in Figure 5: in this screenshot of a tender creation, one can see that each required data point such as unit prices or delivery times are obtained via mandatory form fields. So each applying bidder is forced to provide all relevant information, avoiding incomplete tenders that have to be filtered out by the procurement authority personnel. In addition, the forms enforce a structured, quality-assured format that can be directly subjected to an evaluation and analysis. As a side effect, the decisions and assessments regarding procurement do not only base on a more elevated data basis but are also available sooner.

Common Catalogue

Another pathway for efficiency optimization through e-Procurement is the establishment and usage of common product catalogues. The idea is to create an integrated catalogue of all sufficiently standardised procurement items, especially those which are bought regularly in high quantities (e.g., office supplies) (compare, e.g., Stoll 2007). Since the change towards e-Procurement typically implies a certain level of centralisation of procurement processes, this step should not only be conducted for each public authority but ideally throughout all participating authorities and across all administrative levels.
In the end, the common catalogue can help to reduce search costs for procurement personnel. Instead of searching for a suitable product—e.g., copy paper—from a diverse set of options, they would only be able to select one of a few standardised paper supplies. As a side effect of sharing a catalogue, it would become easier for different authorities to combine their tenders and achieve better pricing or delivery conditions given the larger contract value.

3. Exemplary Cases

Now, let´s have a look at examples from practice to identify best practices helping to transfer research suggestions into operational systems. To ensure that lessons learnt from these cases are easy to transfer, two EU member states with already advanced e-Procurement systems have been chosen: Portugal and Estonia.

Portugal

Within the European Union Portugal is considered the **first country implementing and enforcing mandatory e-Procurement** (Costa et al. 2013; European Commission 2016a). In the context of a redesign of the procurement system—following the directives 2004/17/EC and 2017/18/EC—from a dispersed to a centralised system, Portugal decided to shift from paper-based to electronic procurement. Following the adoption of the law end of July 2008, only a transition period of 15 months has been granted (Costa et al. 2013). Hence, with the key-date of the 1st November 2009, Portugal concluded its transition—even five years prior to the directives steering the current EU-wide shift to e-Procurement (European Parliament and Council of the European Union 2014b, 2014c, 2014d). Subsequent surveys identified that the deliberate embracement of and the commitment of policymakers to e-Procurement were two decisive factors in the success of its implementation (European Commission 2016a).

While, for example, the European Commission (2016a) and Costa et al. (2013) point out several achieved advantages (e.g., cost savings, shorter processing times, …), they also indicate several areas for improvement: One aspect is the adoption of fully privately run and competing platforms, which so far prevent a one-stop shop experience and also cause high operating costs. Further challenges reported include a lack of training for procurement personnel and issues with electronic signatures.

Estonia

Another interesting case within the EU is Estonia, which became a member state in the 2004 eastward expansion of the EU. As one of the ex-Soviet Union states Estonia had the unique chance to basically develop its government on the greenfield. Taking up the chance, Estonia began to build an e-Government system in 2001/2002. Starting with a **digital ID** and a backend system, successively more and more services were integrated into a one-stop shop **e-Government platform** (European Commission 2015; Vassil 2015). In this ecosystem, e-Notifications as a part of e-Procurement have been mandatory since 2001. Subsequently added, partially mandatory elements such as e-Submission are even taken up faster than expected (from 5% in 2011 to 72% in 2014—with the original goal of 50%) (European Commission 2016b). Identified key success factors include widespread availability and acceptance of electronic governmental services, as well as an e-Procurement platform which is "frequently referred to as best practice" for being "rapid and easy to use" (European Commission 2016b, p. 66). The benefit of such deep integration, e.g., becomes visible comparing the Estonian to the Portuguese case: While the latter stated issues with digital signatures as a large hindrance, the Estonian e-Procurement platform makes use of the long-established Estonian electronic ID. Furthermore, Estonia made use of awareness raising actions to promote the new services as well as extensive training programs to educate employees to make use of the available e-Procurement platforms (Vassil 2015).

4. Critical Success Factors (Recommendations)

After a lot of retrospective work and assessments of potentials, this section should conclude this briefing by outlining several critical success factors. Even though not exhaustive the following list of six factors should assist transforming public authorities (and entities involved in the process) in avoiding the most severe pitfalls.

Business Process Re-Engineering

While the e-Procurement process in Figure 1 is similar to the traditional procurement process, the changed name with prefixed "e" and Section 3 should already indicate that transitioning from (public) procurement to e-Procurement is more than buying and installing an IT system. Instead, it is of essential importance to (re-)design the underlying procurement processes in a way that takes into account changes induced through IT-support (Vaidya et al. 2006).

Procedurally the **re-engineering should be conducted in three steps**: Firstly, unnecessary process elements should be discarded, before secondly, simplifying the process as much as possible. Only then, in a concluding third step, the process should be automated with a suitable IT system.

During the process re-engineering, special attention should be paid to ensure that all data inputs and communications are conducted in a **structured format** (e.g., via form-based data collection). While, e.g., sending submissions of tenders as a scanned PDF via e-mail would qualify as an "e"-submission, the overall process performance would be similarly poor as in the traditional case (and thus indicate poor process design). The simple reason is that the information in a PDF is almost as unstructured as the one on a traditional sheet of paper, hence still requiring a person to manually enter the data into an IT system.

Digital End-to-End/System Integration

As already indicated in Section 2 it is **insufficient to digitise single steps** of the procurement process. In order to reap the full benefits from e-Procurement it is **mandatory to digitise the process from end to end**—so all steps from noticing till payment/evaluation must be conducted electronically (as suggested by the European Commission 2013b). Otherwise, through the fall-back to traditional procedures and media-breaks, associated issues such as higher processing times or error rates are reintroduced to the e-Procurement process.

This includes, but is not limited to, integrating the different systems involved in the procurement process as well as those added during the transformation to e-Procurement (Vaidya et al. 2006). Beyond mere intra-organisational integration, the multi-actor procurement process requires inter-organisational integration as well (European Commission 2010). Here the definition of clear standards for data exchange (e.g., BMEcat, XML) is important to increase trust and acceptance from the supplier side (European Commission 2010).

End-User Uptake + Training

Since both, the working tools, as well as the established working processes, are changed through e-Procurement, the end-users (especially public authority employees) require **appropriate training** (Vaidya et al. 2006). This not only ensures that they can operate the system effectively and efficiently but also helps to **increase acceptance** of and willingness to use the new process. Considering that a lack of training has been identified as the major hindrance for the transition to e-Procurement in Portugal by Costa et al. (2013), the criticality of this step should not be underestimated.

Supplier Adoption

However, acceptance and uptake are not only an internal problem of procuring authorities. Previous projects have shown that suppliers are often rather unwilling to embrace e-Procurement (Andrade et al. 2010; Vaidya et al. 2006). Reasons range from expected costs for implementation, fear of a price war as well as a perceived lack of legal support. Hence, **suppliers should be integrated into the planning of public e-Procurement early on** (Vaidya et al. 2006). This allows to properly address their fears and requirements during the implementation, preventing subsequent adoption issues. Another integral component can be the establishment of properly specified standards—ideally free and non-proprietary—for data exchange and intra-organisational system integration to reduce technical barriers. Otherwise, especially SMEs with only limited financial budgets may be excluded due to high initial technological investments.

Security + Authentication

Security and authentication are highly critical factors since e-Procurement directly involves financial transactions and is thus susceptible to fraud. Consequentially, it is **mandatory to consider all security dimensions** (confidentiality, integrity, availability, accountability, and authentication) (e-TEG 2013). In terms of authentication, for example, this breaks down to either providing (PKI-based) **digital signatures** or integrating existing **electronic IDs** (compare, e.g., the Estonian case above). Given the handling of both financial and personal data of the participating companies, **encryption** of all collected and stored data is another—even legally binding (European Parliament and Council of the European Union 2016)—necessity. Beyond the implementation of security measures, the e-TEG (2013) suggests to do **process-based risk assessments** and to obtain a **certification**, e.g., by the established **ISO 27001** standard. This will enhance trust from the supplier side that the e-Procurement system can be used with confidence.

Usability + Accessibility

The additional space provided by this briefing shall be used to explicitly introduce "**usability**" respectively "**accessibility**" as an additional critical success factor[8]. While business process re-engineering, system integration and end-user training implicitly target usability, it also has been identified as an independent critical factor for e-Procurement already more than a decade ago (Bruno et al. 2005). Since then, most of the characteristics such as **legibility**, **meaningful navigation**, and **comprehensibility** have not ceased to be important determinants of user experience—especially in highly complex and regulated environments such as public administration.

Beyond the specific area of electronic procurement, information systems research confirms the need to consider usability or the "**ease of use**" of a technological/software artefact to achieve an acceptance of new technologies by affected/target users (compare, e.g., Venkatesh 2000). The example of Estonia can be picked up again: The European Commission (2016b), i.e., praises the Estonian system for its ease of use and also provide statistics indicating that it is experiencing rapid uptake. Hence, any (future) public e-Procurement project resulting in the creation of a new technological artefact should **give usability and associated testing** (with different stakeholder groups) **sufficient focus** to avoid rejection.

Top Management Support

Last but not least, the support of the top management has to be considered as an important factor (Vaidya et al. 2006)—as in almost any IT/IS-project. This has several implications: First, it is essential that the executive management team responsible for the transition to e-Procurement (or procurement in general) **provides the vision and goals** driving the change (Vaidya et al. 2006). Beyond this, there are five major categories where top management support should be provided (Boonstra 2013). This reaches from the provision of **sufficient resources** (financial, material and personnel) and **expertise**, over the establishment and enforcement of the **project structure** to a regular and supportive **communication** together with the application of **managerial power** where required to advance the project.

5. References

Andrade, P., Alturas, B., and Oliveira, T. 2010. "Electronic Procurement: Dealing with Supplier Adoption," in *ENTERprise Information Systems*, CENTERIS 2010, J. E. Q. Varajão, M. M. Cruz-Cunha, G. D. Putnik, and A. Trigo (eds.), Viana do Castelo, Portugal: Springer, Berlin, Heidelberg, pp. 168–179.

Armstrong, E. 2005. "Integrity, Transparency and Accountability in Public Administration: Recent Trends, Regional and International Developments and Emerging Issues."

Boonstra, A. 2013. "How Do Top Managers Support Strategic Information System Projects and Why Do They Sometimes Withhold This Support?," *International Journal of Project Management* (31:4), pp. 498–512.

Bruno, G., Esposito, E., Mastroianni, M., and Vellutino, D. 2005. "Analysis of Public E-Procurement Web Site Accessibility," *Journal of Public Procurement* (5:3), pp. 344–366.

Bundesministerium für Umwelt, Naturschutz, B. und R. 2016. "Bekanntmachung Der Vergabe- Und Vertragsordnung Für Bauleistungen Teil A (VOB/A)," *Bundesanzeiger*, pp. 1–18.

Buyse, A., Dewyngaert, N., Loozen, N., Lopez Potes, M., Simons, G., and Ziemyte, A. 2015. "E-Procurement Uptake."

Costa, A. A., Arantes, A., and Valadares Tavares, L. 2013. "Evidence of the Impacts of Public E-Procurement: The Portuguese Experience," *Journal of Purchasing and Supply Management* (19:4), pp. 238–246.

Costa, A. A., and Grilo, A. 2015. "BIM-Based E-Procurement: An Innovative Approach to Construction E-Procurement," *The Scientific World Journal* (2015), p. 15.

Davila, A., Gupta, M., and Palmer, R. 2003. "Moving Procurement Systems to the Internet: The Adoption and Use of E-Procurement Technology Models," *European Management Journal* (21:1), pp. 11–23.

e-TEG. 2013. "Recommendations for Effective Public E-Procurement." (http://ec.europa.eu/DocsRoom/documents/18026/attachments/1/translations/en/renditions/pdf).

European Commission. 1996. "Public Procurement in the European Union: Exploring the Way Forward," No. 583, COM(96), Brussels, Belgium.

European Commission. 2010. *Green Paper on Expanding the Use of E-Procurement in the EU*, Brussels, Belgium: EU Publications, p. 23.

European Commission. 2012. “A Strategy for E-Procurement,” No. 179, COM(2012), Brussels, Belgium.

European Commission. 2013a. *E-Invoicing in Public Procurement: Another Step towards End-to-End E-Procurement and E-Government in Europe*, Brussels, Belgium, p. 3.

European Commission. 2013b. “End-to-End E-Procurement to Modernise Public Administration,” No. 453, COM(2013), Brussels, Belgium.

European Commission. 2015. “eGovernment in Estonia.”

European Commission. 2016a. “Public Procurement – Study on Administrative Capacity in the EU: Portugal Country Profile.”

European Commission. 2016b. “Public Procurement – Study on Administrative Capacity in the EU: Estonia Country Profile.”

European Commission. 2017a. “Making Public Procurement Work in and for Europe,” No. 572, COM(2017), Strasbourg, France.

European Commission. 2017b. *E-Submission Quick Reference Guide for Economic Operators*.

European Defence Agency. 2016. *E-Submission Application Guide for Economic Operators*.

European Parliament, and Council of the European Union. 2014a. “Directive 2014/55/EU of the European Parliament and of the Council of 16 April 2014 on Electronic Invoicing in Public Procurement,” *Official Journal of the European Union* (L 133), pp. 1–11.

European Parliament, and Council of the European Union. 2014b. “Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the Award of Concession Contracts,” *Official Journal of the European Union* (L 94), pp. 1–64.

European Parliament, and Council of the European Union. 2014c. “Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on Public Procurement and Repealing Directive 2004/18/EC,” *Official Journal of the European Union* (L 94), pp. 65–242.

European Parliament, and Council of the European Union. 2014d. “Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on Procurement by Entities Operating in the Water, Energy, Transport and Postal Services Sectors and Repealing Directive 2004/17/EC,” *Official Journal of the European Union* (L 94), pp. 243–374.

European Parliament, and Council of the European Union. 2016. “Regulation 2016/679 of the European Parliament and the Council of the European Union on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data ,” *Official Journal of the European Communities* (L 119), pp. 1–88.

Henriksen, H. Z., and Mahnke, V. 2005. “E-Procurement Adoption in the Danish Public Sector: The Influence of Economic and Political Rationality,” *Scandinavian Journal of Information Systems* (17:2), pp. 85–106.

Krishna, P. R., Karlapalem, K., and Dani, A. R. 2005. “From Contracts to E-Contracts: Modeling and Enactment,” *Information Technology and Management* (6:4), pp. 363–387.

MacManus, S. A. 2002. “Understanding the Incremental Nature of E-Procurement Implementation at the State and Local Levels,” *Journal of Public Procurement* (2:1), pp. 5–28.

Moe, C. E. 2004. “Public E-Procurement – Determinants of Attitudes Towards Adoption,” in *Electronic Government* (Vol. 3183), Lecture Notes in Computer Science, R. Traunmueller (ed.), Zaragoza, Spain: Springer-Verlag Berlin Heidelberg, pp. 278–282.

Neupane, A., Soar, J., Vaidya, K., and Yong, J. 2012. “Role of Public E-Procurement Technology to Reduce Corruption in Government Procurement,” in *Proceedings of the 5th International Public Procurement Conference*, IPPC5, Seattle, WA, USA, pp. 304–334.

Stoll, P. 2008. *Der Einsatz von E-Procurement in Mittelgroßen Unternehmen - Konzeptionelle Überlegungen Und Explorative Untersuchung*, Wiesbaden, Germany: Gabler Verlag.

Stoll, P. P. 2007. *E-Procurement - Grundlagen, Standards Und Situation Am Markt*, (1st ed.), Wiesbaden, Germany: Springer Science+Business Media.

Tavares, L. V. 2010. "Public eTendering in the European Union - Trust in eVolution."

Vaidya, K., Sajeev, A. S. M., and Callender, G. 2006. "Critical Factors That Influence E-Procurement Implementation Success in the Public Sector," *Journal of Public Procurement* (6:1/2), pp. 70–99.

Vassil, K. 2015. "Estonian E-Government Ecosystem: Foundation, Applications, Outcomes."

Venkatesh, V. 2000. "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model," *Information Systems Research* (11:4), pp. 342–365.

Vincze, M. P., Mathis, J., Dumitrescu, A., Erbilgic, A., Coscia, E., and Megliola, M. 2010. "Evaluation of SMEs' Access to Public Procurement Markets in the EU."

Wimmer, M. A. 2002. "A European Perspective towards Online One-Stop Government: The eGOV Project," *Electronic Commerce Research and Applications* (1:1), pp. 92–103.

[1] Files and information linked to the own-initiative report 2017/2278(INI) can be found under http://parltrack.euwiki.org/dossier/2017/2278(INI) as well as under the following address http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=&reference=2017/2278(INI).

[2] Information on the workshop, as well as the presentations held, can be accessed via http://www.europarl.europa.eu/committees/en/imco/events-workshops.html?id=20180206WKS01321.

[3] COM(2017) 572 final is the Commission Communication on "Making Public Procurement work in and for Europe", which is available under http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2017%3A572%3AFIN. In short, the communication identifies several optimization potentials for public procurement in the EU and outlines six strategic priorities including an increase in transparency or improved access to procurement markets for SMEs.

[4] COM(2017) 573 final is the Commission Communication on "Helping investment through a voluntary ex-ante assessment of the procurement aspects for large infrastructure projects", which is available under http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2017%3A573%3AFIN. In short, it describes a voluntary ex-ante mechanism which can be used by national authorities to get an assessment of large (cross-border) infrastructure projects from the European Commission.

[5] C(2017)6654 is the Commission Recommendation on the professionalization of public procurement, which is available under http://eur-lex.europa.eu/legal-content/DE/ALL/?uri=CELEX:32017H1805. In short, it describes a concept on how to improve the professional skills of people involved in public procurement.

[6] Costa et al. (2013) further subdivide the **e-Execution** phase into **e-Award**, **e-Execution** and **e-Evaluation**.

[7] The slides of the presentation are available under http://www.europarl.europa.eu/cmsdata/138602/04%20-%20BECKER-e-procurement.pdf. A recording of the workshop can be found under http://web.ep.streamovations.be/index.php/event/stream/180219-1530-committee-imcopoldep. Both websites have been last accessed on the 28th February 2018.

[8] At this point, it is acknowledged that the terms "usability" and "accessibility" are not synonymous, but inherently complementary terms that can hardly be assessed separately (Bruno et al. 2005).

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