



Sanchez Graells, A. (2019). Data-driven and digital procurement governance: Revisiting two well-known elephant tales. *Communications Law - Journal of Computer, Media and Telecommunications Law*, 24(4), 157-170.
<https://www.bloomsburyprofessional.com/journal/communications-law-17467616/>

Peer reviewed version

[Link to publication record on the Bristol Research Portal](#)
PDF-document

This is the author accepted manuscript (AAM). The final published version (version of record) is available online via Bloomsbury Professional at <https://www.bloomsburyprofessional.com/journal/communications-law-17467616/> . Please refer to any applicable terms of use of the publisher.

University of Bristol – Bristol Research Portal

General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available: <http://www.bristol.ac.uk/red/research-policy/pure/user-guides/brp-terms/>

Data-driven and digital procurement governance: Revisiting two well-known elephant tales

Albert Sanchez-Graells*

To be presented at the conference
'Digital Rights in Brexit: Changes and Challenges',
to be held at the IALS Information Law and Policy Centre
London, 22 November 2019

Abstract

This paper takes the dearth of quality procurement data as an empirical point of departure to assess emerging regulatory trends in data-driven and digital public procurement governance and, in particular, the European Commission's ambition for the single digital procurement market. It resorts to two well-known elephant tales to send a message of caution. It first appeals to the image of *medieval bestiary elephants* to stress the need to develop a better data architecture that reveals the real state of the procurement landscape, and for the European Commission to stop relying on bad data in the Single Market Scoreboard. The paper then assesses the promises of blockchain and smart contracts for procurement governance and raises the prospect that these may be *new white elephants* that do not offer significant advantages over existing sophisticated databases, or beyond narrow back-office applications—which leaves a number of unanswered questions regarding the desirability of their implementation. The paper concludes by advocating for EU policymakers to concentrate on developing an adequate data architecture to enable digital procurement governance.

Keywords

Big data, machine learning, algorithmic screens, data architecture, governance, public procurement, public procurement 4.0, data insufficiency, indicators, GovTech, RegTech.

JEL Codes

C50, C80, D40, H57, K21, K23, K42.

* Professor of Economic Law and Member of the Centre for Global Law and Innovation, University of Bristol Law School. Comments welcome: a.sanchez-graells@bristol.ac.uk. Disclosure note: the author has provided consultancy services regarding open data procurement analytics to the European Bank for Reconstruction and Development (EBRD). The author also carried out research on procurement registers while a Member of the European Commission Stakeholder Expert Group on Public Procurement (2015/18). This paper solely represents the views of the author and does not bind any of the institutions to which he is affiliated or any third parties.

*'When you are called to action, sometimes
the most useful action you can take is to improve the data'*
H Rosling, *Factfulness* (2019) 232.

1. Introduction

The promise of digitalisation and data-driven governance has reached public procurement,¹ much like every other field of economic regulation of the public sector,² where big data and algorithmic decision-making are rapidly achieving predominance in policymaking agendas.³ In the European Union, the European Commission has stressed that 'digital transformation, the growing wealth of data in general and the availability of open data standards offer opportunities to create better analytics for needs-driven policymaking and warning systems to signal and tackle corruption in public procurement.'⁴

There is indeed a mushrooming number of domestic experiences that demonstrate the potential for big data to enable the application of advanced business intelligence techniques to streamline public procurement spending,⁵ to develop algorithmic tools to support the activities of courts of auditors and corruption watchdogs,⁶ as well as competition authorities,⁷ and to enhance compliance with procurement regulation through ex ante monitoring based on automated systems of risk indicators and red flags.⁸ Where the big data

Note: all websites last accessed on 21 Aug 2019.

¹ On the main concern of big data and procurement governance, see eg A C Calderón Ramírez, 'Data: The Main Ingredient in Public Procurement 4.0' (18 Sept 2018, *Inter-American Development Bank Blog*), [/blogs.iadb.org/gestion-fiscal/en/data-for-public-procurement](https://blogs.iadb.org/gestion-fiscal/en/data-for-public-procurement).

² World Bank, Open Learning Campus, 'Big Data in Action: Focus on Governance' (undated) olc.worldbank.org/content/big-data-action-focus-governance. More generally, see OECD, Compendium of good practices on the use of open data for anti-corruption: Towards data-driven public sector integrity and civic auditing (undated) [oecd.org/gov/digital-government/g20-oecd-compendium.pdf](https://www.oecd.org/gov/digital-government/g20-oecd-compendium.pdf).

³ For in-depth analysis, see C Coglianesi & D Lehr, 'Transparency and Algorithmic Governance' (2019) 71 (1) *Administrative Law Review* 1-56.

⁴ European Commission, *Making Public Procurement work in and for Europe*, 3.10.2017, COM(2017) 572 final, at 10, footnote omitted, <https://ec.europa.eu/transparency/regdoc/rep/1/2017/EN/COM-2017-572-F1-EN-MAIN-PART-1.PDF>.

⁵ For example, in relation to the new procurement systems implemented in Ukraine (<https://www.prozorro.gov.ua/en>) and Moldova (<https://mtender.gov.md/en/>), with the technical support of the European Bank for Reconstruction and Development (EBRD) and the Open Contracting Partnership.

⁶ See eg I Adam and M Fazekas, 'Big data analytics as a tool for auditors to identify and prevent fraud and corruption in public procurement' (2019) 2/2019 *European Court of Auditors Journal* 172-179, http://www.govtransparency.eu/wp-content/uploads/2019/05/ECA-JOURNAL19_02.pdf.

⁷ See eg M Huber and D Imhof, *Machine Learning with Screens for Detecting Bid-Rigging Cartels* (2018) University of Fribourg Faculty of Social and Economic Sciences Working Paper Series No 494, https://doc.rero.ch/record/308901/files/WP_SES_494.pdf. See also D Imhof, *Empirical Methods for Detecting Bid-rigging Cartels* (2018) Université Bourgogne Franche-Comté PhD Thesis, <https://tel.archives-ouvertes.fr/tel-01963076>. Regarding the broader theme of cartel screening tools, not necessarily based on artificial intelligence, see OECD, *Policy Roundtable on ex officio cartel investigations and the use of screens to detect cartels* (2013) <http://www.oecd.org/daf/competition/exofficio-cartel-investigation-2013.pdf>. For critical discussion of the UK's initiative, see A Sanchez-Graells, "'Screening for Cartels" in Public Procurement: Cheating at Solitaire to Sell Fool's Gold?' (2019) 10(4) *Journal of European Competition Law & Practice* 199-211.

⁸ For a description of the breath of emerging experiences in Latin America, see N Penagos & O Hernández, 'Examining procurement "red flags" in Latin America with data' (27 Jun 2019, *OCP Blog*) <https://www.open-contracting.org/2019/06/27/examining-procurement-red-flags-in-latin-america-with-data/>.

is also published under open government principles,⁹ it can facilitate civil society engagement in the oversight of procurement expenditure,¹⁰ as well as the development of reputation-based indexes that seek to spur self-driven improvements by contracting authorities.¹¹ These are all emerging practices and their detailed assessment will still require more time, a better understanding of their implications and perhaps a reconsideration of some of their key features.¹² However, this is the direction in which data-driven and digital procurement is moving, and at an increasingly accelerated pace. Policymakers do not want to lag behind, which augurs a rather quick propagation of these techniques in the foreseeable future.

Seeking to harness the potential of data-driven and digital governance tools, the European Commission has identified the full digitalisation of public procurement as a top strategic priority to harness the buying power of the public sector to improve public services, and to boost economic growth and innovation. The Commission has stressed that

the full benefits of e-procurement [which is mandatory EU-wide since October 2018] will only be captured if the **whole public procurement process undergoes digital transformation**. This includes many phases, from planning, notification and submission to invoicing, payment and archiving. New technologies provide the possibility to rethink fundamentally the way public procurement, and relevant parts of public administrations, are organised. There is a unique chance to reshape the relevant systems and achieve a digital transformation.¹³

Given the high economic stakes at play in procurement and the growing (over)reliance of policymakers on business consultants, the hype around big data and blockchain—and, more generally, about *public procurement 4.0*¹⁴—is perhaps particularly intense in this field of GovTech¹⁵ and RegTech.¹⁶ Some legal scholars are rather optimistically jumping on the

⁹ Eg in Chile, see <http://datosabiertos.chilecompra.cl/>. This is also the case of Ukraine and Moldova (n 5).

¹⁰ Eg the rather developed Dozorro system in Ukraine, see <https://ti-ukraine.org/en/project/control-over-public-procurement/>.

¹¹ See eg the Czech Republic's zIndex, as developed by J Skuhrovec & J Soudek, 'zIndex – Benchmarking Municipalities in Public Procurement' (2016) Institute of Economic Studies, Charles University in Prague, IES Working Paper: 01/2016, <http://ies.fsv.cuni.cz/default/file/download/id/29555>.

¹² And, in particular, their level of transparency and the granularity of the information disclosed under open government standards. However, these are issues that require an analysis that remains outwith the scope of this paper.

¹³ *Making Public Procurement work in and for Europe* (n 4), 10, emphasis in the original.

¹⁴ See eg P Piselli, 'Public procurement 4.0 come leva per la PA digitale' (6 May 2019, *Agenda Digitale EU*) <https://www.agendadigitale.eu/procurement/public-procurement-4-0-come-leva-per-la-pa-digitale/>.

¹⁵ The relationship between GovTech and procurement is bidirectional, with increasing calls for governments to use procurement expenditure to boost GovTech innovation. See eg J Hugill & R Puvinathan, *Buying into the Future. How to deliver innovation through public procurement* (2019) <https://www.public.io/wp-content/uploads/2019/04/Buying-Into-The-Future-WEB.pdf>.

¹⁶ Exaggerated claims are indeed pervasive. See eg N R Moru, 'Blockchain Can and Will End Public Procurement Corruption' (30 Jul 2018, *Decentral*) en.decentral.news/public-procurement-blockchain/; *The AI Revolution in Procurement* (Raconteur, Sep 2018) raconteur.net/wp-content/uploads/2018/09/AI-Revolution-in-Procurement-HICX-1.pdf; S Lee Shui Cha, 'How Artificial Intelligence Can Revolutionize Procurement' (12 Nov 2017, *SIPMM blog*) sipmm.edu.sg/how-artificial-intelligence-revolutionize-procurement/; B Maltaverne, 'What Can Blockchain Do for Public Procurement?' (28 Aug 2017, *Public Spend Forum*) publicspendforum.net/blogs/bertrand-maltaverne/2017/08/28/blockchain-technology-public-procurement/; or S Malone, 'How will machine learning affect public procurement?' (12 Feb 2019, *CIPS blog*) cips.org/en/supply-management/opinion/2018/november/how-to-survive-the-public-sector-shift-to-ai/.

‘disruptive technologies bandwagon’,¹⁷ and some officially-backed ‘visions for the future’ go as far as promising blockchain-supported global e-procurement platforms capable of covering the entirety of procurement transactions carried out worldwide.¹⁸

Taking a contrary view, this paper argues that, at least in the European Union, the prospects of a significant data-driven revolution and a blockchain-enabled automatization of procurement governance are rather limited in the short to medium run—mainly due to the disconnect between such exercises in futurology and the current dearth of reliable public procurement data, which could not be more acute. Indeed, as the European Commission has itself lamented, ‘**clear and consolidated procurement data are often not available**. There is no EU-wide consensus on which data need to be collected and for what purpose ... public scrutiny is largely absent, there is no possibility for a data-driven policymaking and even budgetary control is hampered’.¹⁹ Taking this empirical insight as a starting point, this paper stresses that all projects seeking to harness the potential of digital technologies for procurement governance should prioritise the development of an adequate enabling data architecture. In order to do so, the paper revisits two well-known elephant tales.

The first tale is about an elephant painted by someone who has never seen one, much like the illustrators of European medieval bestiaries.²⁰ It warns us of the distortionary effects likely to result from policy developed on the basis of poor data that misrepresents reality. The paper critically assesses the distortions that can result from the development of faulty analysis based on a partial view of public procurement, which is problematic both in the area of policymaking²¹ and in relation to academic analysis.²² Where data does not reflect reality, data-driven policymaking is as good as any blind guess—or, in other words, it is affected by the ‘garbage in, garbage out’ problem. However, the allure surrounding big data and machine learning may make it more difficult to challenge ‘data-based’ policy interventions, which requires a reconsideration of the governance of data-driven policymaking.²³ This calls for a reconsideration of data quality requirements, notably as an extension of the duty of good administration, which is of particular relevance in the EU (see Section 2).

¹⁷ Though not without raising some legal difficulties with blockchain-based smart contracts; see S Williams-Elegbe, ‘Public Procurement, Corruption and Blockchain Technology: A Preliminary (Legal) Inquiry’ (2018) sun.ac.za/english/Documents/newsclips/InauguralLecture_ProfSopeWilliamsElegbe_23Oct2018.pdf. With a more confused approach to the use of blockchain in procurement, see also R Carvalho, ‘Blockchain and Public Procurement’ (2019) 6(2) *European Journal of Comparative Law and Governance* 187-225.

¹⁸ Asian Development Bank, Development of a Global e-Government Procurement Architecture using Blockchain Technology (October 2018) <https://www.adb.org/projects/documents/reg-47192-001-tacr-3>.

¹⁹ *Making Public Procurement work in and for Europe* (n 4) 5, emphasis in the original.

²⁰ See ‘Elephants on Parade’ (15 Oct 2012, *British Library Medieval manuscripts blog*) <https://blogs.bl.uk/digitisedmanuscripts/2012/10/elephants-on-parade.html>. There is an alternative parable relating to blind men arguing about the shape of an elephant, which could also be aptly used here; see ‘Blind men and an elephant’ (undated, *Wikipedia*) https://en.wikipedia.org/wiki/Blind_men_and_an_elephant.

²¹ For more details, see A Sanchez-Graells, ‘Data and procurement policy: some thoughts on the Single Market Scoreboard for public procurement’ (16 Apr 2019, *How to Crack a Nut blog*) <https://www.howtocrackanut.com/blog/2019/4/16/data-and-procurement-policy-some-thoughts-on-the-single-market-scoreboard>.

²² See A Sanchez-Graells, ‘Further thoughts on data and policy indicators a-propos two recent papers on procurement regulation & competition: comments re (Tas: 2019a&b)’ (22 Apr 2019, *How to Crack a Nut blog*) <https://www.howtocrackanut.com/blog/2019/4/22/further-thoughts-on-data-and-policy-indicators-a-propos-two-recent-papers-on-procurement-regulation-amp-competition-comments-re-tas-2019a-amp-b>.

²³ For extended discussion, see J Parkhurst, *The politics of evidence: from evidence-based policy to the good governance of evidence* (Routledge 2017) especially 128 and ff.

The second tale is about a white elephant which upkeep and care can ruin the unlucky recipient of such extraordinary gift.²⁴ It cautions us against the lack of deep thought accompanying the current push to implement blockchain as data management solutions without estimating their governance implications and, more importantly, without a clear assessment of the advantages that can reasonably be expected to derive from their implementation. The paper points out at the rather limited advantages of the type of blockchain most likely to be adopted by public authorities (ie private, permissioned, based on non-monetary incentives)²⁵ over existing sophisticated types of databases. The paper also highlights the limitations of smart contracts both for the execution of procurement procedures and for the provision of public services, which limits the potential of blockchain to narrow applications (such as the procurement of strictly digital assets or the payment of e-invoices). The paper also briefly considers the compounding regulatory complication of the protection of personal data in the context of blockchain,²⁶ which may constrain the rollout of blockchain-based solutions for the provision of public services even further (see Section 3).

The paper concludes by advocating for EU policymakers to concentrate on the development of an adequate data architecture based on the Open Data Contracting Standards (OCDS)²⁷ and asymmetrically accessible databases²⁸ to underpin desirable applications of digital technologies to procurement governance. This can require both time and significant investment, as well as raise important change management challenges, all of which also requires a significant recalibration of current expectations surrounding the digital transformation of procurement and its likely timescale (see Section 4).

2. Painting elephants by ear: data distortions and procurement policymaking in the EU

Our first cautionary tale is clear in the public imagination. In the middle ages, very few if any European book illustrators would have seen an elephant for themselves. Most of those illustrating medieval bestiary books would thus rely on second-hand descriptions of the animal (and their own imagination) for their work. The result is well-known:

Visual representations of the elephant vary across bestiary manuscripts. Frequently, elephants are depicted as large grey or white beasts with long trunks and straight legs ending in wide, flat feet. Some images are more true to what modern readers know elephants to look like, while others are approximations based on description alone, resulting in something that appears a bit like a horse with floppy ears and a long nose. These strange creatures may not

²⁴ A Jack, *Red Herrings and White Elephants. The Origins of the Phrases We Use Every Day* (Harper 2005) 248.

²⁵ For a useful taxonomy, see M Rauchs et al, *Distributed Ledger Technology Systems. A Conceptual Framework* (Aug 2018) https://www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/alternative-finance/downloads/2018-10-26-conceptualising-dlt-systems.pdf.

²⁶ For exhaustive analysis, see M Finck, *Blockchain Regulation and Governance in Europe* (CUP 2019) 88-116, and her Study for the European Parliament, *Blockchain and the General Data Protection Regulation. Can distributed ledgers be squared with European data protection law?* (July 2019) [https://www.europarl.europa.eu/RegData/etudes/STUD/2019/634445/EPRS_STU\(2019\)634445_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2019/634445/EPRS_STU(2019)634445_EN.pdf).

²⁷ In particular, the OCDS for the European Union developed by the Open Contracting Partnership, available at <https://standard.open-contracting.org/profiles/eu/master/en/>. See also K Granickas, 'Open contracting and the ultimate standards body: The European Union' (14 Jan 2019, *OCP Blog*) <https://www.open-contracting.org/2019/01/14/open-contracting-and-the-ultimate-standards-body-the-european-union/>.

²⁸ For extended discussion, see A Sanchez-Graells, 'Centralised Procurement Registers and their Transparency Implications—Discussion Non-Paper for the European Commission Stakeholder Expert Group on Public Procurement' (19 Sep 2015, *How to Crack a Nut blog*) <https://www.howtocrackanut.com/blog/2015/09/why-are-public-contracts-registers.html>.

resemble the elephant as we know it, but they may have appeared reasonable to a medieval reader in light of their similarity to more familiar creatures.²⁹

This first part of the paper looks at how the European Commission's push for data-driven procurement governance is largely a re-enactment of the phenomenon of 'painting by ear'.

2.1. *Wanting to see the elephant before painting it ...*

As mentioned above (section 1), in the European Union, the lack of reliable sources of quality public procurement data is a major roadblock for the development of data- or evidence-driven procurement policy. This has been a constant complaint by the European Commission in its role of watchdog of the EU's single procurement market. Twenty-five years ago, the Commission already stressed that '[p]roviding better information on public procurement is essential to the opening-up of the internal market and can be done by improving either the data-transmission and data-exchange systems or the quality of the information itself'.³⁰ The Commission has continuously tried to improve procurement data availability, but its success beyond the specific area of pre-award transparency through EU-wide notices has been rather limited. Despite its efforts in the context of the recent revision of the EU procurement rules,³¹ and given a strong opposition by Member States,³² the existing statistical information and reporting obligations are still rather limited and fall well short of proactive publication of all information concerning the expenditure of public funds via public procurement³³—although some Member States unilaterally do it.

There is also wide divergence across the EU concerning the Member States' approaches to on-request disclosure of procurement information and documentation, both under general freedom of information rules and under the procurement rules that transpose the EU directives.³⁴ Some of these discrepancies are underpinned by different levels of protection of competition and business-sensitive procurement information, as well as more general divergences in their domestic systems of public law and the role of government transparency as a constitutional requirement. The relevance of these divergences at national level should not be overlooked. This has been particularly prominent in recent legislative processes involving the extent to which procurement and public sector data should be disclosed, such as in the context of the Trade Secrets Directive³⁵ and, more recently, in the context of the Open Data Directive.³⁶ In particular, it is worth noting that the Open Data Directive excludes from its scope 'documents, such as sensitive data, which are excluded from

²⁹ D Giglia, 'The Implausible Medieval Elephant' (9 May 2018, *The Iris blog*) <https://blogs.getty.edu/iris/the-implausible-medieval-elephant/>.

³⁰ European Commission, Public Procurement in the Community, MEMO/94/3, https://europa.eu/rapid/press-release_MEMO-94-3_en.htm?locale=en.

³¹ See Art 86 of the European Commission's Proposal for a Directive of the European Parliament and of the Council on public procurement, 20.12.2011, COM(2011)896 final.

³² See P Cerqueira Gomes, 'A lost proposal in the 2014 Public Procurement Package: is there any life for the proposed public procurement oversight bodies?' in G Skovgaard Ølykke & A Sanchez-Graells (eds), *Reformation or Deformation of the EU Public Procurement Rules* (Edward Elgar 2016) 170-190.

³³ See Arts 84 and 85 of 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 [2014] OJ L 94/65.

³⁴ For a comprehensive analysis, see the comparative chapters in K-M Halonen, R Caranta and A Sanchez-Graells (eds), *Transparency in EU Procurements. Disclosure within Public Procurement and During Contract Execution*, vol 9 European Procurement Law Series (Edward Elgar 2019).

³⁵ Directive 2016/943/EU on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure [2016] L157/1; see recital (18).

³⁶ Directive 2019/1024/EU on open data and the re-use of public sector information [2019] OJ L172/56.

access by virtue of the access regimes in the Member State, including on grounds of ... commercial confidentiality (including business, professional or company secrets).³⁷ Moreover, there is the added need to ensure compliance with the General Data Protection Regulation,³⁸ which can create additional restrictions on the publication of some information concerning tender procedures (eg the names, roles and addresses of individuals), at least unless specific measures and safeguards are implemented.³⁹

On the whole, then, there are still significant legal restrictions and obstacles towards the adoption of common EU-wide policies on procurement data collection and publication. While the collection of data can be improved as an added benefit of the transition to electronic procurement mandated by the EU procurement rules and as a result of on-going work on the revision of information templates and the development of an eProcurement ontology by the European Commission,⁴⁰ the publication of procurement data is likely to remain a controversial issue.

Nonetheless, given the rather obvious need for quality procurement data to harness the potential of digital technologies—and, even at a lower level of ambition, to develop evidence-based policy;⁴¹ the European Commission is pushing the Member States to create publicly accessible contract registers to provide transparency on awarded contracts and their amendments,⁴² as well as to serve as data repositories. In that regard, it is worth noting that the Commission has issued a good practice factsheet on procurement registers,⁴³ and endorsed a report from its Expert Group on Electronic Procurement on best practices for contract registers.⁴⁴ The European Commission is thus well aware of the shortcomings of current data collection and publication—which leads to both poor quality and limited data availability—and is seeking to address them as a matter of strategic priority.

2.2. ... but relying on someone else's description instead

However, despite the abovementioned initiatives to improve procurement data quality and availability, in a rather inconsistent manner, the European Commission systematically relies on incomplete and potentially erroneous or distorted information⁴⁵ sourced from the Tenders

³⁷ Art 1(2)(d)(iii) of Directive 2019/1024/EU.

³⁸ Regulation (EU) 2016/679 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 Protection Regulation) [2016] OJ L 119/1.

³⁹ See recitals (52) and (53) of Directive 2019/1024/EU.

⁴⁰ EU eProcurement Ontology (ePO), <https://joinup.ec.europa.eu/solution/eprocurement-ontology/about>.

⁴¹ The Commission indeed has clearly stated that 'Improved and more accessible data on public procurement will make it possible to better assess the performance of procurement policies, optimise the interaction between public procurement systems, and shape future strategic decisions', https://ec.europa.eu/growth/single-market/public-procurement_en.

⁴² *Making Public Procurement work in and for Europe* (n 4) 10.

⁴³ European Commission, Public contract registry (undated), eLibrary of good practices in public procurement https://ec.europa.eu/regional_policy/sources/good_practices/GP_fiche_23.pdf [accessed 1 August 2019].

⁴⁴ Multi-Stakeholder Expert Group on e-Procurement (EXEP), *EXEP report on contract registers* (2018) <https://publications.europa.eu/s/mDvz>.

⁴⁵ For discussion on the methodological problems that can arise in the use of self-reported information such as that published in TED as the main source of (unchecked) procurement data, see A Czibik, B Tóth & M Fazekas, *Constructing Public Procurement Databases from Administrative Records. With examples from the Hungarian public procurement system of 2009-2012* (2015) Government Transparency Institute reports: GTI-R/2015:02 https://digiwhist.eu/wp-content/uploads/2016/04/GTI_publicprocurement_techreport_151221.pdf.

Electronic Daily (TED)⁴⁶—the portal where public contract opportunities above certain value thresholds are published to promote EU-wide competition—to support its policymaking activities, in particular in the context of the set of indicators included in the Single Market Scoreboard for Public Procurement (SMSPP).⁴⁷ In doing so, the Commission seems to somehow change tack, depart from its aim of fostering better data quality (as discussed above 2.1) and follow the mistaken mantra that ‘more data beats better data’,⁴⁸ despite knowing that the available data is rather bad.⁴⁹ This leads the Commission to ignore that there is an even bigger downside to the existence of poor and limited data than being unable to apply advanced digital technologies, such as big data analytics and machine learning: ie the formulation of procurement policy on the basis of poor data and poor(er) statistical analysis.

The SMSPP is created as a set of indicators that aim to show how different EU countries are performing on key aspects of public procurement, defined as a measure of ‘whether purchasers get good value for money’.⁵⁰ Implicitly, the SMSPP is intended by the Commission to function as a policy steer or lever that allows for comparisons across Member States and for time series analysis prompting Member States to improve their performance year-on-year. This could be seen as an attempt at evidence-based policy monitoring and, at developing indicators that could point towards problematic areas, as a foundation for policy revision. The problem is not in the general goal behind the SMSPP, but rather in its design and in the fact that it is affected by the same quality deficiencies as the TED data it draws from. In other words, it is a case of ‘garbage in, garbage out’,⁵¹ where the indicators cannot improve upon the limitations of the underlying data and are likely to misrepresent reality. For the purposes of our discussion, it is rather remarkable that the methodology underpinning the SMSPP itself recognises that the TED database has problems of various sorts because it is constructed as a result of the self-declaration of data by the contracting authorities of the Member States, which makes its content very inhomogeneous and difficult to analyse, including significant problems of under-inclusiveness, definitional fuzziness and a lack of

⁴⁶ Public procurement notice data from Tenders Electronic Daily is available on the EU Open Data Portal. The Publications Office provides all notices in extensible mark-up language (XML) format, while the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs provides a smaller subset of this data (covering just some years, countries, and types of notices) as comma-separated values (CSV).

⁴⁷ The 2019 edition, based on 2018 data, is available at https://ec.europa.eu/internal_market/scoreboard/docs/2019/performance_per_policy_area/public_procurement_en.pdf.

⁴⁸ For discussion, see J Höchtel, P Parycek & R Schöllhammer, ‘Big data in the policy cycle: Policy decision making in the digital era’ (2016) 26(1-2) *Journal of Organizational Computing and Electronic Commerce* 147-169.

⁴⁹ This would be particularly problematic in the context of big data analysis and artificial intelligence more generally, see European Data Portal, *Unlocking the potential of Artificial Intelligence* (4 Jul 2018, *EU Data portal blog*) <https://www.europeandataportal.eu/es/highlights/ai-and-open-data-crucial-combination>.

⁵⁰ The definition of ‘value for money’ in this context is highly contested and the policy choices made by the European Commission can be criticised. However, that issue deviates from the core of the discussion and will thus not be covered in detail in this paper.

⁵¹ For broader discussion of this and connected issues, see M Janssen, Y Charalabidis & A Zuiderwijk, ‘Benefits, Adoption Barriers and Myths of Open Data and Open Government’ (2012) 29(4) *Information Systems Management* 258-268. In very clear terms, they stress that ‘Opening data that has no adequate information quality can result in discussions, confusions, less transparency, and even in less trust in the government. The latter can be explained by the fact that resources are wasted and only fuzzy or even incorrect outcomes can be created when there is low information quality. The adagio “garbage in, garbage out” certainly holds true for open data’ (ibid, 264).

filtering of errors.⁵² Thus, the data in TED can hardly be considered ‘sufficiently reliable’ (a self-imposed standard by the Commission, and whatever ‘sufficiently’ is intended to convey here) and this should make us take the results of the SMSPP with more than a pinch of salt.⁵³ The problem is, however, that this does not happen.

In 2019, as a result of the SMSPP, ‘countries received more red cards on a number of policy areas than last year. For instance, on the fairness of public procurement systems’.⁵⁴ The policy significance of this use of the indicators is difficult to establish—as the reaction of the Member States to such red cards is hard to track—but the SMSPP is certainly being used to put pressure on the Member States to review and potentially reform their domestic procurement systems in directions that most likely are guided by bad data. Moreover, like other sets of indicators based on limited or poor data, on subjective assessments of legal systems and heavily normative policy choices,⁵⁵ once published, the SMSPP becomes a ‘golden standard’ set of indicators and benchmarks that is re-used not solely for policymaking, but also for (academic) policy analysis. While there are some exceptions and the European Commission has funded academic research that led to the publication of richer databases of procurement data for the EU and neighbouring jurisdictions,⁵⁶ there is a clear risk in the re-use of the SMSPP as an unchecked indicator of procurement performance in the EU. Where the SMSPP is used without double-checking the data it is built on (ie the TED database) and its shortcomings, researchers can be misled into carrying out analyses that lead them to present general conclusions that are, at best, only applicable to some aspects of EU procurement practice and, at worst, simply misleading.⁵⁷ Furthermore, these indicators could be used to train algorithms, as an input for machine learning attempts at creating screens or systems of red flags in the context of procurement analysis. The European Commission should be mindful of the fact that the allure surrounding big data and machine learning may make it more difficult to challenge ‘data-based’ policy interventions.⁵⁸

2.3. How diligent is that?

This situation underlying the SMSPP is problematic and undesirable. From a public governance perspective, it is difficult to accept that the Commission elaborates, publishes and relies on indicators that it is aware are based on defective and unreliable data and that are likely to be presenting a rather distorted view of the EU procurement landscape. Some bad indicators are not better than no indicators, as poor-quality data leads to misinformation and to the potential adoption of wrong policies.⁵⁹ It would seem that, however frustrating that

⁵² See European Commission, TED CSV open data. Advanced notes on methodology. Version 0.9 (14 Jul 2017) http://data.europa.eu/euodp/repository/ec/dg-grow/mapps/TED_advanced_notes.pdf.

⁵³ For extended discussion, see Sanchez-Graells, Data and procurement policy (n 21).

⁵⁴ European Commission, ‘The new Single Market Scoreboard is out’ (4 Jul 2019, *Promoting Enterprise News Portal*) <https://blogs.ec.europa.eu/promotingenterprise/single-market-scoreboard-2018/>.

⁵⁵ For example, the World Bank, *Benchmarking Public Procurement 2017. Assessing public procurement regulatory systems in 180 economies* (2016) <http://pubdocs.worldbank.org/en/121001523554026106/BPP17-e-version-Final-compressed-v2.pdf>.

⁵⁶ In particular, see J Hrubý et al, DIGIWHIST, Final Linked Database and related algorithms (2018) <https://digiwhist.eu/publications/d2-6-final-linked-database-and-related-algorithms/>.

⁵⁷ For extended discussion, see Sanchez-Graells, Further thoughts on data and policy indicators (n 22).

⁵⁸ For discussion, see J Cobbe, ‘Administrative Law and the Machines of Government: Judicial Review of Automated Public-Sector Decision-Making’ (2018) *Legal Studies*, forthcoming, <https://ssrn.com/abstract=3226913>. See also C Coglianese & D Lehr, ‘Regulating by Robot: Administrative Decision Making in the Machine-Learning Era’ (2017) 105 *Georgetown Law Journal* 1147-1223.

⁵⁹ C Fisher et al, *Introduction to Information Quality* (AuthorHouse 2011) 1 ff.

may be, a diligent policymaker would first address the issue of lack of data or poor-quality data and only then build on it. By contrast, the two-track approach currently followed by the Commission is difficult to reconcile with the duty of good administration and the principles of care and diligence under which it must act. It is indeed inconsistent to, on the one hand, criticise the Member States for not collecting and making available good data and, on the other hand, knowingly reuse bad data to create an impression of policy activity or effectiveness, such as with the SMSPP. In the end, creating an appearance of evidence- or data-based policymaking in the knowledge that the information on which it relies is faulty falls short of the ethical and diligence standards that could be expected from an institution that has an obligation to provide leadership in relation to data stewardship, data treatment and its use, in particular in the context of the deployment of artificial intelligence.⁶⁰

One can thus wonder whether the Commission's current approach to using defective data for policymaking purposes in the area of public procurement is consistent with the duty of good administration enshrined in Article 41 of the Charter of Fundamental Rights of the European Union (the 'Charter').⁶¹ While it is clear that the literal wording of that provision refers to individual rights—and would thus potentially be inapplicable to global policy-making issues, rather than discrete decisions in the context of administrative files affecting specific individuals—it seems pertinent to recall that the Court of First Instance has expressed that the right to good administration is not confined to the literal wording of Article 41 of the Charter, but that 'Article 41 is based on the existence of the Union as subject to the rule of law whose characteristics were developed in the case-law which enshrined inter alia good administration as a general principle of law',⁶² and that the guarantees that derive from the right to good administration include respect for the principles of care and of diligence,⁶³ which can be specified as a duty of the competent authority 'to gather, in a diligent manner, the factual elements necessary for the exercise of its broad discretion'.⁶⁴ Indeed, as rightly

⁶⁰ See European Commission, Final Report and Action Plan from the European Commission Expert Group on FAIR Data, *Turning FAIR into reality* (2018) https://ec.europa.eu/info/sites/info/files/turning_fair_into_reality_1.pdf.

⁶¹ [2012] OJ C 326/391. The Charter binds the European Commission in all its activities. See Art 6(1) Treaty on European Union 2012] OJ C 326/13. Article 41 on the right to good administration reads:

1. *Every person has the right to have his or her affairs handled impartially, fairly and within a reasonable time by the institutions, bodies, offices and agencies of the Union.*
2. *This right includes:*
 - (a) *the right of every person to be heard, before any individual measure which would affect him or her adversely is taken;*
 - (b) *the right of every person to have access to his or her file, while respecting the legitimate interests of confidentiality and of professional and business secrecy;*
 - (c) *the obligation of the administration to give reasons for its decisions.*
3. *Every person has the right to have the Union make good any damage caused by its institutions or by its servants in the performance of their duties, in accordance with the general principles common to the laws of the Member States.*
4. *Every person may write to the institutions of the Union in one of the languages of the Treaties and must have an answer in the same language.*

⁶² This is also explicit in the Explanations relating to the Charter of Fundamental Rights [2007] OJ C 303/17.

⁶³ For discussion, see B C Mihaescu Evans, *The right to good administration at the crossroads of the various sources of fundamental rights in the EU integrated administrative system* (Nomos 2015) 398 ff.

⁶⁴ Judgment of 29 April 2015, *Staelen v European Ombudsman*, T-217/11, EU:T:2015:238, paragraphs 82-84.

stressed, ‘the duty of care... although not explicitly listed in Article 41 CFR, is generally understood as a key component of good administration.’⁶⁵

Indeed, this case law has been developed in the context of litigation involving individual interests or rights, but the duty of good administration and the principles of care and diligence have been applied in relation to general information and the relevant ‘observations seem to apply irrespective of the individual or general scope of the act under review’.⁶⁶ For example, it has been stressed that ‘a scientific risk assessment carried out as thoroughly as possible on the basis of scientific advice founded on the principles of excellence, transparency and independence is an important procedural guarantee whose purpose is to ensure the scientific objectivity of the measures adopted and preclude any arbitrary measures’.⁶⁷ Indeed, it has been rightly stressed that ‘the courts have emphasized the objective facet of [the duty of care]. Even where it does not generate any individual right, the duty of careful and impartial examination must be observed as part of a proper administrative conduct (sound administration)’.⁶⁸

It thus seems clear to me that the same functional principles relating to good administration in general also apply to data collection and use, and that the principles of care and diligence demand that high standards of data collection and data curation are complied with before any data can be published and/or reused in the context of policymaking by the EU Institutions.⁶⁹ The European Commission thus needs to reconsider its current approach. In the specific context of the SMSPP, rather than continuing to use defective data based on TED, the Commission should discontinue the publication of faulty benchmarks and indicators and rather concentrate its efforts in the improvement of the collection and availability of procurement data (as discussed above 2.1, and again in the conclusion, below 4). Only when quality and reliable data is available should the Commission start using it for policy review and to push for reforms at Member State level. It is not good enough for the Commission to aim to paint a picture of the state of procurement in the EU. It has to be an accurate picture that reflects reality. Particularly now that adequate data may be closer to reach than ever.

3. Blockchain as the new procurement white elephant

Our second cautionary tale is also rather present in the public imagination, in particular in the area of governance and public procurement. In Western discourse, the tale goes as follows:

White elephants are considered sacred in Thailand and, as such, cannot be put to work like other elephants despite the high cost of their maintenance. From here, the figurative use of the term ‘white elephant’ to designate a facility with very little activity and high maintenance costs ... the kings of Siam used to give a white elephant to those courtiers that had fallen into disgrace, given that maintaining the gift would have the effect of ruining the receiver.⁷⁰

⁶⁵ See also H C H Hofmann & C Mihaescu, ‘The Relation between the Charter’s Fundamental Rights and the Unwritten General Principles of EU Law: Good Administration as the Test Case’ (2013) 9(1) *European Constitutional Law Review* 73, 92.

⁶⁶ J Mendes, ‘Discretion, care and public interests in the EU administration: Probing the limits of law’ (2016) 53(2) *Common Market Law Review* 419, 431.

⁶⁷ Judgment of 16 September 2013, *ATC and Others v Commission*, T-333/10, EU:T:2013:451, paragraph 85.

⁶⁸ Mendes (n 66) 434.

⁶⁹ For related discussion in the US context, see J C Bertot et al, ‘Big data, open government and e-government: Issues, policies and recommendations’ (2014) 19 (1-2) *Information Polity* 5-16.

⁷⁰ However, it has been pointed out that this narrative is rejected by Thai historians. See D Albalade, G Bel & A Gragera, ‘When politics and lobbying combine to promote white elephants by using PPPs’ (2018) *University of*

This second part of the paper considers whether blockchain can become the new procurement white elephant, at least for use cases with no clear advantage over sophisticated databases, as well as in relation to the limitations of blockchain-enabled smart contracts.

3.1. Let's put procurement on a blockchain

'Blockchain' has become shorthand to refer to a relatively wide variety of distributed ledger technologies (DLTs) and it is usually identified with the properties of a decentralised, trustless and immutable (or at least, tamper proof) mechanism for information verification and recording that can enable self-executing digital transactions between anonymous parties. In simple terms, the big advantages identified in 'blockchains' are that they are not susceptible of control or manipulation by any given party and that the information contained in the blockchain is seen as immutable—or at least as tamper evident.

The promise of such technology in the context of procurement governance is clear and mainly relates to the contribution it could make to a reduction (or suppression) of corruption,⁷¹ as well as a reduction of red tape and an increase in information accuracy in contexts of decentralised or atomised participation in global procurement systems—such as those run by multinational development banks.⁷² In particular, blockchain has been considered for a series of specific applications in the context of procurement, such as tracking full-cycle procurement workflows to prevent record tampering, creating interoperable supplier profiles across fragmented e-procurement systems to reduce asymmetry of information in purchasing or pre-tender assessment, and decentralising tender evaluation to disincentivise bribery and biased decision-making.⁷³

Before assessing the potential of DLTs to contribute to digital procurement governance—and, in particular, to a reduction of corruption—it will be useful to clarify some of the key differences between DLTs. In simple terms, it is possible to classify different solutions according to criteria such as the level of anonymity of validators and the level of trust in validators. Taking these criteria into account, a classification emerges as in Graph 1. 'Blockchain' is popularly used to refer to a DLT that operates like *bitcoin* (a type I blockchain in Graph 1), with which it is oftentimes confused.⁷⁴ In that case, the DLT is permissionless and public, which is understood to mean that anyone can have access to the content of the records (as long as they have access to the required cryptographic keys to meet cybersecurity requirements) and can potentially participate in the system as a validator of transactions. Rightly or wrongly (mostly wrongly), this is the paradigm on which some claims of the potential for a blockchain-based digital procurement governance are formulated. In my view, this is problematic, for a number of issues discussed below. It is also relevant to note that most of the advantages derived from commonly discussed DLTs are linked to their 'append-

Barcelona Research Institute of Applied Economics Working Paper 2018/23, http://www.ub.edu/irea/working_papers/2018/201823.pdf (from where the quote is taken, at 0).

⁷¹ Clearly with this goal in mind, see Williams-Elegbe (n 17).

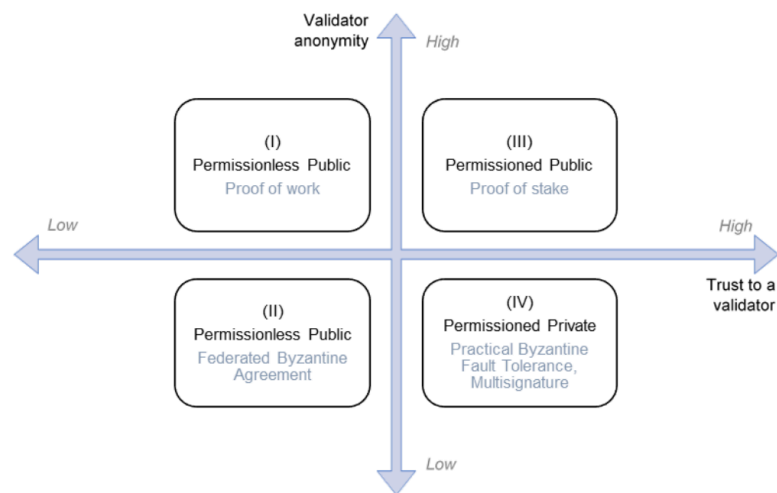
⁷² See eg Asian Development Bank (n 18).

⁷³ C Yang, 'Is there a role for blockchain for enhancing public procurement integrity?' (2019) Papers of the OECD Global Anti-Corruption & Integrity Forum, <http://www.oecd.org/corruption/integrity-forum/academic-papers/Chan-Yang-blockchain-public-procurement-integrity.pdf>. For more examples of use cases, see A Sanchez-Graells, 'Some quick thoughts on blockchain use cases in procurement' (19 Jun 2019, *How to Crack a Nut blog*) <https://www.howtocrackanut.com/blog/2019/6/19/some-quick-thoughts-on-blockchain-use-cases-in-procurement>.

⁷⁴ Rauchs et al (n 25) 15.

only' design—which means that they are tendentially going to grow indefinitely—and the multiplicity of copies that are kept of the ledger—that is, potentially, an infinite number—as well as the level of difficulty of the consensus mechanism used to validate transactions.⁷⁵ These are also important considerations for our critical evaluation.

Graph 1: Basic classification of DLT technologies



Source: Yang (n 73) 6, based on further references.

One of the problems with the hype around procurement and blockchain is that it has been imported from the context of private supply chain management⁷⁶ into the much more regulated public procurement arena, where legal constraints create significant challenges.⁷⁷ Given the rather tight regulation of most phases of the procurement lifecycle leading to the award of public contracts—and, recently, also the execution of those contracts and the invoices and payments linked to it—the implementation of blockchain raises difficult legal questions regarding eg due process guarantees and the need to allow for the modification of on-chain records, at the very least where judicial decisions overturn earlier administrative actions that had been recorded therein.⁷⁸ This is not a minor issue, as it directly affects one of the main expected advantages of blockchain, such as the *immutability* of the procurement record and all the information recorded on the chain.

Another, related problem is that there seems to be an implicit assumption that the blockchains that would be implemented in the procurement setting would be public and permissionless (like *bitcoin's*). However, in the public sector, it is very difficult to envisage the adoption of a fully decentralised blockchain solution, not solely due to technical issues of scalability and latency,⁷⁹ but also due to the simpler fact that *the public sector can hardly be*

⁷⁵ For an accessible description of the different consensus algorithms, see J Calian, N Stichel & P Ruppel, 'Consensus Algorithms: the essential forces of the DLT universe' (24 Apr 2018, *Medium*) <https://medium.com/@tlabs/consensus-algorithms-the-essential-forces-of-the-dlt-universe-e1dd8e049534>.

⁷⁶ See eg the multiple contributions to the *Medium* site on procurement, <https://medium.com/into-advanced-procurement/tagged/procurement>.

⁷⁷ This is recognised even by legal scholars that are optimistic about the potential of blockchain to improve procurement governance; see Williams-Elegbe (n 17) and Carvalho (n 17).

⁷⁸ The existence of these issues and the lack of legal answers is uncontroversial, see Williams-Elegbe (n 17) and Carvalho (n 17).

⁷⁹ As well as the difficulty of creating adequate incentives for the mining or processing of the transactions, although this will not be discussed in detail.

expected to surrender control over the procurement system. Blockchain is not an infallible technology and I find it hard to imagine that the public sector would be willing to give hostage to fortune in this way. Indeed, whereas in commercial settings there can be advantages in decentralising the system to bypass intermediaries and achieve transactional efficiencies in a trustless environment, in the public procurement setting there is no question about the centrality of the public sector and its role in being a source of trust and control. Of course, the more control of the system by the public administration, the more space for distrust from civil society and the more scope for corruption.

Similarly, a blockchain solution for public procurement could not be premised on the ‘proof of work’ standard (also used by *bitcoin*)—which makes tampering with the on-chain records practically impossible—not least due to its very high carbon footprint.⁸⁰ Even if solely due to environmental considerations and the need to ensure the sustainability of the solution, the consensus mechanism would need to be different (at most, proof of stake, but most likely proof of authority), which would also erode the potential of the technology to avoid control and make the system prone to manipulation through centralisation of decision-making power. The issue of the distribution of the (entire) ledger as a precaution to prevent its manipulation also requires consideration of both the resources needed to store multiple copies of the ledger, as well as the likely growth of that ledger. In the context of procurement, where there are extremely large volumes of tenders (and the ensuing documentation) generated on a daily basis, these are not minor issues and a careful assessment would be required before creating and implementing systems that could be very resource intensive—in particular if they were based on an append-only design.

Given structural requirements of control and mutability of the procurement record, to my mind, there are rather large question marks hanging over any proposal for blockchain use cases in procurement. These tensions between the promise of blockchain and the feasibility constraints in its implementation for public procurement governance has been rightly acknowledged by other commentators, who stressed that while a ‘permissioned private chain may appear most fit for public procurement as it accelerates the verification processes ... while allowing the government to retain control over the network, its power in deterring “system fraud” would be undermined if corruption stems from the inside and there is not a large enough set of validators to preserve blockchain record integrity, or when the validating mechanisms and incentives/penalties are not effectively designed to counter malicious behaviour or collusion.’⁸¹

In other words, unless the institutional design of the public administration radically changed, the use of DLTs to support the procurement function does not seem to have clear advantages over sophisticated types of databases. As rightly pointed out, ‘a DLT system is a “consensus machine”: a multi-party system in which participants reach agreement over a set of shared data and its validity, in the absence of a central coordinator. What separates DLT systems from traditional distributed databases are features rooted in designs capable of supporting data and maintaining data integrity in an adversarial environment’.⁸² To the extent that public procurement continues to be an activity coordinated (ie controlled) by the public administration, the differences tend to evaporate. In the end, thus, the creation of a rather

⁸⁰ See eg C Stoll, L Klaaßen & U Gallersdörfer, ‘The Carbon Footprint of Bitcoin’ (2019) 3(7) *Joule* 1647-1661.

⁸¹ Yang (n 73) 6.

⁸² Rauchs et al (n 25) 22.

concentrated, permissioned and private DLT for the public procurement function seems to be largely comparable to the creation of a sophisticated database that matches high standards of cryptographic functionalities, cybersecurity and data storage requirements. While a DLT could be a suitable technical option for institutional settings where there was no such database—subject to an adequate cost/benefit analysis—the desirability of blockchain use cases in other settings remains in my opinion very unclear.⁸³ In that regard, it is worth taking into account that the proposal of blockchain use cases in public procurement is oftentimes not presented (solely) as having value in itself, but as the means towards the implementation of blockchain-enabled smart contracts.⁸⁴ This is assessed in the next sub-section.

3.2. *Let's make public contracts smarter on the blockchain*

In some cases, the proposal for the implementation of blockchain solutions in public procurement is not mainly aimed, or not limited to improving record-keeping and preventing corruption at that level, but rather as a means of enabling the carrying out of the procurement process on the blockchain or, more commonly, to enable smart contracts to support transactions between the public buyer and its contractors. In such cases, the implementation of such additional layer of functionality would enable a different value proposition for the implementation of blockchain, even if its advantages at the primary level would remain the same as above.

The first type of proposal would consist in the design of self-executable tender procedures placed on the blockchain by the contracting authority, the submission of tenders on the blockchain by participating tenderers and the automatic award of the contract to the tender that best satisfied the advertised public sector needs.⁸⁵ There are some obvious constraints and difficult challenges implicit in this type of proposals. Some difficulties are of a technical nature, such as the current limitations on computing power and the incentives required for blockchain transactions to be processed, which have been estimated to support procedures involving documentation no longer than 700 words in total (be it for contract documents or tenders).⁸⁶ Even if this estimate was to be revised by a few multiples, this would require a significant reinvention of the way requirements and tenders are defined and communicated—perhaps involving a mix of off-chain solutions to store longer documents, which would create difficulties similar to the operation of *oracles* discussed below. In any case, there are more constraints, even if technical capacity was not one of them.

Indeed, some other difficulties derive from some aspects of the blockchain design of the tender, which would for example not easily allow for clarifications of the published information and requirements in a way that required any modification of the previously uploaded information or code. It would also be difficult to specify to the level required for a yes/no test (or and if/else code) all the specifications of the object of the tender and the tender conditions, except for highly standardised supplies that were contracted on the basis of the general terms and conditions specified by the contracting authority. This would make a blockchain-enabled tender procedure suitable only for a relatively limited part of the needs

⁸³ Along the same lines, Yang (n 73) 7 and 11-14.

⁸⁴ See eg P Debono, 'Transforming Public Procurement Contracts into Smart Contracts' (2019) 10(2) International Journal of Information Technology Project Management 16-28.

⁸⁵ See eg F S Hardwick, R N Akram & K Markantonakis, 'Fair and Transparent Blockchain based Tendering Framework - A Step Towards Open Governance' (2018) 17th IEEE International Conference On Trust, Security And Privacy In Computing And Communications <https://arxiv.org/pdf/1805.05844.pdf>.

⁸⁶ *Ibid*, 6.

of the public sector, which would need to run a parallel (electronic) procurement system for more complex needs and procedures. The extent to which such a dual approach to contracting would be beneficial would require a detailed case by case analysis, which however seems unlikely to be positive in settings with sophisticated electronic procurement solutions susceptible of application across the board.

The second type of proposal would not necessarily rely on smart contracts to conduct the award of the contract, but rather as the conduit of the contractual relationship between the public buyer and its contractors. These proposals largely amount to a ‘salami-slicing’ of traditional contracts in order to change their structure and make them meet a (very large number of) ‘if/then’ clauses that can then be automated and executed in a deterministic manner by an algorithm.⁸⁷ These proposals tend to place the emphasis on the automaticity and irrevocability of the smart contracts, which could increase the confidence of the parties in the attainment of their own objectives without having to trust the counterparty. The difficulties with these proposals are also manifold, but I find two particularly relevant.⁸⁸

First, this approach can exponentially increase transaction costs—in particular, the negotiation and drafting costs of the (smart) contract—and is doomed to fail because, crucially, ‘the obvious problem is that blockchains only work on complete contracts, whereas most in-the-world firms ... are largely (entirely?) made of incomplete contracts’; ‘a blockchain is an economic world of complete contracts.’⁸⁹ Therefore, except for extremely simple transactions where it is possible to achieve a (near) complete contract, the functionality that smart contracts can develop is rather limited and usually mostly linked to a specific aspect of the contractual transaction—such as the delivery of a digital asset or the release of a digital payment. Even in that case, it should also be taken into account that the introduction of blockchain-based procurement will in itself generate significant costs, which should be taken into account in the context of any decision to adopt this technology.

Second, and linked to this, the inability for blockchain technology to reliably seamlessly connect to the ‘real world’ is bound to further restrict any potentially useful applications to those back-office functions and the procurement of strictly digital assets.⁹⁰ This is simply because blockchain technology can only enable the automated execution of smart contracts to the extent that it does not require the generation of off-chain effects, as this would require a further integration of an *oracle*. Oracles are data interfaces that connect a blockchain to a database or a source of data.⁹¹ This makes them potentially unreliable as the oracle can only be as good as the data it relies on and the oracle can itself be manipulated.

⁸⁷ See eg R Freeman, ‘Are smart contracts a game changer for procurement?’ (28 Jan 2019, *Procurious*) <https://www.procurious.com/procurement-news/smart-contracts-game-changer-procurement>.

⁸⁸ For extended discussion, see A Sanchez-Graells, ‘Governance, blockchain and transaction costs’ (22 Mar 2019, *How to Crack a Nut blog*) <https://www.howtocrackanut.com/blog/2019/3/22/governance-blockchain-and-transaction-costs>.

⁸⁹ S Davidson, P De Filippi and J Potts, ‘Economics of Blockchain’ (2016) SSRN working paper at 9, <https://ssrn.com/abstract=2744751>.

⁹⁰ For extended discussion, see A Sanchez-Graells, ‘Oracles as a sub-hype in blockchain discussions’ (16 May 2019, *How to Crack a Nut blog*) <https://www.howtocrackanut.com/blog/2019/5/16/oracles-as-a-sub-hype-in-blockchain-discussions-or-how-my-hamster-helps-me-get-to-10000-steps-a-day>.

⁹¹ For a taxonomy and some discussion, see J Rodriguez, ‘The Middleman of Trust: The Oracle Paradox and Five Protocols that can Bring External Data into the...’ (31 Jul 2018, *Hackernoon*) <https://hackernoon.com/the-middleman-of-trust-the-oracle-paradox-and-five-protocols-that-can-bring-external-data-into-the-df39b63e92ae>.

There are thus, two main sources of oracle vulnerability, which automatically translate into blockchain-enabled smart contract vulnerability. For everything that is not data-based or data-transformable (such as eg software licences)—or, in other words, where moving digital tokens around does not generate the necessary effects in the real world—even much advanced ‘blockchain + smart contract + oracle’ solutions are likely to remain of limited use in the context of procurement and the delivery of public services. Not because the applications are not (technically) possible, but because they generate governance problems that merely replace the current ones. And the advantage is not necessarily obvious. Ultimately, there would still need to be a way of ensuring that the oracle is not tampered with and that what the oracle is capturing reflects reality. There are myriad ways in which most systems could be manipulated—and, given the right economic incentives, there will always be attempts to manipulate even the most sophisticated systems—so checks will always be needed. This goes back to the issue of transaction costs and, more generally, of the general cost of the system and is thus an unavoidable constraint that makes the desirability of blockchain-enabled smart contracts rather dubious, except for very specific use cases.

3.3. A passing mention to data protection compliance

A final issue worth mentioning is the need to comply with data protection rules.⁹² This can be of particular relevance where blockchain solutions seek to be implemented in contexts that require the use of personal information, such as the contracting and/or delivery of public services directly to their users. It has been persuasively demonstrated that ensuring that blockchain implementations are compliant with EU data protection rules is a challenge and that compliance is more likely to be possible where blockchains are designed in ways that eg facilitate establishing who is the controller of the data⁹³ (which could be more likely to be the case for private and/or permissioned DLTs). This comes to compound the tendencies towards a centralised implementation of DLTs in the procurement context, in a manner that reinforces the considerations made above (section 3.1).

Given all preceding analysis, in my view, the case for blockchain implementations in procurement remains largely dubious except for rather narrow and partial aspects of the procurement lifecycle. All in all, the advantages of the type of DLTs that are likely to suit the public sector (both in terms of governance, control and compliance requirements) seem quite limited compared with alternative sophisticated databases and this is not significantly changed when the possibilities to carry out tender procedures on the blockchain or to enable smart contracts are taken into consideration. There is thus a rather real risk that blockchain-based procurement solutions turn out to be the new white elephants after all.

4. Conclusion

This paper has shown how the potential for data-driven and digital procurement governance exists but may be currently overblown. Through the two cautionary tales of medieval bestiary elephants and white elephants, the assessment in previous sections has shown how some of the current policies pursued by the European Commission are flawed as a result of their reliance on poor data, despite the parallel effort to try to improve the quality and availability of procurement data; and how the potential advantages of blockchain and smart contracts largely dissipate on close examination, raising unanswered questions as to their desirability.

⁹² See above (n 38).

⁹³ Finck, Can distributed ledgers be squared with European data protection law? (n 26).

This should not be read as a wholesale dismissal of the potential for data-driven and digital procurement governance, though. In my opinion, the biggest potential lies in the deployment of big data analytics and other forms of artificial intelligence. As mentioned in the introduction, evidence of successful deployment of machine learning and algorithmic screens is emerging and, given an adequate enabling data architecture, further development and experimentation can lead to better tools for public procurement digital governance. Therefore, given the absence of reliable source of quality procurement data in the European Union, the priority needs to be put there. I thus submit that EU policymakers should concentrate their efforts on developing an adequate data architecture to enable digital procurement governance. In order to follow best practice and to ‘future-proof’ its data architecture in a manner that facilitates interconnection at a larger (possibly global) scale, the architecture should be based on the Open Data Contracting Standards (OCDS).⁹⁴ This was recognised in the first public consultation on the eForms being developed by the European Commission,⁹⁵ and has informed the draft Implementing Regulation on eForms,⁹⁶ which at the time of writing are with the Member States for a final round of consultation.⁹⁷ Policymakers should also carefully consider the level of disclosure and public access to that information. Despite the influence of the aggressive approach to full open disclosure followed by the Open Contracting Partnership,⁹⁸ and as argued elsewhere,⁹⁹ I would submit that there is a need to review the current approach to fully accessible contract registers and to create a more sophisticated system of asymmetrically accessible databases.

This can require both time and significant investment, as well as raise important change management challenges that will require clear leadership from the European Commission if EU-wide solutions are to be developed. All of this also requires a significant recalibration of current expectations surrounding the digital transformation of procurement and its likely timescale, as a change of this magnitude is unlikely to be achieved by the imminent deadline of 2020. By being realistic about the necessary investments and setting EU-wide standards, the European Commission can make a difference. I thus submit that it should concentrate all of its efforts in the development of this data architecture it is already sketching—thus abandoning or at least putting on ice other projects, such as the SMSPP and any emerging initiatives on blockchain and procurement. An adequate big data architecture may be the enabler of further developments down the line, but its development is the necessary first step and clearing the policymaking path from inconsistent interventions is part and parcel of laying down the foundations of a good quality data system. As insightfully stressed by the late Hans Rosling, ‘when you are called to action, sometimes the most useful action you can take is to improve the data’.¹⁰⁰ The Commission should focus on doing that.

⁹⁴ Congress of Local and Regional Authorities of the Council of Europe, Transparency and open government (2018) 31, 35, <https://rm.coe.int/booklet-a6-transparency-coll-public-ethic-en/1680907906>.

⁹⁵ European Commission, ‘eForms – the next generation of the public procurement standard forms’ (2016) at 24-25, <http://ec.europa.eu/DocsRoom/documents/20224/attachments/1/translations/en/renditions/native>.

⁹⁶ Draft Implementing Regulation of the Commission establishing standard forms for the publication of notices in the field of public procurement and repealing Implementing Regulation (EU) No 2015/1986 https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2019-797630_en.

⁹⁷ See the 30 May 2019 update of the GitHub page <https://github.com/eForms/eForms>.

⁹⁸ OCP, *Mythbusting confidentiality in public contracting* (2018) <http://mythbusting.open-contracting.org/>.

⁹⁹ Sanchez-Graells (n 28).

¹⁰⁰ H Rosling, with O Rosling & A Rosling Rönnlund, *Factfulness. Ten Reasons We're Wrong About The World - And Why Things Are Better Than You Think* (Sceptre 2019) 232.