

FEATURE ARTICLE:

Measuring the Benefits of Open Standards: A Contribution to Dutch Politics

[Tineke Egyedi](#) and [Bert Enserink](#)¹

Abstract: *In 2010 the Dutch Parliament requested the Court of Audit to measure the benefits of using open standards and open source software for government IT. In its report of 2011 the Dutch Court of Audit concluded that there were hardly any benefits to be gained. The Court's underlying research was widely and harshly criticized, especially with regard to open source software. In this article we focus on the open standards part of the Court's research, a subject which was barely addressed. We analyze the report's omissions and weaknesses. An inventory of existing international methodologies shows that these do not fully cover the required ground. As a stepping stone towards a more systematic way of measuring the benefits of open standards, we introduce an economic framework on standardization (functions and effects). To illustrate its use, we examine one effect of open standards more closely, i.e. reduced switching costs.*

We conclude that the Dutch Parliament's request regarding open standards could have received more serious consideration. Looking beyond the Court of Audit's report, in combination with elements from existing methodologies, the proposed framework appears to be a useful starting point for pursuing more systematically an international policy research agenda on measuring the benefits of open standards.

A pressing question is how to manage the rising costs of government IT projects. Several causes explain these costs, one of which is supplier-dependence (Dussel and Vos, 2012). The Dutch government addresses supplier dependence in its open standards (Updegrove, 2012)¹ and open source software² (OSOSS) policy. Among other things, its OSOSS policy

¹ Tineke M. Egyedi is Senior Researcher Standardization at Delft University of Technology. She also serves as Vice-president of the European Academy for Standardization (EURAS) and as the Director of the Delft Institute for Research on Standardization (DIRoS)

Dr.ir. Bert Enserink is Associate Professor of Policy Analysis and Programme Manager of the Engineering and Policy Analysis master at the faculty of Technology, Policy Analysis and Management of Delft University of Technology.

This paper was originally presented at 'Open iOverheid: verbindend verbroken?', held in Groningen, the Netherlands, on January 10 2013, and at the EURAS conference, held in Brussels, Belgium, on June 25 2013.

focuses on improving interoperability in government IT, digital sustainability and unlimited re-use of software developed for government (EZ, 2007). It is one of the pillars of Dutch e-government policy.

In 2010 the Dutch Parliament passed the motion Gerken³, which requested the Dutch Court of Audit (DCA) to investigate the potential savings achieved by reducing the use of closed standards (i.e., proprietary standards) and introducing open source software. The timing of the motion coincided with the final stage of the policy implementation program 'Netherlands Open in Connection' (NOiV) that was installed to support the use of OSOSS in government. Although OSOSS policy would remain in force after 2011, a need was felt to (again) highlight the benefits of OSOSS in order to ensure the policy's continuation in the years to come. For despite broad political support for this policy (motion Vendrik c.s., 2002) and for successive government implementation programs (e.g., OSOSS and NOiV), the problem of supplier-dependence remained intractable. While some ministries, government agencies, local authorities etc. did embrace the idea of an open IT ecosystem, there were repeated signs of non-conformance to OSOSS policy. For example, in call for tenders for IT public procurement and document exchanges with citizens and businesses government authorities regularly required closed, vendor-specific solutions and formats, respectively (Paapst, 2012). Therefore, Members of Parliament had reasons to doubt whether future market failure resulting from supplier dependence could be avoided. If not, it would remain difficult to keep a grip on public IT spending, even apart from achieving other OSOSS goals such as sustained access to government data and unlimited re-use of government sponsored software development.

In March 2011, the Dutch Court of Audit presented its results. The [report](#) (in Dutch) concluded, in short, that cuts in public IT expenses could not be demonstrated as a result of using open standards and open source software.

There was much criticism about the quality of the report and the findings both from within the Parliament as well as from outside⁴ (e.g., Commission for Government Expenditure, 2011⁵; Sleurink, 2011a, 2011b). In particular, the report was criticized for the lack of a sound scientific approach and the narrow empirical basis for its main conclusions. Regarding this basis, the Court reported a crucial lack of data on government IT expenses. Amongst other reasons, it had therefore limited its investigation to only part of the public sector (e.g. not local governments and not the education sector) and in particular to the licensing and maintenance costs of software (and not the entire life cycle). See further on.

The Court's scientific approach shows a number of flaws⁶. It lacks a consistent methodology and methodological accountability; the literature study is unbalanced and very limited; far-reaching statements lack references; decisions about which data is admissible and which is not are arbitrarily made⁷; and research questions remain unanswered. Moreover, in determining possible savings no distinction is made between open standards and open source software. Regarding possible savings in software costs by central government, the report states that "because standards are implemented in software or organizational procedures, we will not separately address the costs of standards. These costs are part of the software costs." (DCA, 2011a, p. 41; *translation TE & BE*)

Our motive to write this article is the – unjustified, for unsubstantiated – influence the Court's report may have on IT decisions of governments internationally⁸, and the scientific-methodological challenge embedded in the motion Gerken, namely to measure the benefits of open standards. This is not easy and several countries are currently struggling with this topic (CIPPM, 2012). It therefore deserves considered treatment.

In this article, we provide building blocks to contribute to such an effort. We explore what should be measured when it comes to the – here: market – effects of open standards, and which methodologies already exist. It is intended as a stepping stone for further research.

The article is structured as follows. First, we analyze the Court of Audit report and introduce our line of reasoning. Next, we present an economic framework which identifies the effects on open standards that could be measured. We then discuss three methodologies for measuring the benefits of open standards that emerge from an initial inventory of the literature. To illustrate the use of the framework, we elaborate on means to measure one of the listed effects: increased vendor independence. We conclude by reflecting on our findings in the light of the motion Gerkens and making recommendations for further research.

Criticism on the Court of Audit Report: Our article focuses, first, on open standards because they are hardly addressed in the Dutch Court of Audit report; and, second, on exploring the benefits of open standards for the functioning of the market because this, we argue, is what the motion Gerkens is most interested in.

Open standards remain underexposed and are confused with open source: Open standards are hardly mentioned in the report of the Court of Audit. Their costs and benefits are not measured separately, as the earlier quote indicates. Thus, the questionnaire sent to the ministries to map their savings exclusively addresses open source software; it contains no questions on open standards (see DCA, 2011a, Appendix 6). Moreover, the Court's report does not clearly distinguish the two. The authors seem to confuse the two. For example, without any further explanation standardization committees are called 'communities' in analogy with open source communities; and, as "often cited benefits of open standards" the report mentions that, compared to closed standards, open standards have a higher quality (because of their open process) and lead to more cost savings (because they contain no patents) - without mentioning any sources. These benefits are not typically quoted in listings of the benefits of open standards. They do typically appear, however, in lists on the benefits of open source software. In open source projects "given enough eyeballs, all bugs are shallow" (Raymond, 1999). The more people that work on the source code, the better the quality. The assumption that, because of the open process, this also applies to standardization may seem obvious, but ignores the dilemma that in open standards processes, where interests differ, ambiguous compromises are sometimes forged (Sherif et al, 2007).

The proposition that open standards lead to cost savings is widely endorsed, but not so much because of the absence of patents and user licenses (DCA, 2011a, pp.28-29) but rather because standards lead to a level playing field (David and Steinmueller, 1994). That is, the source of the frequently mentioned advantage lies elsewhere.⁹

The motion Gerkens is about the functioning of the market: In the motion Gerkens (19 May 2010) the Dutch Parliament notes that competition in the IT market should be improved and that more openness will yield substantial savings in public IT expenditure. Open standards contribute to a better functioning of the market. The motion Gerkens builds upon an earlier motion, the motion Vendrik (Vendrik c.s., November 20, 2002). Therein the Parliament requests the cabinet "to ensure that in 2006 all public sector software complies with open standards". The motion Vendrik specifies the problem to be addressed - and thus in which areas the (measured) benefits of a better functioning market may lie. It notes that the software market is highly concentrated (read: oligopolies); that "changing suppliers often entails high switching costs" (read: vendor lock-in); that "this restricts competition" (read: market failure); and that therefore "society is not taking full advantage of the possibilities software provides" (read: too high IT costs for consumers and too little innovation). By fully by-passing the impact of open standards on the IT market and limiting itself to the direct savings of open source software, we therefore conclude that the Court of Audit inappropriately narrows down the Parliaments request for research.

Economic framework: functions and effects of open standards: To more systematically address open standards and how they affect the IT market, we introduce a conceptual framework drawn from economic studies of standardization (Swann, 2000) and apply it to compatibility standards. In the IT sector compatibility standards, also known as

interoperability or interface standards, are most prominent. This category of standards allows software from different vendors to inter-operate, data to be exchanged, and so on. In the following, we will focus on open compatibility standards unless stated otherwise. Compatibility standards have certain effects to which benefits are attributed. By 'effects' we mean: the impact of open compatibility standards for users (i.e., those who implement them such as software vendors), end users (e.g. government authorities) and others who experience their benefits and drawbacks. By 'benefits' we mean the value (monetary and otherwise) that society attaches to standards to realize these effects (see also ECORYS, 2007, p.41).

To gain insight into their economic effects, we apply a heuristic framework that classifies different functions of compatibility standards (see Table 1; revision of Swann, 2000). These functions, while not mutually exclusive, are: providing information, creating interoperability and reducing variety. We discuss them and their effect on the market below.

With regard to providing information, standards ease our lives because we can refer to them and thus reduce informational transaction costs (Kindleberger, 1983). They reduce the cost of negotiation because parties to a deal know what is being dealt in (Kindleberger, 1983, p. 395). They reduce the search costs of consumers because less time and money is needed to evaluate products (Jones and Hudson, 1996). This is particularly important in markets where consumers have difficulty recognizing the quality of products, as in the IT market, and where consumers are disadvantaged in the information they have relative to producers (information asymmetry; Akerlof, 1970). In such situations, market failure is more likely to occur - that is, too little functionality for too much money. Open standards reduce the risk of market failure. They make it easier for consumers to compare products (e.g., energy consumption of mobile chargers - once the plugs are the same) thereby increasing market transparency (Reddy, 1990). Standards thus reduce the chance that the supplier of an inferior product gets a larger market share via competitive pricing because the supplier of the higher quality product has no way to signal this to potential customers (adverse selection; Akerlof, 1970). Transparency is also of high importance in anonymous international markets, where trading partners do not know each other. Thus, open standards also facilitate international trade. See Table 1.

Functions of open standards	Effect on the market
Information	Increases market transparency Reduces transaction costs (e.g. reduces information asymmetry) Corrects adverse selection Facilitates trade
Interoperability, Compatibility	Creates network externalities Increases competition (i.e., increases number of producers, quality and choice of products, lowers prices, incentive for innovation) Decreases vendor lock-in (e.g. decreases costs of switching vendors and of maintenance)
Variety reduction	Allows economies of scale Facilitates building a critical mass

Table 1: Main features of open compatibility standards and their impact on the market (revision of Swann, 2000)

With regard to creating interoperability, the second main function of open compatibility standards, the latter constitute an 'infrastructure' (Swann, 2010) based on which

competition and innovation may occur (David and Steinmueller, 1994). The intended economic effect is full competition between suppliers of a technology (Ghosh, 2005). This creates a playing field that reduces the threshold for new producers, increases the incentive to innovate, leads to better value for money and leads to a greater variety of products for consumers. Moreover, standards facilitate the emergence of new economic clusters. An example is the Internet services that were able to develop based on agreed network and transport protocols. Because the use of open standards is not restricted to certain parties, the effort required to enter standards-based markets is smaller, the number of providers is likely to increase, and consumers are less likely to be tied to a single supplier (less 'lock-in'; Farrell and Saloner, 1985). Even if consumers switch supplier, they can continue to reap the benefits of adjacent and complementary products that often co-determine the consumer value of a product or service.

Reducing variety, the third function, is closely allied with the information and compatibility functions of open standards. The purpose of standardization is to curb unnecessary and unwanted variety by agreeing on a specification that can then serve as a common point of reference (Van den Beld, 1991). Overviews of the economic standardization literature (Swann, 2000, 2010; Blind, 2004) show that variety is sometimes equated to innovation. However, variety does not have an intrinsic value. For consumers, this is well-illustrated by the different plugs for mobile chargers and the metric and imperial measurement systems. For producers, less variety allows larger production volumes, which leads to lower costs per unit produced (scale advantage). Standards can thus help to build the critical mass needed to open up new markets. And finally, less variety makes markets more transparent and efficient.

The motion Gerkens and its predecessor, the motion Vendrik, mainly cover the interoperability effects of open standards. In the following, we therefore focus in particular on ways of measuring these effects.

Measuring the benefits of open standards: The benefits of open standards can be diverse. We mention here some that gave rise to the development of 'The Netherlands in Open Connection: An action plan for the use of Open Standards and Open Source Software in the public and semi-public sector' (EZ, 2007, p. 28¹⁰); and which would therefore seem to be an obvious point to start research for the motion Gerkens:

- improved exchangeability of data;
- better accessibility to data (e.g., on websites);
- independence from suppliers encourages the market;
- reduced software production costs;
- greater independence from hardware systems and operating systems;
- reduced monopoly formation on the ICT supply side;
- potential positive effect on the trade balance and local knowledge economy.

Box 1: Dutch Court of Audit report on the benefits of open standards

The Dutch Court of Audit report quotes four frequently mentioned benefits of open standards, that is: next to 'increased quality' and 'saved patents costs' (see earlier comments), also vendor independence and digital sustainability (meaning that data will remain accessible even if suppliers decide to no longer support older software versions or go bankrupt). The report, however, adds at the same time - without revealing its source - that "there is no evidence of the general validity of the aforementioned benefits" (DCA, p.31). This leads to much incomprehension. In their reaction the Dutch Parliament asks

"How does the Dutch Court of Audit assess the 'frequently mentioned benefits of open standards' given its remark that 'There is no evidence for the general validity of these potential benefits?'" (DCA, 2011b, question 30) The Court then replies that with this remark it had wanted to add a practical angle to the discussion on open standards. Also the minister of Interior Affairs challenges the Court's statement. He views open standards, in particular, but also open source software, as a means to "diminish the complexity [of IT systems], their intertwinedness and vendor dependence. (...) [There are] long-term advantages and economic-social benefits [to be gained] by better cooperation and more efficient exchange of information within and between organizations" (letter by minister of Interior Affairs Donner, March 9, 2011, p.2).

Below we summarize relevant research and methodologies on the benefits of standards in the Netherlands and internationally identified by Yang (2012)¹¹.

CBA cases in the Court of Audit Report: The Court observes that attempts to measure the impact of open standards have not yielded much useful insights. This also applies to the three existing cost-benefit analyses (CBAs) of projects introducing open standards, which it includes as business cases in its report¹².

CBA is an instrument to assess the economic viability of projects. It provides a "systematic, rational basis for making a societal choice between relevant alternatives. Thereby all societal aspects should be taken into consideration, including non-financial ones such as safety or environmental impact. It also provides insight into the distribution of costs and benefits across relevant groups in society."(ECORYS, 2007, p.12).

The CBAs in the three business cases include financial estimates of efficiency advantages for end users and data suppliers, increased effectiveness of services, and costs avoided via synergies and reduced administrative burdens. However, according to the Court of Audit, these figures cannot be used to answer the parliamentary motion because the cases "do not [concern] completed projects that made the transition from 'closed' to 'open'" (DCA, 2011a, p.49). (We will address whether this dismissal is justified later on.) Furthermore, according to the Court, the project documents do not indicate whether it is important that these standards are open. The Court notes the lack of other quantitative data, and does not conduct any studies of its own. In sum, the Court of Audit report contains no appropriate data, according to the Court itself, to answer the question on standards in the motion Gerkens.

Baarsma report: A previous study that seeks to answer a question very similar to that of the Dutch Court of Audit, is that of Barbara Baarsma of the Foundation for Economic Research (Baarsma, 2004). Her research question is 'Are there societal benefits to be gained if the public sector as a whole would switch to software based on open standards and/or open source software?' The study is not discussed in the report of the Court of Audit. In the following we summarize its methodological approach and main conclusions.

The research methodology proposed in the Baarsma study was a cost-benefit analysis as detailed in the Dutch governmental guideline for evaluating infrastructure projects (Eijgenraam et al, 2000). Because there was too little data on the costs of government IT, Baarsma was unable to determine the Total Cost of Ownership of standardized IT, which was to be part of the CBA. Therefore she developed a more qualitative assessment framework to support those involved in deciding whether to switch towards open standards (see Baarsma, 2004, Table 4/3). A case study was conducted to further elaborate the assessment framework. The case, that is, information exchange between cooperating organizations in the public sector (meso-level measurement), focused on interoperability and included several types of effects: direct, indirect and external effects and transition costs.

The Baarsma report draws a number of highly relevant conclusions. It notes that most benefits lie in efficiency gains resulting from improved information exchange and functioning of the market. The issue is not merely using open standards but equally "the extent to which organizations use the same (open) standard" (Baarsma, 2004, p.49). At the societal level, significant welfare gains can be achieved but two difficulties arise. First, the (considerable) estimated benefits lie in the future, whereas most expenses have to be made on the short term (Baarsma, 2004, p.49). Because of the delayed benefits, issues such as the evaluation of time and interest rates can be relevant to decision makers.

Second, costs and benefits are not equally distributed among the parties involved (p.49, p.82). In many cases, the cost of introducing open standards is initially borne by public authorities, whereas the main benefits may accrue to citizens and businesses (e.g., improved quality of service). These benefits may be indirect and unpriced.¹³ The Baarsma report further mentions two redistribution effects:

- Redistribution effects between suppliers and consumers. The profit from closed standards and closed source software often ends up with suppliers; when making the transition to OS and OSS, a portion of the profits will shift from suppliers to end users / consumers.
- International distribution of effects. Market power leads to higher prices and often to less product innovation. A switch to OS and OSS can stimulate the local economy and innovation.

ISO Methodology: More recently, the International Standardization Organization (ISO, 2010a, 2010b, 2011) developed a methodology to measure the benefits of open standards for companies. The ISO Methodology focuses in particular on standards that contribute to the core value of a company. Measuring occurs in retrospect and consists of four steps. First, the value chain (Porter, 1985) of a company is analyzed. Second, the effects of standards on main business activities are identified. To support this process, a list of 81 possible effects of standards has been drawn up. Third, the value drivers and key operational indicators are identified (e.g., saving time, decrease of the number of rejects and cost reduction). Finally, based on the selected indicators information is collected and effects are measured.

The ISO methodology has been applied in eleven case studies, most of which concern the introduction of compliance standards (i.e., environmental, health and safety management standards such as the ISO 9000 and 14000 series). Analysis of these cases shows that the main quantitative benefits are cost savings for businesses, that is, reduced information transaction costs (easy access to information) and economies of scale effects (fewer suppliers and less raw material). According to Yang (2012), application of the methodology to interoperability standards seems possible.

The sequence of steps in the ISO Methodology resembles that of a verification process, and is in this sense vulnerable to methodological criticism. For example, it does not indicate how to isolate the impact of standards from that of other factors, such as the ability of companies to implement standards and contextual factors such as regulation. However, the methodology's elaborate specification of possible effects of open standards may provide a valuable input for developing measurement methods in the field of government IT.

Intermediate Conclusion: Yang's initial inventory (2012) suggests that little quantitative research has been done internationally on the benefits of open standards¹⁴. While the discussed methodologies do contribute elements that are relevant for measuring the consequences of a move to open standards, no comprehensive, ready-made methodologies exist to quantify possible savings for government IT.

While the lack of quantitative government data was held to be a major stumbling block for the Dutch Court of Audit (2011a), one might question whether data on transitions from closed to open standards would have helped to answer the motion Gerkens. (This is challenged in the next section.) Moreover, the Court leaves unspecified which data it would have needed.

The economic framework introduced earlier points to several (market) effects relevant for measuring the benefits of open standards that are still missing. In the next section, we examine more closely what it would mean to measure one of the effects of interoperability, namely reduced switching costs and vendor dependence¹⁵. The motion Gerkens states that in the long run by using open standards the costs of switching IT supplier can be significantly reduced, which will increase competition in the IT market and lower prices.

Types of Switching Costs	Switch between proprietary products (closed standards)	Switch between open standard-based products
Search cost, i.e. the time, effort and expenses needed to find a product or supplier (if these are very high the switch may not be made)	High	Low/ Moderate
Transaction costs, i.e. the costs that must be made to reach an agreement, including forging a new trade relationship and writing off investments in earlier ones	High	Moderate
Learning costs, i.e. the costs (time, money, effort) consumers incur to familiarize themselves with the new product/supplier; these costs are non-transferable	High	Low
Complementary investments, i.e. expenses made to buy complementary products (e.g. DVD and DVD player)	High	Very Low
Costs related to network effects and compatibility; some products exhibit network effects that arise when a user desires compatibility with other users or where increased consumption of addition units of the same good creates additional value. Users then benefit from adopting products with most users.	High	Very Low
Contractual switching costs, i.e. financial incentives for customers to make repeat purchases from same vendors (e.g. frequent flyer program or penalty for early withdrawal of deposit banking)	High	High

Table 2: The implications of using closed and open standards for different types of switching costs.

Switching costs: In the economic literature the term switching costs is most often used for switching from one closed standard to another (von Weizsacker, 1982). Competing incompatible technologies are concerned (Shapiro and Varian, 1999) such as HD-DVD and Blu Ray. Whether a switch is made, depends on previous investments in time, effort and money and complementary products; the additional functionality provided; the speed at which new network externalities can be realized (i.e., the benefits attached to being

connected to a network with other users); and so on. If the costs are too high, this is termed 'vendor lock-in'. Especially if there only seems to be room in the market for one of the two competing technologies (a 'winner takes all' situation) the height of the switching costs may lead consumers and producers of complementary products to postpone choosing a technology. In these cases switching costs inhibit the functioning of the market. In the field of IT various switching costs can be discerned (Chen and Hitt, 2006). Table 2 column 1 lists a number of them.

Switching costs do not exclusively apply to closed standards (i.e., switching from one closed to another closed standard). Each switch to another supplier involves costs. But their height may vary strongly. Thus, the switching costs between suppliers of products that comply with the same open standard are usually much lower. Table 2 roughly indicates the switching costs for closed and open standards. For example, when switching to another closed standard (incompatible technology) one will have to write off investments in complementary products and transaction and learning costs, whereas this is typically not the case when switching to a supplier who sells products that comply with the same open standard. Because they ease such a switch, open standards help to avoid lock-in (Farrell and Saloner, 1985). By doing so they increase consumer choice and stimulate the market.

Back to the motion Gerkens. In its report, the Court of Audit interprets the Parliament's request as concerning the costs of switching from closed to open standards (DCA, 2011a, p.49). The report focuses on the (short term) costs of such a transition. However, these data, had they been available, would hardly have thrown light on the (mid-and long-term) market effects of open standards. To clarify our point, we outline three transition scenarios:

1. From a closed to an open standard
2. From a closed to another closed standard
3. From an open standard-based product to another based on the same standard

The line of reasoning in the Court of Audit report is based on scenario 1. Broadly speaking, in this scenario the short term costs are high and the short term benefits low. On the short term, the cost of scenario 1 hardly differs from that of scenario 2 (for example, switching from Video2000 to VHS). But in the long run the benefits of these two scenarios do differ. The expected long-term benefits in scenario 1 are high. In scenario 3, however, the switching costs already make a difference on the short term. For, the switching costs are low and the market benefits are felt immediately (lower prices, vendor independence). See Table 3. Perhaps needless to say, the switch from closed to open standards in scenario 1 is a precondition for switching vendors more easily in the future (i.e., under the regime of scenario 3).

Scenarios for switching to new supplier	Costs	Short-term benefits	Long-term benefits
1. from closed to open standard*	High	Low	High
2. from closed to other closed standard	High	Low	Low
3. from open to same open standard	Low	High	High

Table 3: Scenarios for the cost of switching to a new supplier. (*The switch focused on by the Dutch Court of Audit)

According to our interpretation of the motion Gerkens, the Parliament is foremost interested in the difference between the switching costs in scenario 2 and 3, whereas the Court's

report focuses on scenario 1. The difference between scenarios 2 and 3 reflects the societal costs of vendor-dependent government IT and measures the effect of open standards on the market.

This conclusion is in line with earlier criticism that in its calculations of government IT expenditure the Court's report does not take long term consequences into account such as (a) exit costs, i.e., the costs made when switching suppliers, which should be depreciated (an issue embedded in questions posed by the Dutch Parliament, see DCA, 2011b), and (b) the indirect consequences of working with closed systems, that is, producing data which later may have to be converted and migrated to open formats. As Sleurink (2011b) puts it in his letter, "when it comes to a cost estimate one should not only study the life cycle of the software in question, but also that of everything produced with the software."

Discussion: The report of the Dutch Court of Audit confuses open standards and open source software. It hardly addresses open standards and fully omits addressing their effect on the market. It does not answer the question posed by the motion Gerken about the savings that can be achieved by reducing the use of closed standards. The report does, however, draw conclusions about this issue¹⁶. These conclusions re-surface in the English summary and are referred to in international policy discussions, in which the Dutch Court of Audit is – in this instance undeservedly – regarded as an authoritative source. We therefore recommend the full report to be translated in English so that those who refer to the summary can acquaint themselves with its content and limited scope.

Internationally, no appropriate methodologies exist that quantify in a systematic way the benefits of open standards for government IT. With this article, we offer a possible stepping stone for a developing such a methodology. Summarizing our steps:

- We introduced a (revised) economic framework that identifies functions of open IT standards and their possible effect on the market. For the motion Gerken, particularly the interoperability function and its effects were argued to be relevant.
- We analyzed the results of a preliminary inventory of methodologies internationally. The existing methodologies focus foremost on making a business case for introducing standards. While they do not solve the problem of determining the benefits of dismantling closed systems, elements therein (i.e., variables and indicators) offer useful input for further research.
- We illustrated what it might entail to measure the benefits of open standards. We focused on various switching costs in three transition scenarios, and showed which data would have been required to respond to the motion Gerken, i.e.: *not* data about the costs of switching from a closed to an open standard, which the Court of Audit sought, but the *difference* between (a) the cost of switching from closed to closed standards (scenario 2) and (b) the cost of switching between open standard-compliant suppliers (scenario 3).
- With the rising cost of government IT, the Dutch Parliament has good reasons to seek quantitative data on savings by reducing the use of closed standards. The required research poses a methodological challenge to which we have tried to make a modest contribution. However, we fully realize that we have not even touched on the problem of quantifying other possible benefits of open IT standards, such as increased ease of IT use, increased security, long-term digital preservation, and greener IT.

To conclude, what if the Dutch Court of Audit had done a better job and their scientists had managed to provide the required information to the Dutch Parliament? There would have been the danger that politicians would have mistakenly expected, first, that the costs and (financial) benefits accrue to the same government authority; and, second, that OSOSS activities can be initiated and benefits reaped in the same (political) time frame (see also Baarsma, 2004). This is a recurrent dilemma in policy research: if scientists do sound research, will politicians be able to draw the right conclusions and political consequences?

References:

- Akerlof, G.A. The Market for 'Lemons': Quality Uncertainty and the Market Mechanism. *Quarterly Journal of Economics*, 84(3), 1970, pp. 488–500.
- Baarsma, B. *Kosten en baten van open standaarden en open source software in de Nederlandse publieke sector- ene analyse op meso- en macroniveau*. Stichting Economisch Onderzoek, SEO-rapport 755. Amsterdam: Universiteit van Amsterdam, September 2004.
- Beld, J.W. van den Technische normen niet altijd commercieel gewenst. *Elektrotechniek-Elektronica*, 2, 1991, pp.22-24.
- Blind, K. *The economics of standards: theory, evidence, policy*. Cheltenham, UK: Edward Elgar, 2004.
- Chen, P.Y. and L.M. Hitt, Information technology and switching costs. *Handbooks in information systems 1*, 2006, pp.437-470.
- CIPPM *Open standards in government IT: A review of the evidence*. Bournemouth University, Centre for Intellectual Property Policy & Management, <http://www.cippm.org.uk/publications.html> – final draft 10 September 2012, consulted 20 September 2012.
- David, P.A. and W.E. Steinmueller, Economics of compatibility standards and competition in telecommunication networks. *Information Economics and Policy* 6(3), 1994, pp.217-241.
- DCA, Dutch Court of Audit (Algemene Rekenkamer), [Open standaarden en opensourcesoftware bij de rijksoverheid](#). Tweede Kamer, vergaderjaar 2010-2011, 32679, nr. 2. 's-Gravenhage: Sdu, 15 maart 2011, 2011a.
- DCA, Dutch Court of Audit (Algemene Rekenkamer), *Beantwoording vragen Tweede Kamer bij rapport Open standaarden en opensourcesoftware bij de rijksoverheid*. Brief aan de voorzitter van de Tweede Kamer, Den Haag, 15 juni 2011, 2011b.
- DTI, *The Empirical Economics of Standards*. UK, London: Department of Trade and Industry, 2005.
- Dussel, H. and B. Vos, *Leveranciers Lock-in*. PIANOo congres 2012, <http://www.pianoo.nl/sites/default/files/documents/documents/vendorlockinenopenstandaardenbijictaanbestedingen.pdf>, consulted 3 October 2012.
- Ecorys *Handreiking voor kosten-batenanalyse voor ICT projecten. Actieprogramma maatschappelijke sectoren & ICT*, opdrachtgever ministerie van Economische Zaken, Rotterdam, December 2007.
- Eijgenraam, C.J.J., C.C. Koopmans, P.J.G. Tang and A.C.P. Verster, *Evaluation of Infrastructural projects: Guide for Cost-Benefit Analysis, Sections I and II*. The Hague, CPB Netherlands Bureau for Economic Policy Analysis, 2000.
- EZ, *Nederland Open in Verbinding: Een actieplan voor het gebruik van Open Standaarden en Open Source Software bij de (semi-)publieke sector*. 's-Gravenhage: Ministerie van Economische Zaken, 2007.
- Farrell, J. and P. Klemperer, Coordination and lock-in: Competition with switching costs and network effects. *Handbook of industrial organization 3*, 2007, pp.1967-2072.
- Farrell, J. and G. Saloner, Standardization, compatibility, and innovation. *RAND Journal of Economics*, 1985, pp. 70-83.
- Forum Standaardisatie, <http://forumstandaardisatie.nl/open-standaarden/>, consulted 20 September 2012.
- Gerkens c.s., see Tweede Kamer (House of Parliament) 2010.
- Ghosh, R. *Free/Libre/OpenSource Software: Policy Support; An Economic Basis for Open Standards*. Maastricht: MERIT, University of Maastricht, FLOSSPOLs project, 2005
- ISO, *Economic Benefits of Standards- Methodology Guide*, Version 1, Geneva,Switzerland: ISO, 2010a.
- ISO, *Economic benefits of consensus-based standards: the ISO Methodology*. Geneva,Switzerland: ISO, 2010b.
- ISO, *Economic benefits of standards - International case studies*. Geneva,Switzerland: ISO, 2011.

- Jones, P. and J. Hudson, Standardization and the Cost of Assessing Quality. *European Journal of Political Economy* 12, 1996, pp.355-361.
- Kindleberger, C.P. Standards as Public, Collective and Private Goods. *Kyklos* 36, 1983, pp.377-396.
- Krechmer, K. (2006). Open Standards Requirements. *The International Journal of IT Standards and Standardization Research*, 4(1), January - June 2006.
- NOiV, *De derde voortgangsrapportage Nederland Open in Verbinding*, <http://www.rijksoverheid.nl/onderwerpen/digitale-overheid/documenten-en-publicaties/rapporten/2011/12/13/de-derde-voortgangsrapportage-nederland-open-in-verbinding.html> of 30-12-2011, consulted 5 October 2012
- Paapst, M.H. *Barrières en doorwerking, een onderzoek naar de invloed van het open source en open standaarden beleid op de Nederlandse aanbestedingspraktijk*. Dissertation, Groningen: Rijksuniversiteit Groningen, 2012.
- Porter, M.E. *Competitive Advantage, Creating, and Sustaining Superior Performance*. New York: The Free Press, 1985.
- Raymond, E.S. *The Cathedral and the Bazaar*, Sebastopol, CA: O'Reilly, 1999.
- Reddy, N.M. Product of Self-Regulation. A Paradox of Technology Policy. *Technological Forecasting and Social Change* 38, 1990, pp.43-63.
- Shapiro, C. and H.L. Varian, *Information rules: a strategic guide to the network economy*. Boston, Harvard Business School Press, 1999.
- Sherif, M.H., K. Jakobs and T.M. Egyedi, Standards of quality and quality of standards for Telecommunications and Information Technologies. In: M. Hörlesberger, M. El-nawawi, T. Khalil (eds.). *Challenges in the Management of New Technologies*. Singapore: World Scientific Publishing Company, 2007, pp. 427-447.
- Sleurink, H. *Open brief aan de het College Algemene Rekenkamer*. 23 March 2011a, [English translation:] http://www.opentrends.nl/wp-content/uploads/2011/03/PublicLetter1_Sleurink.pdf, consulted 28 April 2013.
- Sleurink, H. *Open brief aan de het College Algemene Rekenkamer*. 2 September 2011b, [English translation] http://www.opentrends.nl/wp-content/uploads/2011/09/PublicLetter2_Sleurink.pdf, consulted 28 April 2013.
- Stedehouder, J. *Reactie op rapport OS/OSS Algemene Rekenkamer*. 22 March 2011, <http://www.slideshare.net/janstedehouder/reactie-op-rapport-ososs-algemene-rekenkamer>, consulted 1 October 2012
- Swann GMP (2000). *The Economics of Standardization*. London: Department of Trade and Industry, Standards and Technical Regulations Directorate.
- Swann, G.M.P. *International standards and trade: a review of the empirical literature*. OECD Trade Policy Working Papers, no. 97, OECD Publishing, 2010.
- Tweede Kamer (House of Parliament), *Motie van het lid Vendrik c.s.*. Vergaderjaar 2002-2003, 28600 XIII, nr. 30. 's-Gravenhage: Sdu, 2002, <https://zoek.officielebekendmakingen.nl/kst-28600-XIII-30.html> .
- Tweede Kamer (House of Parliament), *Motie van het lid Gerkens c.s.*. Vergaderjaar 2009-2010, 26643, nr. 156. 's-Gravenhage: Sdu, 2010, <https://zoek.officielebekendmakingen.nl/kst-26643-156.html> .
- Updegrove, A., 'Openness and Legitimacy in Standards Development', *Consortiuminfo.org*, feature article, <http://www.consortiuminfo.org/bulletins/nov12.php#feature>
- Vendrik c.s. see Tweede Kamer (House of Parliament) 2002.
- Weizsacker, C.C. von *Staatliche Regulierung - positive und normative Theorie*. Schweizerische Zeitschrift für Volkswirtschaft und Statistik, 2, 1982, pp. 325-243.
- Yang, X. *Methodologies for assessing the benefits of open standards; The implications for the public IT procurement*. Thesis for master of science in Engineering and Policy Analysis. Delft: Delft University of Technology, July 2012.

End Notes

¹ The term 'open' is used to indicate that different stakeholders (can) participate in the standardization process, that the documented standards are readily available, and that

there are no obstacles to use them (see also Standardisation Forum, 2012). For a more detailed discussion on open standards see Krechmer (2006) and Updegrove (2012).

²That is, one can read the source code (and look, as it were, under the hood of the car) and change and reuse the source code depending on the accompanying license.

³The motion Gerkens (formally: Gerkens cum suis) was proposed by the members of Parliament Gerkens (socialist party), Heijnen (liberal party) and Vendrik (green party).

⁴ See Stedehouder (2011) for a compilation of reactions to the report.

⁵This is referred to in DCA (2011b).

⁶As part of an internal evaluation the Dutch Court of Audit invited one of the authors, Tineke Egyedi, to comment on the report. This conversation took place February 20, 2012 in the presence of four representatives. Some of her comments are provided here.

⁷In answer to a parliamentary question the Court responds that, although an earlier report (Baarsma, 2004) concludes that "probably net societal benefits can be achieved if the public sector as a whole switches (...) to open standards", this conclusion "is quantified nowhere" and therefore the Court does not take it into account (question 51, DCA, 2011b). The Court does not apply the same degree of criticism to its own research.

⁸ The report is referred to as an authoritative source, for example, during a meeting on European ICT public procurement (Brussels, 12 December 2011), http://cordis.europa.eu/fp7/ict/ssai/action23workshop-nov2011_en.html, accessed 5 December 2011. It is also referred to in the study of Bournemouth University (CCIPM, 2012).

⁹ As far as we know, no studies exist that specifically address the costs saved by patent-free standards. This may deserve further investigation.

¹⁰<https://www.ictu.nl/archief/noiv.nl/service/english/index.html>

¹¹Xiuyun Yang's research was done as part of his master thesis (TU Delft, EPA). For the inventory of methodologies, he searched the Internet using different (combinations of) terms and interviewed a number of experts (face-to-face, via email and phone). See Yang (2012). We warmly thank him for consenting to using some of his work.

Given the focus of this article, we do not discuss macro-economic research on the impact of open standards on economic growth (DTI, 2005) and international trade (Swann, 2010).

¹²These are: INSPIRE, 'Welstand Transparant' and 'Stelsel van basisregistraties'.

¹³The Baarsma report concludes that in particular indirect (often unpriced) benefits will be decisive when choosing between closed and open software (Baarsma, 2004, p.80), such as fewer disadvantages of network effects and the emergence of new markets.

¹⁴ To our knowledge, there are still no TCO studies on the use of open standards (see also Baarsma, 2004, p.23).

¹⁵ The Court has not examined the "cost effects associated with vendor-dependence" (the Court's answer to Parliamentary letter, question 11, DCA, 2011b).

¹⁶ The Court of Audit concludes, for example, that competition law and regulation are more appropriate means to address the functioning of the market than standards are (DCA, 2011a, p.52) - without having examined this.