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The Rule of Standards: Codifying Power in the Transnational Arena

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1 Introduction: Rule Setting through Standards

The growing body of research on transnational governance and regulation by non-state actors has highlighted the role of standards in bringing about social order beyond the nation state (Boli and Thomas 1999; Braithwaite and Drahos 2000; Mattli 2003; Djelic and Sahlin-Andersson 2006). While the relevance of such private rules is commonly acknowledged, the social and organizational dimensions of transnational standardization are still underspecified. There are still many questions with regard to how standards actually fill the regulatory void at the transnational level. Furthermore, it is largely unclear how actors make use of standards to extend their influence beyond the reach of their home jurisdictions. Standards have not only received increasing academic interest; the widespread conceptual use perhaps suggests an imprecise understanding and the coexistence of various debates merely sharing the same label. We hope to contribute to the vast debate on standards and standardization by looking back on the different traditions and by offering a framework that conceptualizes standardization as interrelated process of the formation and diffusion of standards in which actors play a prominent role.

Some observations have inspired us to work towards conceptual clarifications: First and foremost, there seems to be an odd coexistence between works on technical standardization on the one hand and non-technical regulation on the other. Even though empirical and theoretical works on technical standardization – mainly in the field of information technology – are manifold, surprisingly little reference is made to them in the debate on transnational governance (see Schmidt and Werle 1998 and Mattli and Büthe 2005 for notable exceptions). Second, more often than not, technological standards are reduced to their coordinative function and thus merely considered special cases of regulation (Lessig 1999). Such views, mostly rooted in institutional economists, have fostered a functionalist reading of standards reducing them mainly to their capacity to lower transaction costs. Such an emphasis on interface management has led to a neglect of cultural and organizational aspects, making it difficult for some social sciences to build on the coordinative argument. Third, in works on transnational governance strong emphasis is put on the allegedly non-binding character of (transnational) standards when comparing them to traditional forms of intergovernmental regulation (Brunsson and Jacobsson 2000; Kerwer 2005). Ahrne and Brunsson (2006, p. 83) emphasize the fact that “standardizers can only recommend a standard; it is up to others to decide if they will follow it. [W]hereas organizations often evoke protests and complaints, this

is rarely the case for standards because of their non-binding nature." Such a perspective rightfully points to the dispersed agency of collective rule-making but leaves some issues unaddressed: The binding nature of 'voluntary' standards remains opaque and underestimates the importance of the subsequent diffusion of standards in which actors are essential.

To address these issues we suggest taking a process perspective on standardization, putting particular emphasis on the relationship of standards' formation and their diffusion. More precisely, we want to contribute to the debate on transnational standardization of non-state actors by comparing two regulatory endeavours of technological and non-technological nature: Microsoft Windows operating system on the one hand and International Accounting Standards (IAS) on the other. In reconstructing both cases, we want to show the dynamics of standardization which are driven by attempts to codify power in the transnational arena. We have therefore selected two 'success stories' of transnational standard setting which vary according to their road to domination. Considering the diversity amongst but also the similarities between different standardization processes, we go beyond the notion of standards as being principally more "soft" in their regulatory power than traditional "hard law" regulation. Instead of trying to label standards according to such qualitative characteristics, we point to the procedural and contested nature of standardization beyond the nation state. We analyze the two empirical cases to answer the following questions: What can we learn from comparing technical and non-technical standardization; what are core differences and similarities? What is the additional benefit of a process perspective of standardization; how do the formation and diffusion of standards relate to each other? How do actors take advantage of the particularities of transnational standardization; how is power codified?

By answering these questions, we aim to contribute to the standardization literature in four ways: First, we want to bring together technological and non-technological works for mutual benefits: advancing the debate on technological standardization by deconstructing the prevalent functionalistic reading; but also adding to the sociological discussion by showing the obligatory potential of standards. Second, we underline the organizational context as a vital element during the formative period of a standard setting as well as for their diffusion. Third, we highlight the dialectics of power in standardization: On the one hand, power is a prerequisite to bring about meaningful rules and to ensure their proliferation (diffusion of standards/network externalities). On the other hand, successful standardization privileges dominant actors, thus reinforcing their influential position (positive feed-back of

standardization). Fourth, we stress the relevance of participation in transnational standardization as a vital element to alter binding rules, thus (re-)contextualizing transnational governance to local requirements and possibilities.

The paper is organized as follows: The theoretical section summarizes key works of standardization literature outlining the relationship between technical and non-technical areas showing some characteristics of both the formation and the diffusion of standards. Subsequently, we reconstruct two cases of transnational standards comparing Microsoft's Windows operating system as a technological and the development of International Accounting Standards (IAS) as a non-technological case of standardization. A final section compares and summarises the cases drawing more general conclusions about the political nature of standardization and the relevance of organizational processes.

2 Theory: Standards, Standardization and Organization

Commonly, standards are considered to be specifications to enable production and guide action. "It is helpful to distinguish among several kinds of standards – reference, minimum quality, and interface or 'compatibility' standards" (David and Greenstein 1990: 4). Their goal is to encourage actors "to behave in a similar way, producing uniformity across space" (Brunsson and Jacobsson 2000: 14). The production of uniformity points to the relevance of procedural characteristics of standard setting. Ahrne and Brunsson (2006: 82) define standardization as a "particular form of rule-setting" and view standards as "the most important organizational element that can be found outside organizations." Standards link up organizations and, in turn, standardization can be interpreted as an extension standard setters' influence beyond their organizational ambit. For analytical purposes, this extension can be distinguished into two dimensions of standardization: the formation of standards and their diffusion.

Standards are means for coordinating action. Their formation depends on types of formal or informal authority or other organizational ties between different actors. This points to the inherently dual nature of standards as – at the same time – enabling and constraining social action. This duality can be found in technical and non-technical standardization endeavours: First and unavoidably, standards produce coordination benefits by limiting individual leeway. In institutional economics, the coordinative function of such private rules has been widely

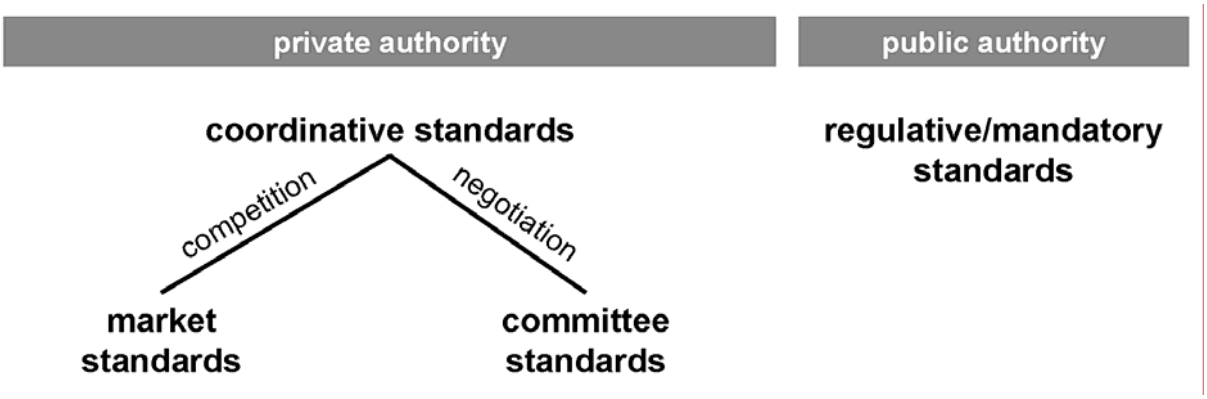
discussed (North 1990; Abbott and Snidal 2001). The prime benefits are considered to be lower transaction costs which translate into an overall increase in welfare. A second element concerns the distribution of benefits amongst actors affected by any particular standard. These benefits, e.g. resources, authority or legitimacy, feed back into the standardization cycle of standard development, diffusion, adoption, and reproduction. Standards and standard formation are therefore embedded and contextualized. Actor constellations and the conditions for participation are vital to understand how standards are set. Moreover, actors are also relevant in determining the diffusion of standards which in turn affects the generation of rules. As our empirical examples will show, an organizational perspective is useful to better understand the relationship of formation and diffusion. Although to varying degree this is true both for technical and non-technical standardization.

2.1 Technical Standardization: Fuzzy Blueprint or Minor Exception?

In his literature review, Feng (2003, p. 92) defines standardization as "the process by which explicit specifications for the form or function of a particular technology are created." He broadly distinguishes between *functionalist views* (e.g. Cargill 1989; Liebowitz and Margolis 2001) that see standard setting mainly as solving an "engineering problem" on the one and *constructivist views* (e.g. Schmidt and Werle 1993, 1998; Egyedi 1996) that conceptualize technological standardization as "social negotiations" on the other hand. Both views share the notion of standards as coordinating devices or "dominant designs" (Murmann and Frenken 2006) that orientate action as well as further technological development.

Much attention in the literature on technological standards is devoted to identifying different types of standardization and its consequences. For example, David and Greenstein (1990, p. 4ff.) differentiate between (a) "sponsored" or "unsponsored standards" emerging on markets, (b) "standards agreements" arrived at within, and published by voluntary standards-writing organizations and (c) "mandated standards", which are promulgated by government agencies that have some regulatory authority. In discussing the legitimacy of information and communication technology (ICT) standards, Werle and Iverson (2006: 21-22) propose a similar classification that allows overcoming a market/non-market divide: they propose to distinguish "coordinative" from "regulative" standards and subsume market diffusion under the former (see Figure 1).

Figure 1: Typology of technological standards



Source: Own composition, derived from Werle and Iverson (2006).

Whereas regulative standards are defined as mandatory legal rules imposed by states to prevent negative externalities of technologies, coordinative standards are divided into to two types: In the case of "market standards" "individual commercial interests can manage to promulgate […] solutions on the market where they become de-facto standards." (2006: 21) In contrast, "committee standards" are developed in and agreed on under the auspices of standard setting organizations.

The distinction between market and committee standards provides additional clarity for three reasons: First, the focus is on the circumstances of standard emergence applying a process perspective. Second, subsuming both market and committee standards under the common umbrella of "coordinative" standards, moves beyond functionalist logics, paving the way for a holistic view of standardization. Third, this distinction points to empirical variations with regard to the interrelation of the formation and diffusion of standards: while committee standardization focuses the former, market standardization emphasizes the latter.[1] "Mandated" or "regulative" standards imposed by nation states are subsumed under our categorization presented in the following section because they as well can cover both technical and non-technical standardization.

[1] Hence, similar to several theories of non-technical standardization presented in the subsequent section, Werle and Iverson (2006: 22-23) describe the "normative character" of coordinative standards as "voluntary" conventions. They do acknowledge, however, that this character might change into a "quasi-mandatory status" when standards are widely diffused and network effects lead to "lock in" (Hawkins 1999; Shapiro and Varian 1999) providing high or insuperable barriers for alternative action.

2.2 Non-technical Standardization: Voluntary Guidelines in Transnational Governance?

„Standardization constitutes a particular form of rule-setting. By rules we mean explicit, almost always written, statements that prescribe how certain actors must behave in certain situations“ (Ahrne and Brunsson 2006, p. 82). Together with other norms such as best-practice rules or guidelines, standards are generally considered to embody relevant expertise making them effective means of transnational regulation in areas where social order is just emerging (Djelic and Quack 2003) or existing orders require adaptation, extension or correction (e.g. Dobusch and Quack 2008). In the transnational arena, standards are often considered to be of particular interest because they contribute to filling regulatory voids. In such rather weakly institutionalized contexts, standards aim at overcoming or at least reducing uncertainty (Botzem and Hofmann 2008). Some authors even see private rules such as standards as alternatives to public institutions (Kerwer 2005: 611; Cutler, Porter and Haufler 1999). Pattberg (2005: 593) detects a functional equivalent to international governance: “Similar to regimes established by states, private institutions might provide goods, reduce transaction costs, and decrease uncertainty”.

Against the background of more recent institution-building in the transnational arena, we argue that standards are in fact a core element of social ordering. While they might appear to be non-binding in comparison to national laws or decrees, their limiting effects on social action might be substantial – and far from voluntary: They have the potential to bring about uniformity across time and space (Brunsson and Jacobsson 2000: 14). However, to reduce uncertainty and/or bring about uniformity, standard setting requires organizational support. Mattli (2003) has pointed out that transnational standard setting is characterized by an interrelation of private and public actors that span national and transnational levels: “What emerges is a novel type of transnational standards governance, one that is neither primarily private nor public, but may best be captured by the term of ‘joint governance’. It describes an arrangement that seeks to combine technical expertise, extensive resources, and market responsiveness with genuine openness, transparency, and legitimacy” (Mattli 2003: 200f.). Such an arrangement needs defined organizational structures that enable effective standardization.

2.3 Technological and Non-technological Standardization: a Holistic View

In both technological and non-technological standardization processes two different modes of standard formation can be found: The first mode is *exclusive formation* which is characteristic for proprietary (or de-facto) standards. Competitive standards may be sponsored by organizations – e.g. Microsoft Windows (Campbell-Kelly 2001) or become diffused on the basis of positive feedback mechanisms – e.g. QWERTY keyboard (David 1985). The second mode is *inclusive formation*, i.e. relatively open negotiations among parties affected by a standard. Different proposals are bargained over and usually, some sort of consensus is reached in central standard setting bodies. Here again, we find sponsored standards like some modes of Digital Rights Management (DRM, see Rosenblatt et al. 2002; Becker et al. 2003) or multi-stakeholder approaches. Examples of cooperative or committee standards are ISO's technical standards (Mattli 2003; Tamm Hallström 2004) or international accounting standards (Perry and Noelke 2005; Botzem and Quack 2006).

When we add standard diffusion as a second dimension of standardization to standard formation, we do so because of two reasons: First, standard diffusion is related to issues of legitimacy associated with the different types of standard formation (cf. Werle and Iverson 2006). Second, characteristics of standard diffusion such as coordination effects, credibility and reliability might lead to self-reinforcing feedback further strengthening a (pre-)selected solution ("network effects", see Farrell and Saloner 1986, 1987; Shapiro and Varian 1999) and, thereby, redistribute standard setting power among different actors previously involved in the standardization process. A brief overview of different ideal types of standards is given in table 1.

Table 1: Two dimensions of standardization: formation and diffusion

		Standard diffusion	
		weak adoption ⟷	high adoption
Standard formation	exclusive ↕ inclusive	**(1) *competing standards***	**(2) *de-facto standards***
		(3) *coexisting standards*	**(4) *collective standards***

Source: Own composition.

This typology not so much distinguishes different kind of standards but allows classifying standards according to their genesis. This way, it is possible to track changes throughout the processes of standardization over time and characterize the respective developments. Competition between standards (1), for example, can result in a single remaining de-facto standard (2) as will be shown in the Windows case below. In contrast, established de-facto standards (2) might be converted into collective standards (4) as has happened when the International Standardization Organization (ISO) officially adopted the QWERTY keyboard standard or again challenged by renewed competition (1). Finally, inclusive but parallel development of coexisting standards (3) can be the first stage of negotiating comprehensive collective standards (e.g. DIN-A-4 paper format which dominates in Europe and beyond)[2] (4) or the outset of an upcoming standard war (1) as it happened in the case of VHS vs. Beta video formats (Cusumano et al. 1992).

In the following section we briefly turn to two contrasting examples of standards, the Microsoft Windows case as a sponsored market standard and to the International Accounting Standards (IAS) as a case of unsponsored private collective rules. In addition to the formation of both sets of standards we also briefly consider their diffusion.

3 Stickiness of Standards: PC Operating Systems and Accounting Standards

Today, both cases are established in their respective field and show a high adoption rate (or degree of proliferation). As argued above, they differ with regard to the following criteria: Microsoft Windows is a case of a technological de-facto standard formed via market competition out of which one company emerged as the sole proprietor. IAS in contrast, is a case of a private, but cooperatively negotiated, non-technological standard which recently has become dominant largely by linking up with public and private authorities at national and international levels.

[2] DIN Standards are the authoritative statements of Germany's national standardization organization (Deutsches Institut für Normung e.V., in English: German Institute for Standardization). Currently there are about 30.000 DIN standards. One of the most well-known ones is standard DIN 476 which introduced the A-series paper sizes in 1922. In 1975 it was adopted as international standard ISO 216 (source: http://en.wikipedia.org/wiki/DIN, accessed: 29.05.09). Notable exceptions of paper formats exist primarily in North America.

3.1 Competing Standards: Windows

While today, after 15 years of constant market shares way above 90 percent in the desktop segment, analyzing Windows under the heading of "competing standards" might sound a little odd, there has been a lot and still is some competition in this field. For the mid-1980s, Campbell-Kelly lists five comparable windowing-systems just for the IBM compatible PCs, leaving out desktop-pioneer Apple's MacOS (see Table 2).

In the following ten years Microsoft managed to reach a monopolistic position in the two most important and closely related segments of the desktop software market, operating and office systems. For Liebowitz and Margolis (2001: 235) this was due to Microsoft's product quality: „Our message is simple: Good products win." Others (e.g. Shapiro and Varian 1999; Campbell-Kelly 2001) stress the path dependent nature of this competitive struggle (David 1985; Arthur 1989). Numerous "small events" – including strategic moves of Microsoft and its competitors – culminate in the proprietary de-facto standard of Windows and Office we live with today. Examples for such "small events" was IBM's decision to only license and not buy DOS as an operating system for personal computers, which supplied Microsoft with a large installed base (Farrell and Saloner 1986) or Microsoft's bundling and pre-announcement ("vapor-ware") strategy. It was the former that allowed Microsoft to abandon the cooperative development of OS/2 together with IBM and just promote its own alternative Windows.

Table 2: Windowing-Systems for the IBM-compatible PCs, 1984-1985

Publisher	Product	Price ($)	Announced	Released	Notes
VisiCorp	VisiOn	495	November 1982	January1984	Price reduced to 95$
Digital Research	GEM	399	November 1983	September 1984	Preis included concurrent DOS
Microsoft	Windows 1.0	95	November 1983	November 1985	
IBM	TopView	149	August 1984	February 1985	
Quarterdeck	DESQ	399	Spring 1983	May 1984	

Source: Campbell-Kelly 2001: 125.

The failure of IBM's version of OS/2 as well as the marginalization of alternative desktop operating systems was not only a consequence of Microsoft's strong installed base but also of its strategic approach: The year-long pre-announcement of Windows 95 and NT 4 not only led to its denotation as "VaporWare"[3] (Bayus et al. 2001) but also illustrates the importance

[3] In their definition of VaporWare Dranove and Gandal (2000, p. 1) even cite Microsoft's Press Computer Dictionary: "Strategic product preannouncements are often referred to as vaporware. According to the

of *expectations* in market standardization processes as described by Shapiro and Varian: "In a very real sense, the product that is *expected* to become the standard *will* become the standard. Self-fulfilling expectations are one manifestation of positive-feedback economics and bandwagon effects." (1999: 13-14; emphasis added)

Once established, its ownership of the proprietary Windows standard allowed Microsoft to extend its market domination to more and more complementary fields, the most prominent one being the browser market (see Cusumano and Yoffie 1998). Besides, Microsoft's leeway for pricing and product politics is substantial in spite of recent but still marginal competition by open source software alternatives (Dobusch 2008).

The successful and almost complete diffusion of Microsoft's products on desktop markets also led to remarkable shifts in its competitive practices: Lacking serious competition in the market place, antitrust allegations in the US and the EU[4] became the greatest threat for Microsoft's position as the sole standard setter. Consequently, Microsoft started to engage much more heavily in political lobbying, as described by Lowery (2007: 38-39): "While Microsoft did not lobby prior to 1995, by 1998 it had a Washington office and spent $2.12 million on lobbying using nine different contract lobbying firms. This might seem like a lot of activity, but by 2000, expenditures increased to $6.36 million with 15 lobbying firms working for Microsoft."

3.2 Negotiating Standards: International Accounting Standards

International Accounting Standards (IAS) or International Financial Reporting Standards (IFRS) as they are being called since 2001 have become accepted as norms for the preparation of corporate financial accounts in more than 100 countries. By acts of national law-making, IAS have replaced or complemented (pre-)existing national standards. International accounting standards are exclusively developed by the International Accounting Standards Board (IASB), today a non-profit organization which has been active for more than 35 years. The organizational characteristics of IASB have changed significantly over time, transforming the standard setting body from a meta-organization comprised of national professional bodies

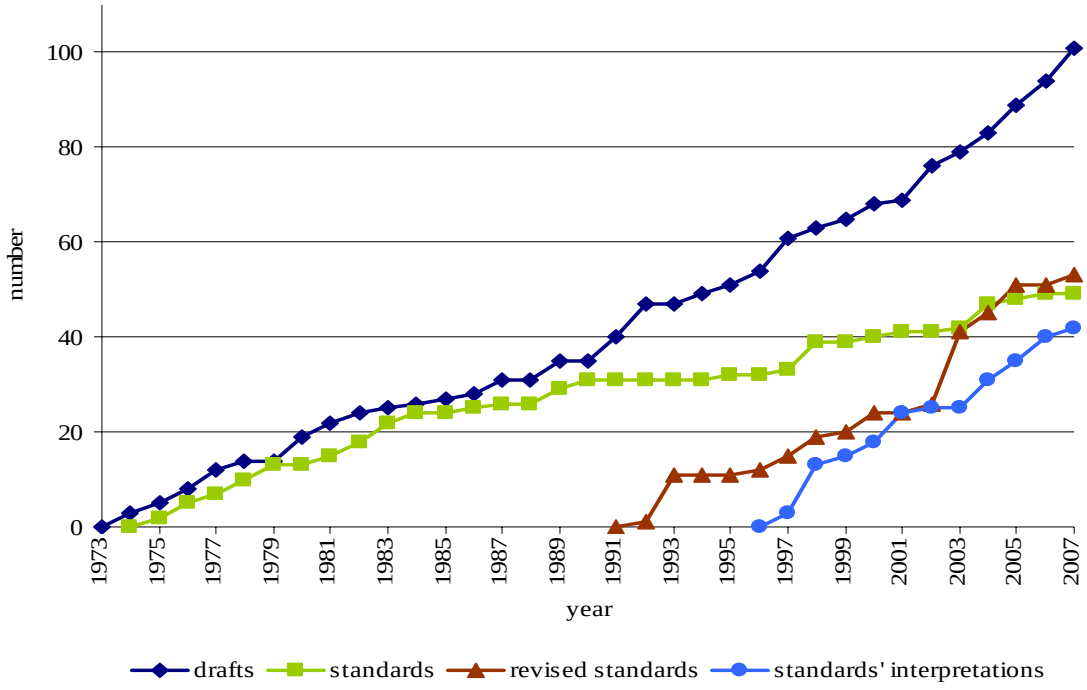
1991 Microsoft Press Computer Dictionary, vaporware is defined as 'promised software that misses its announced release date, usually by a considerable length of time.' Thus vaporware includes products arriving significantly late due to unexpected technical difficulties and products that arrive late because of strategic preannouncements."

[4] Microsoft's bundling of application have been subject of antitrust suits in the US and the EU respectively (e.g. Economides 2001; Ayres and Nalebuff 2005)

into a transnational standard setter with no institutional members (details of the organization's development have been covered elsewhere, see Tamm Hallström 2004; Perry and Nölke 2005; Botzem and Quack 2006; Camfferman and Zeff 2007; Botzem 2008). Nowadays standards are developed by an expert body comprised of 14 individuals who rely on a formalized due process and additional engagement of the business community as well as national and international regulators.

Throughout its history, IASB's development has been contested. First, the organization had to rival intergovernmental harmonization attempts of the European Union or at the UN-level that were started in the late 1960s to bring about more uniform rules for the disclosure requirements of financial statements. In close cooperation with private and public actors from Anglo-American countries, IASB managed to be considered the only viable solution for cross-border harmonization. However, the organization had to undergo severe organizational changes – in essence imitating the formal structures of the US-American standards setter (FASB: Financial Accounting Standards Board). In addition, the international standards had to be in line with the information requirements of capital market actors.

Figure 2: IASB's regulatory output 1973-2007



Source: own composition.

Over the years, IAS changed considerably and successively became more capital market-oriented, establishing fair value accounting as the dominant paradigm. Until a few years ago, it had only been one principle amongst others. Originally, the pluralist nature of IAS came about because early international standards were combinations of various national standards that were merely redrafted and reformatted. This led to a vague catalogue of normative prescriptions which neither fulfilled national legal requirements nor did it satisfy the information needs of private actors such as banks, stock exchanges, analysts or institutional investors. At the end of the 1980s IASB began to review and revise all its standards, cutting out most alternatives which were not in line with capital market-orientation. The revision of standards is still not entirely completed today, but rivaling principals such as historical cost accounting or replacement cost have been marginalized. Figure 2 shows the standard setting activities of IASB over time, pointing out the intensity of revisions (since 1990) and additional interpretations of IAS (since 1996).

As mentioned above, the transformation of IASB into an expert-oriented standard setter without democratic accountability came about after a number of actors agreed to back IASB and its capital market-orientation. In the late 1990s substantial progress hat been made with regard to the capital market orientation of IAS, but official recognition by public authorities was still hesitant. Most Anglo-American countries made the transformation of the IASB into an independent, private, not-for-profit foundation a prerequisite for their decision to enforce IAS. The IASB, therefore, is a case in which consensus over the formation of standards was a condition for their diffusion and subsequent enforcement at national level.

Today's IAS clearly adhere to the information needs of capital market actors. This makes them tools to further enhance the cross-border mobility of capital and therefore favoured their diffusion in an era of deregulating national financial markets. The EU's decision to make IAS mandatory from 2005 onwards certainly strengthened IASB. However, diffusion of its standards also took additional roads: One of these more subtle ways was loan granting policies of the World Bank which requires states to accept IAS in national law. Other venues are stock exchanges and private banks which make IAS obligatory when doing business with firms even in countries in which no legal provisions exist. Thus, third parties can make IAS mandatory and effectively turn them into binding rules. The widespread diffusion of IAS further strengthens the IASB and also feeds back into the formation of standards: IASB's

standard setters interpret the acceptance of IAS also as legitimizing the processes of standard formation.

3.3 Comparing Windows and IAS

The main characteristics of our two examples can be summarized as follows: Due to coordination effects, both cases show that an increase of the total number of adopters paves the way for – though not guaranteeing – one dominating standard. Nevertheless, the ways of reaching a monopoly and further enhancing dominance are distinct: In the case of operating systems, several standard developers compete on the market for customers that select a standard with their purchasing decision. This “standard war” (Dranove and Gandal 2003) between different standardizers, however, was just an initial episode, followed by a proprietary monopoly standard that is developed exclusively by Microsoft, the standard owner. Accounting standards have taken a different road: They have been developed by private actors to rival existing national accounting regulations. Their diffusion only happened after a coalition of public and private actors approved the reasonably coherent set of standards favouring capital market interest. Not before the late 1990s – after more than 25 years of organizational change and intense revision of standards – did IASB manage to globally diffuse its standards. Today’s successful dissemination of IAS further strengthens the actors dominating the formation of IAS because they can point to the output legitimation of their work.

Table 3: Comparison of standardization processes

	PC operating systems	accounting standards
Standard developer	software publisher(s)	International standard setting body (IASB)
Standard selectors	customers	Public and private authorities
Logic of standardization process	marginalization of alternatives	synthesizing of alternatives
Standard selection mode	market competition	negotiation and argumentation
Standard owner	software publisher	copyright rests with a non-profit Foundation
Coordination benefits for individual adopters	- Interoperability and transferability of know-how (direct network effects - Supply of complementary software, service, personnel (indirect network effects)	- cross-border comparability of financial statements - facilitation of global allocation of capital - fulfilling legal requirements - fulfilling requirements of third parties (stock exchanges, banks) who made standards binding unilaterally
Standard bias/constraint for individual adopters	- enforced product update cycles - monopoly pricing - (over time increasing) switching costs	- enforced capital market orientation - all information requirements subordinated to investor needs - distribution effects from labour to capital
Alternative Standard	open source software (“Linux”) - non-proprietary - participatory standard development and selection - coordination deficits for individual adopters	- existing national accounting standards

Source: Own composition.

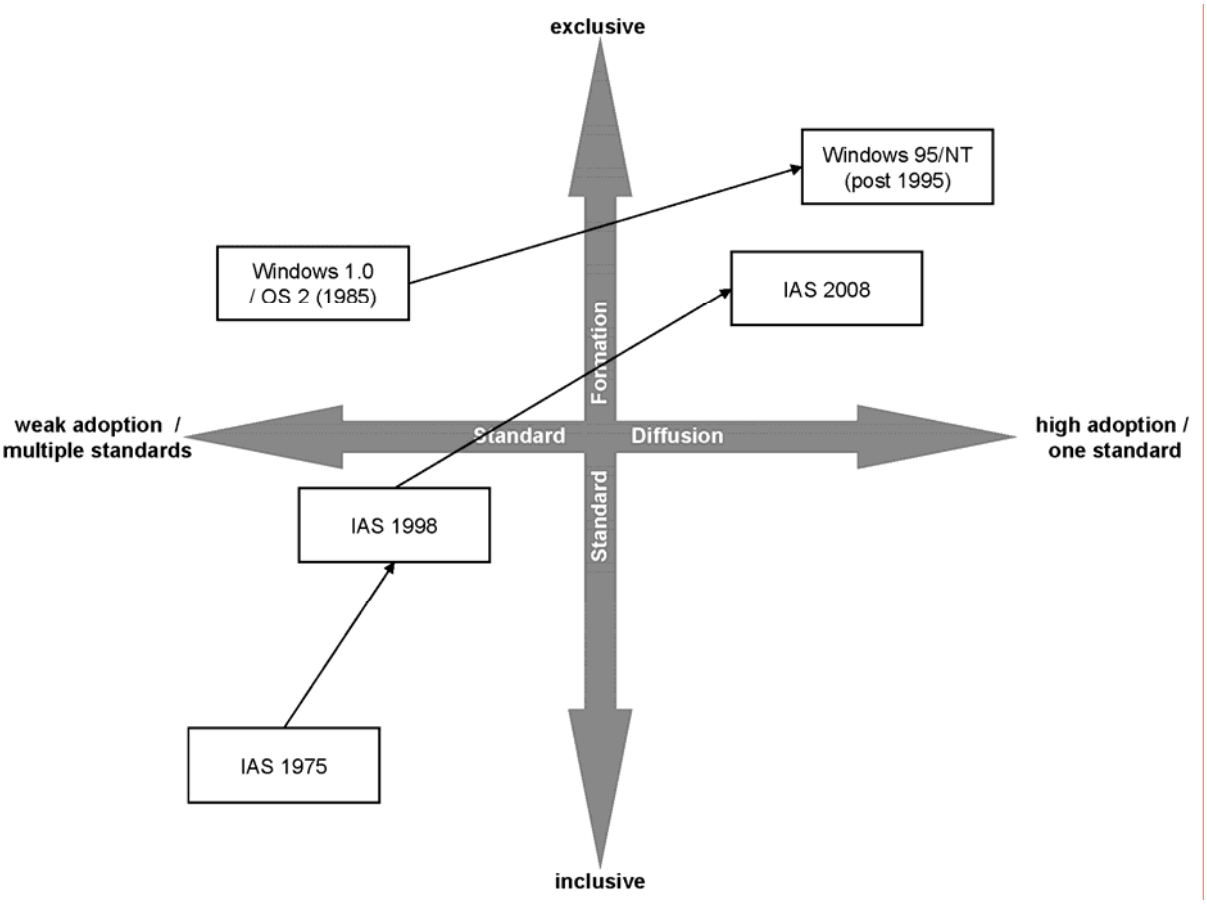
Once a dominant standard is established, individual adopters not only enjoy coordination benefits but also encounter biases and constraints brought about by the standards previously selected. For example, in the Windows case these are enforced product updates or monopoly pricing. In the case of IASB, a focus of the information needs of capital market actors brings about a bias towards investor needs and distributional effects from labour to capital. In addition, the comparison of Windows and IASB demonstrates that the logic of standard development changes substantially during the standardization process. This is underlined by the analytical separation of formation and diffusion. The variance in interrelation between the two is outlined below. There it is shown how over time, established standards have the potential to reinforce power asymmetries between actor groups engaged in standardization processes.

3.4 Different Roads to Domination

As argued above, we distinguish two dimensions of standardization to account for the dynamic nature of standardization in general and the temporal ordering of successive steps of the standardization cycle in particular. We use the relationship of the formation and diffusion of standards as sketched out in Table 1 to track our two cases and to show the route they took to become standards that are not only spread globally but also quasi-obligatory. The formation of standards focuses on the concentration of power in the process of standard setting, ranging from exclusive (or hierarchic) to inclusive (or participatory).

The second dimension is standard diffusion: With regard to the dissemination of rules it can be said that standards solely relying on voluntary compliance without legal, technological or economical enforcement are fragile and offer little potential for exploitation independent of whoever controls standard development. High adoption rates of standards increase coordination benefits for individual adopters and contribute to the regulatory power of central standard setting actors. Figure 3 shows the development of our two examples along the dimensions mentioned above and characterizes how similar they unfold over time – regardless of differences in their modes and logics of standardization (competitive selection versus cooperative negotiation).

Figure 3: Dynamics of standard formation and diffusion over time



Source: Own composition.

While standardization in the field of desktop software markets was never very participative, the origins of the de-facto standard Windows clearly lie in the cooperation between Microsoft and then computer industry incumbent IBM. The expectation generating legitimacy of IBM as a standard setter for computers is probably best illustrated by the description of PCs as “100% IBM compatible”, which was still common when actually compatibility with Microsoft Windows was crucial (see also Cottrell and Koput 1998). But Microsoft not only was able to cut off its ties to IBM after successfully disseminating DOS and Windows but also to extend and to reap enormous profits from its position as a standard setter through both commercial and lobbying activities. The example of Windows demonstrates how standard diffusion might cause changes in the power distribution between standard adopters and standard developers – and how incumbents use their dominant position to conserve their monopoly they managed to establish after competition with other rivalling private standards.

In contrast to the Windows case, IAS's diffusion only happened after a lengthy process of bargaining and horse-trading. IASB was not able to enjoy the benefits of its standards for many years. Instead, a particular organizational structure of the IASB and an explicit capital market-orientation of its standards were a prerequisite for the diffusion of IAS. Even though, voluntary application of IAS had been possible in selected countries for some time, no wide-spread adoption occurred. In the case of global accounting standard, consensus over the core elements of the formation of IAS was a precondition for the diffusion of the standards. Now, after the formal adoption of IAS by public and private actors, IASB's standards and with it the entire transnational standardization network emerge stronger than before. So far, even the current financial crisis has not seriously challenged the IASB.

4. Conclusion

Two complementary reasons explain these developments: First, participation in early phases of standardization is likely to foster standard legitimacy, acceptance and adoption but also complicates clear-cut rules. With rising adoption rates, dominant actors play out their influence to reduce participation, which is no longer necessary provide legitimacy that is now derived from its dissemination. In other words, input legitimacy is replaced by output legitimacy. Second, growing adoption can trigger what we call the dialectics of power in standardization: The successful establishment of a standard redistributes benefits and power among affected actors and feeds back into the standard formation process. Powerful actors have a good chance of securing their powerful position. Of course, this growing dominance of focal actors may provoke oppositional movements, as can be seen in the free and open source software movement in the Windows case (see Stallman 1999; Dobusch and Quack 2008).

We conclude the paper by summing up our core findings: First, bringing together technological and non-technological works contributes to both lines of thinking. Technological standardization is far more political than suggested by the rhetoric and reflection of both practitioners and academics. There is no such thing as an optimal or functional standard merely coordinating social interaction. Technical standards produce social order with unevenly distributed benefits likely to lay the foundations for future biases in standardization. On the other hand, non-technical works can be inspired by technical standardization in taking seriously the non-voluntary nature of standards. As shown by network effects, adoption and diffusion are potent mechanisms proving standards with a

momentum before they are legally binding. In fact, their acceptance and enforcement by (private) third parties might prove to be a prerequisite before transferring de-facto standards into prescriptive rules.

Second, both fields show the importance of ‘organizing standardization’. The coordination of social action is a complex and contested matter which relies on formalized rules which contribute to the codification of interests of actors involved. Both cases show that formation and diffusion of standards are linked via organizations. Sometimes, as Microsoft shows, one formal organization is able to dominate the entire process. In financial reporting, a transnational network of organizations dominates standardization and distributes the benefits amongst its members.

Third, the dialectics of power is a vital dimension of standardization which can only be brought to light with a temporal perspective. On the one hand power – in various forms such as material resources, expertise, and legitimacy – is a prerequisite for standardization. Its disposal contributes to the distribution of subsequent material, intellectual or social resources leading to further diffusion and network externalities. On the other hand, successful standardization is the foundation for social ordering privileging dominant actors, thus reinforcing their influential position (positive feed-back of standardization).

This brings us to our fourth assessment, the importance of transparent and legitimate participation of stakeholders. Especially in the transnational realm the accessibility should not only be an abstract normative democratic requirement but needs to be included in the entire standardization process. Inclusive standard setting and accountable diffusion of standards provides one of the great challenges in organizing transnational standardization. In addition international standards need to be (re-)contextualized to local requirements, transforming ambivalent and abstract rules to the social order ‘on the ground’, being it company desktop software or national accounting laws. Both technological and non-technological standards coordinate social interaction. They do so in particular contexts from which dominant actors are likely to benefit more than outsiders. This feed-back mechanism, however, is neither endless nor automatic. Actors sustain the existing order in particular when it is beneficial fro them. In contrast, opposition and change are also possible but need to be organized. Alternative coordination regimes which are qualitatively different from its predecessors need

to include multiple stakeholders and be sensitive to the effects of standardization activities, and above all to its distributive characteristics.

References

Abbott, K.W./Snidal, D. (2001): International ‘standards’ and international governance. Journal of European Public Policy, 8 (3), 345–370

Ahrne, G./Brunsson, N. (2006): Organizing the world. In: Djelic, M./Sahlin-Andersson, K. (eds.): Transnational Governance: Institutional Dynamics of Regulation. Cambridge: Cambridge University Press, 74-94

Arthur, B. (1989): Competing Technologies, Increasing Returns, and Lock-In by Historical Events. In: The Economic Journal, 99: 116-131

Ayres, I./Nalebuff, B. (2005): Going Soft on Microsoft? The EU’s Antitrust Case and Remedy. In: The Economist’s Voice, 2 (2), Article 4

Bayus, B./Jain, S./Rao, A.G. (2001): Truth or Consequences: An Analysis of Vaporware and New Product Announcements. In: Journal of Marketing Research, 38 (1), 3-13

Becker, E./Buhse, W./Günnewig, D./Rump, N. (eds., 2003): Digital Rights Management: Technological, Economic, Legal and Political Aspects. Berlin: Springer.

Boli, J./Thomas G.M. (1999): Constructing World Culture. International Nongovernmental Organizations since 1875. Stanford, California: Stanford University Press

Botzem, S. (2008): Transnational expert-driven standardisation - Accountancy governance from a professional point of view. In: Graz, J.-C./Nölke, A. (eds.): Transnational Private Governance and its Limits. London: Routledge, 44-57

Botzem, S./Quack, S. (2006): Contested Rules and Shifting Boundaries: International Standard Setting in Accounting. In: Djelic, M.-L./Sahlin-Andersson, K. (eds.): Transnational Governance: Institutional Dynamics of Regulation. Cambridge: CambridgeUniversity Press, 266-286

Botzem, S./Hofmann, J. (2008): Transnational Institution Building as Public-Private Interaction - The Case of Standard Setting on the Internet and in Corporate Financial Reporting. Discussion Paper No. 51, December, London: London School of Economics and Political Science

Braithwaite, J./Drahos, P. (2000): Global Business Regulation. Cambridge :Cambridge University Press

Brunsson, N/Jacobsson. B. (2000): A World of Standards. Oxford University Press: Oxford.

Campbell-Kelly, M. (2001): Not Only Microsoft: The Maturing of the Personal Computer Software Industry, 1982-1995. In: Business History Review, 75, 103-145

Camfferman, K./Zeff, S.A. (2007): Financial Reporting and Global Capital Markets. A History of the International Accounting Standards Committee 1973-2000. Oxford University Press: Oxford.

Cargill, C. (1989): Information Technology Standardization: Theory, Process, and Organizations. Maynard: Digital Press.

Cottrell, T./Koput, K. (1998): Software variety and hardware value: a case study of complementary network externalities in the microcomputer software industry. In: Journal of Engineering and Technology Management, 15, 309-338.

Cusumano, M.A./Mylonadis, Y./Rosenbloom, R.S. (1992): Strategic maneuvering and mass-market dynamics: The triumph of VHS over Beta,. In: Business History Review, 66, 51-94

Cusumano, M.A./Yoffie, D.B. (1998): Competing on Internet Time: Lessons from Netscape and Its Battle with Microsoft. The Free Press: New York

Cutler, A.C./Haufler, V./Porter, T. (1999) Private authority and international affairs. Albany, NY: State University of New York Press

David, P.A. (1985): Clio and the economics of QUERTY. In: American Economic Review 75 (2): 332-337

David, P.A./Greenstein, S. (1990): The Economics of Compatibility Standards: An introduction to recent research. Economics of Innovation and New Technologies, 1, 3-41

Déjean, F./Gond, J.-P./ Leca, B. (2004): Measuring the Unmeasured: An Institutional Entrepreneur Strategy in an Emerging Industry. Human Relations, 57 (6), 741-764.

Djelic, Marie-Laure und Sigrid Quack (2003): Globalization and Institutions. Redefining the Rules of the Economic Game. Edward Elgar: Cheltenham.

Djelic, M.-L./Sahlin-Andersson, K. (2006): Institutional Dynamics in a Re-ordering World. In: Djelic, M.-L./Sahlin-Andersson (eds.): Transnational Governance. Institutional Dynamics of Regulation. Cambridge: Cambridge University Press, 375-397

Dobusch, L. (2008): Windows versus Linux: Markt - Organisation – Pfad. Wiesbaden: VS Verlag für Sozialwissenschaften.

Dobusch, L./Quack, S. (2008): Epistemic Communities and Social Movements: Transnational Dynamics in the Case of Creative Commons. In: MPIfG Discussion Paper 08/8.

Dranove, D./Gandal, N. (2000): The DVD vs. DIVX Standard War: Empirical Evidence of Vaporware. U.C. Berkeley Competition Policy Center Working Paper

Dranove, D./Gandal, N. (2003): The Dvd-vs.-Divx Standard War: Empirical Evidence of Network Effects and Preannouncement Effects. In: Journal of Economics & Management Strategy, 12, 363-386

Economides, N. (2001): The Microsoft Antitrust Case. In: Journal of Industry, Competition and Trade, 1 (1), 7-39.

Egyedi, T. (1996): Shaping Standardization: A Study of Standards Processes and Standards Policies in the Field of Telematic Services. Delft: Delft University Press.

Farrell, J./Saloner, G. (1986): Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation. In: The American Economic Review, 76 (5): 940-955

Farrell, J./Saloner, G. (1987): Competition, Compatibility and Standards: The Economics of Horses, Penguins and Lemmings. In: H. Landis Gabel, (ed.), *Product Standardization and Competitive Strategy.* Amsterdam: North-Holland, 1-21.

Hawkins, R.W. (1999): The Rise of Consortia in the Information and Communication Technology Industries: Emerging Implications for Policy. In: Telecommunications Policy 23, 159-173.

Kerwer, D. (2005): Rules that Many Use: Standards and Global Regulation. Governance: An International Journal of Policy, Administration, and Institutions, 18 (4), 611-632.

Lessig, Lawrence (1999): Code: And Other Laws of Cyberspace. New York: Basic Books.

Liebowitz, S.J./Margolis, S.E. (2001): Winners, Losers & Microsoft: Competition and Antitrust in High Technology – Revised Edition. The Independent Institute: Oakland

Mattli, W. (2003): Public and private governance in setting international standards. In: Kahler, M:/Lake, D. (eds.): Governance in a Global Economy: Political Authority in Transition. Princeton: Princeton University Press: Princeton, 199-225.

Mattli, W./Büthe, T. (2005): Accountability in Accounting? The Politics of Private Rule-Making in the Public Interest. Governance: An International Journal of Policy, Administration, and Institutions, 18 (3), S. 399-429.

Murmann, J.P./Frenken, K. (2006): Toward a systematic framework for research on dominant designs, technological innovations, and industrial change. In: Research Policy, 35, 925-952

North, D.C. (1990): Institutions, Institutional Change and Economic Performance. Cambridge: Cambridge University Press

Pattberg, Philipp (2005): The Institutionalization of Private Governance: How Business and Nonprofit Organizations Agree on Transnational Rules. Governance: An International Journal of Policy, Administration, and Institutions, 18 (4), S. 589-610

Perry, J./Nölke, A. (2005): International Accounting Standard Setting: A Network Approach. Business and Politics, 7 (3), Art. 5

Rosenblatt, B/Trippe, B./Mooney, S. (2002): Digital Rights Management: Business and Technology. New York: M&T Books.

Schmidt, S.K./Werle, R. (1993): Technical Controversy in International Standardization. Köln: MPIfG Discussion Paper 93/5

Schmidt, S.K./Werle, R. (1998): Coordinating Technology: Studies in the International Standardization of Telecommunications. MIT Press

Shapiro, C./Varian, H.R. (1999): Information Rules: a strategic guide to the network economy. Harvard Business School Press

Stallmann, R. (1999): The GNU Operating System and the Free Software Movement. In: DiBona, C., Ockman, S. and Stone, M. (eds.): Open Sources: Voices from the Open Source Revolution. Sebastopol: O'Reilly

Tamm Hallström, K. (2004): *Organizing International Standardization. ISO and the IASC in Quest of Authority.* Edward Elgar: Cheltenham.

Werle, R./Iversen, E.J. (2006): Promoting Legitimacy in Technical Standardization. In: Science, Technology & Innovation Studies, 2, 19-39

Wichmann, T. (2002): Free/Libre Open Source Study. Use of Open Source Software in Firms and Public Institutions. Evidence from Germany, Sweden and UK. Berlecon Research, http://www.flossproject.org/report/reportPart1_use_oss_in_firms_and_public_institutions.htm [15 October 2007]