European History Online

# The History of Standardisation in Europe

by Roland Wenzlhuemer

The establishment of shared concepts and meanings is a precondition for cultural interaction. Therefore, standardisation is an age-old process and has always been a central component of transnational and transcultural exchange. However, in late eighteenth-century Europe, standardisation was for the first time thoroughly systematised. Attempts at large-scale setting of norms and standards gained momentum and introduced an entirely new rationale to the process of standardisation. The thorough revision of French weights and measures starting during the exceptional phase of the French Revolution marks the first instance of a science- and conference-based standardisation that would later become the primary way to set and maintain international standards. This article traces the origins of standardisation in late eighteenth-century France and seeks to explain why the French Revolution provided a rare opportunity for such an endeavour. It then moves on to the following first attempts at international standardisation and briefly discusses three eclectic examples from the nineteenth century dealing with the fields of telecommunication, time and currency – each of which followed a slightly different path.

**TABLE OF CONTENTS**



## Introduction

While European integration by way of the European Union has made remarkable progress in the last two decades, the process was – as we all know – by no means free of friction. Tensions often emerge when the supranational institution and the individual member states clash over questions of authority in a particular domain. Apart from more visible examples such as a common foreign policy or a common constitution, standardisation policy can be a contested field of this kind. On the one hand, standardisation contributes "in a significant way to the functioning of the single market, the protection of health and safety, the competitiveness of industry and the promotion of international trade, and has been supporting an increasing range of Community policies".[1] To this end, the European Union endorses the work of the three European standards bodies: The Comité Européen de Normalisation (CEN, founded in 1961), the Comité Européen de Normalisation Électrotechnique (CENELEC, founded in 1973), and the European Telecommunications Standards Institute (ETSI, founded in 1988). On the other hand, many member states have since long maintained standards (and standards bodies) of their own and have a vested interest in adhering to these established norms for a variety of reasons – some symbolic and some economic. The unification of the European currency system provides an excellent example for such possible tensions. While the unification process – starting with the implementation of the European Monetary System and the European Exchange Rate Mechanism in 1979 – beyond doubt helped to create a single market, the adoption of a common currency also met national resistance – partly out of fear of economic disadvantages and partly due to the high symbolic value of a national currency. In other cases, some of the more obscure European standards – such as, for instance, the infamous quality standards for bananas[2] – confirmed many citizens' fears that the European Union (and its predecessors) practised bureaucratisation and standardisation for the mere sake of it.

▲1

Standardisation – as these European Union examples show – is rarely a smooth process and often pitches regional against centralised interests. Yet, it is a precondition for any form of cultural or economic integration – be it on the local, regional, national or supranational level. Every form of human interaction relies on a certain degree of standardisation,[3] of shared concepts and meanings without which no meaningful communication or exchange can be established. Human communities – no matter how small – need a common language or sign system and certain agreed-upon rules of living together, i.e. a basic set of shared standards and norms. Especially the most basic standards usually evolve independently in small, local communities and are valid within a certain territory only. As soon as such territorial boundaries are transgressed and contact with other communities is established, common standards (at least in the particular field of contact) have to be negotiated. Therefore, standardisation is a central component of transnational and transcultural exchange. In the case of language – which forms the basis of most mutually beneficial interaction between human communities – the emergence of a pidgin dialect or a lingua franca in a particular contact zone can serve as an example for the negotiation of common communication standards (which is often dominated by the more powerful community).

▲2

Standardisation is, therefore, an age-old process and a precondition for the administration of larger territories, trade or migration. In a nutshell, it is surely not specifically European. Towards the end of the eighteenth century, however, attempts at the large-scale setting of norms and standards gained momentum and introduced an entirely new rationale to the process of standardisation. And this could only take place in the specific political, economic and scientific European context of the day. For instance, the reform and unification of the prevailing feudal system of weights and measures in France was begun in the early days of the French Revolution (➔ Media Link #ac).[4] The lack of uniform standards was not unique to France or even to Europe, but the large-scale unification of, for instance, weights and measures could only be carried out by a strong and centralised nation state that dared (or, as in the case of the French Revolution desperately wanted) to cut many traditional customs and practices.

▲3

Given the long-standing contacts and exchanges between European countries, it comes as no surprise that Europe also saw the first attempts at international standardisation. The thorough revision of French weights and measures marks the first instance of a science- and conference-based standardisation subscribing to the creed that "[f]or the sake of uniformity even the great nations must be prepared to forego their own system".[5] Gradually, the setting of standards ceased to be considered as the prerogative of local authorities. For the sake of compatibility, universal norms should become universally acceptable and be scientifically argued for in committees and at conventions. Metrication occupies a pivotal place in the history of standardisation and is therefore treated in more detail here. The article then moves on to briefly discuss three eclectic examples of nineteenth-century standardisation dealing with the fields of telecommunication, time and currency – each of which follows a slightly different path to standardisation.

▲4

## The Metric System, 1790–1875

It is no coincidence that this first systematic attempt at standardisation took place in France during the Revolution and focused mainly on weights and measures. A number of parallel historical developments rendered the creation of common national (or even international) standards in various fields highly desirable – and feasible. Comparable weights and measures were a precondition for a functioning national and international system of commerce and trade which depended on a reliable common basis for exchange. Likewise, the administration of large territories needed agreed-upon standards of measure since, for instance, matters of land tenure were intrinsically connected with them. Therefore, both the ongoing internationalisation (ultimately the globalisation) of trade and commerce as well as the further centralisation of the nation state demanded the unification of weights and measures. And, as Ken Alder notes, the intensification of collaboration between scientists in different countries (particularly France and Britain) was hindered by their different standards of measurement which rendered the meaningful comparison of scientific results very difficult.[6] Therefore, Scientists were among the chief lobbyists for standardisation in the late eighteenth and the nineteenth century.

▲5

The desire for a unified system of weights and measures was not only felt in France. Standardisation was an issue elsewhere as well – for instance in the newly established United States of America or in Great Britain.[7] But in France several important factors combined and made a swift and thorough standardisation of weights and measures more practicable than elsewhere. First of all, "[t]he diversity of measurements within France was exceptionally acute. At the time of the Revolution, 18 variants of the *aune*, the unit of length, which ranged from 0.620m to 0.845m, were in use in the North of France, while in the department of Maine et Loire 110 different measures were used for grain."[8] Referring himself to Ronald Zupko,[9] Ken Alder even states that *ancien régime* France knew 250,000 different weights and measures.[10] John Heilbron adds that "[t]he existence of French men and women around 1790 was made miserable by, among other things, 700 or 800 differently named measures and untold units of the same name but different sizes".[11] While other regions – such as the German territories[12] – had similar problems, the situation in revolutionary France was particularly confusing.

▲6

At the same time, the French Revolution provided a rare opportunity for thorough reform. As the established system of measurement was closely connected with questions of land tenure, "[o]nly a fundamental political and social upheaval like the Revolution could alter customs and practices so deeply ingrained in the structure of society".[13] The modern nation-state is also a product of the French Revolution. It strongly demands national integration and centralised control (in the case of France focussed on the capital city of Paris).[14] As a matter of course, such a centralised state depends on a certain minimum degree of administrative effectiveness and, therefore, on the universal validity of its administrative tools. And, to complete the picture, France also stood at the very centre of the Enlightenment. The idea of the supreme rule of reason was part and parcel of French self-perception at that time and, therefore, contributed further to "the desire for a uniform and rational system of measurement".[15]

▲7

It was the same spirit of the Enlightenment and the wish for a truly international system that made the involved scientists – organised in the Académie des Sciences – look for an original unit of length in nature – a system that would be "attuned to the twin ideals of the Enlightenment, Nature and Reason".[16] Previously, most basic measures had some original relationship to the human body (e.g. foot, *aune*, *elle*). It was believed that by replacing such an anthropocentric system with one based on a universally valid natural unit, a standardised system could be created that was acceptable to every man and nation in the world. In June 1789 the *Académie* appointed a commission to investigate the problem of unifying weights and measures. As the British also entertained an interest in standardisation, the French minister for foreign affairs, Charles-Maurice de Talleyrand (1754–1838) (➔ Media Link #af), wrote to Sir John Riggs Miller (c. 1744––1798) (➔ Media Link #ag) inviting Great Britain to join in the effort of reforming the system of weights and measures.[17] But during the course of the French Revolution, the political relations between the two countries worsened and Talleyrand never heard back from across the Channel. Accordingly, the French decided to proceed on their own.

▲8

In March 1791 a report entitled *Sur le choix d'une unité de mesure* introduced three possible natural standards for the new system: (➔ Media Link #ah) the length of a pendulum beating seconds at 45° latitude, the quarter of the length of the equator and the quadrant of the distance between the North Pole and the equator.

▲9

The report explicitly recommended the adoption of the third option: using a series of triangles, the exact distance between Dunkirk and Barcelona should be established and then be used to calculate the distance between the pole and the equator. The report was accepted by the *Académie* and forwarded to the National Assembly which sanctioned the project on 30 March 1791.[18] In June 1792 the two astronomers Jean-Baptiste Joseph Delambre (1749–1822) (➔ Media Link #ai) and Pierre François André Méchain (1744–1804) (➔ Media Link #aj) set out to triangulate the distance between Dunkirk and Barcelona.[19] While these measurements had just begun, (➔ Media Link #ak) the French National Convention decreed on 1 August 1793 that meanwhile a provisional metre equalling "a ten-millionth of ninety times the average degree in France"[20] should be adopted as the new principal unit of measurement and provisional metre measures should be issued for general use.[21] By 1 July 1794 the use of the new metric system was obligatory throughout the nation.

▲10

Unsurprisingly, however, the nationwide adoption did not proceed so smoothly. Another decree issued by the National Convention on 7 April 1795[22] confirmed many of the provisions of 1793 and added a number of amendments and corrections. Definitive primary standards based on the ongoing scientific enquiries should be produced from platinum. In the meantime, provisional metre measures were to be mass-manufactured and made available to the public at affordable prices.[23] The basic names of the new measures and weights (the latter being a function of the former) were confirmed as metre, litre and gram. Terms such as *gravet* or *grave* were replaced by *gramme* and *kilogramme* and, thus, the decimalisation of the new system of weights and measures – already implemented with the 1793 decree – was reinforced and recorded in the nomenclature.[24] The system was now entirely based on a decimal scale, which for many contemporaries seemed to be the most natural of scales.[25] Maybe even more importantly, it was believed that introducing a coherent decimal scale would simplify the system and, thus, enable all citizens to do their own calculations.[26]

▲11

The 1795 decree also ordered the triangulation of the distance Dunkirk-Barcelona – which had in the meantime come to a halt – to continue. However, measurements were only completed in October 1798 and Delambre and Méchain returned to Paris. On invitation, by the French an international committee of experts gathered in the capital to discuss the new system and its adoption. Representatives of the Batavian Republic, the Cisalpine Republic, Denmark, the Helvetian Republic, the Ligurian Republic, the Kingdom of Sardinia, Spain, the Roman Republic and Tuscany were present. Notably, Great Britain had not been invited.[27] The committee divided into three groups, "one to control the weight of the kilogram, a second to compare the scales used in the work with the old toise, and the third [...] to deduce the length of the meter from the cornucopia of measurements made by Méchain and Delambre".[28] In the course of this work, the definitive metre was fixed and eventually presented to the public on 22 June 1799.[29] "The new metric standards now had the approval of the official body of French science, a number of foreign scientists officially representing their respective governments, and the French government."[30]

▲12

Nevertheless, the spread of the new standards was slow. France exerted direct as well as indirect pressure on many of the participating countries to adopt the system – albeit with limited success.[31] This is not surprising as adoption in France itself was painstakingly slow. By September 1801, the new units had to be used for all transactions in land.[32] Many people, however, resisted such change and continued to measure with the help of the old units, only later converting their findings into the new system. All that was achieved was that yet another measure had been added. Resistance to the metric system was so pronounced that the use of pre-metric units was again permitted in France in 1812. While the Dutch, the Swiss and the Belgians all readopted the metric system after independence, it took France itself until 1837 to make the system obligatory again[33] (within three years, therefore effectively from 1840 onwards).[34] France also started to propagate the standardised system outside its boundaries – but initially to little avail. Following Edward Cox' argument, widespread adoption of the metric system only commenced in the year 1851 when it was boosted by the first great international exhibition in London and the awakened interest of trade lobbyists. Other exhibitions (e.g. in New York, Paris and London) followed. The establishment of international congresses and institutions, such as the International Statistical Congress, the International Postal Congress, and the International Geodetic Association, fostered the spread of the system.[35] Inter-European trade started to grow rapidly in the 1860s and "[i]ncreased trade with France and other metric countries brought many merchants into contact with this system. It is no coincidence that the 1860s saw more national adoptions of the metric system than any other single decade".[36]

▲13

In the United States of America, Congress legalised the use of the metric system in 1866 – albeit without making it compulsory. (➔ Media Link #am) The North German Federation introduced the new standards in 1868 and made them compulsory by 1872 (by which date Germany had been unified and the adoption of the system extended throughout the country).[37] During the 1860s, even Great Britain came very close to the official adoption of the metric system. However, in 1869 the Second Report of the Royal Standards Commission – installed to enquire into the matter of metrication – held "that the general introduction of the Metric system should be permissive only, and not made compulsory by law after any period to be now specified, so far as relates to the use of Metric weights and measures for weighing and measuring goods for sale or conveyance".[38] The implementation of the metric system in the United Kingdom, therefore, came to a halt. However, due to the system's success in many other countries and its propagation by many of the newly established international organisations, an international conference was held in Paris in 1870 in order to establish and oversee truly international standards of weights and measures. Interrupted by the Franco-Prussian War and resumed in 1872, the conference led to the signing of an international treaty in 1875.[39]

▲14

This treaty, which is commonly known either as the *Convention du Mètre* or the Treaty of the Metre,[40] was initially signed by 17 nations and provided for the establishment of three standards bodies to oversee the metric system: (➔ Media Link #an) the *Conférence Générale des Poids et Mesures* (to be held every four to six years), the *Comité Inter-*

*national des Poids et Mesures* (to meet annually) and the *Bureau International des Poids et Mesures* (a permanent institution established at Sèvres, France). During the course of the twentieth century, the number of signatories to the treaty constantly increased. At the time of writing this article, 52 states, "including all the major industrialized countries" have become signatories.[41]

▲15

## Telegraph Standardisation and the Telegraph Unions

As we have seen above, the unification of weights and measures began on a national level in France – even if it had originally been intended as a bilateral endeavour together with the United Kingdom. While national adoption of the system already proved to be slow, international standardisation was even slower and needed substantial outside stimuli – such as the increase of inner-European trade or lobbying by many of the early international bodies – in order to gain momentum. In the case of telecommunications – represented here by the telegraph – standardisation took place much quicker. Metrication had already introduced and popularised the concept of unification. More importantly, however, the essence of telegraphy was the speed with which messages could now be relayed over large distances (and often across national borders). Different national telegraph standards jeopardised this principal asset of telegraphy. When two incompatible telegraph systems, e.g. those of Austria and Prussia before 1850, met at the border stations, it was necessary to decode and re-encode every international message – a practice that cost time and frequently led to the garbling of messages.[42] Furthermore, different national tariff policies made the calculation of international message prices difficult and time consuming.

▲16

The existence of widely varying standards reduced the very benefit of telegraphic communications and rendered standardisation highly desirable for all parties involved. Only a few years after the first non-experimental telegraph lines had been built in continental Europe, early initiatives aiming at system standardisation emerged. Within the German Confederation, the multitude of different state systems made unification all the more pressing. In July 1850, representatives of Prussia, Austria-Hungary, Bavaria and Saxony met at Dresden to discuss the harmonisation of telegraphic communication between them. They founded the *Deutsch-Österreichische Telegraphenverein* (*DÖTV*; "Austrian-German Telegraph Union")[43] and agreed on standardisation in three areas: technical, operational and tariff-related. These efforts quickly bore fruits and quickened international communications between the signatories.[44] Right from its inception, the *DÖTV* aimed at attracting new members. In 1851 Württemberg joined the union and in 1854 Baden and Mecklenburg-Schwerin followed. Furthermore, a number of bilateral treaties harmonizing telegraphic exchange with other European countries were signed. In 1855, the Western European Telegraph Union was founded by France, Belgium, Spain, Sardinia and Switzerland. Both unions cooperated closely from the beginning.[45] Eventually, in 1865 representatives of twenty European states met at the *conférence télégraphique* in Paris and adopted a convention that regulated international telegraphic exchange between the signatories. The International Telegraph Union (ITU) was founded at this conference and became the first international organisation proper.[46]

▲17

## Time

The standardisation of time-keeping was made necessary by the intensification of long-distance transport and communications that commenced in the middle of the nineteenth century. Traditionally, time was measured locally based on the position of the sun (solar time). Local time depends on the longitude at which it is measured and, therefore, different places usually have different local times – every degree of difference in longitude translates into four minutes of time difference. Generally, such a multitude of local times did not pose any organisational problems. Only with the spread of new transport and communications technologies (such as the railway or the telegraph) did time synchronisation become necessary.

▲18

Eviatar Zerubavel holds that "[t]he initial push toward standardizing time reckoning on a supralocal level was [...] given by the British Post Office, when it started to run all its mail coaches throughout Great Britain in accordance with a uniform standard of time" in the 1780s.[47] These coaches ran on strict schedules and passed through a variety of different local time zones. In order to make adhering to the schedule easier, "every mail-coach guard was required to carry a timepiece indicating Greenwich Mean Time (GMT), so that all clocks in the various post offices on the coach's route could be adjusted in accordance with it".[48] Greenwich had been chosen to provide this early standard as it housed the Royal Observatory and was, therefore, thought to be most reliable. However, it is important to note that this early case of time standardisation occurred within a clearly defined system only and did not influence the prevalence of local times. ▲19

The massive expansion of the railway network in the United Kingdom in the 1830s and 1840s enhanced the problem. The adoption of standardised time was necessary if trains were to be able to run according to schedules and timetables over great distances. Therefore, the Great Western Railway Company decided to exclusively employ GMT on its lines in 1840. As trains of different companies had to be coordinated and timetables had to be harmonised whenever possible, other railway companies followed suit. Due to the rising importance of railway transport and travel, many towns in the railway network adjusted their local time to "railway time" – and, thereby, to GMT – "and by 1855, 98% of all public clocks in Britain were already set to GMT".[49]

▲20

Standardisation of time on a national level occurred in other countries at roughly the same time as well[50] – usually propelled by the expansion of the railway and the inland telegraph networks. Soon, however, the globalisation of telegraphy[51] and the lobbying of scientific bodies[52] rendered international time standardisation highly desirable. The successful laying of the transatlantic telegraph cable in 1866 brought the United States of America and Europe into almost immediate contact (and, for instance, intimately linked the stock exchanges in New York and London), thus necessitating the synchronisation of time at both ends of the wire. Expanding global communications and transport also made the fixation of global time zones and an international date line necessary. All this was finally agreed upon at the 1884 International Meridian Conference in Washington which was attended by 25 countries. Despite the opposition of France, the Greenwich meridian was established as the prime meridian to which standard time was connected and Greenwich Mean Time thus became standard time. The International Date Line was fixed at the 180th meridian and "[t]hough the conference never passed any actual resolutions regarding such a system, it generally agreed that the world would be divided into 24 one-hour time zones".[53] However, as in many other cases of international standardisation, universal adoption of the new standard – outside the fields that directly depended on them – was slow and in some cases took well into the twentieth century. For instance, "it was only in 1940 that Holland [...] synchronized itself with the rest of the world". And in other cases, countries such as Australia, Canada, India or Malaysia "have [not] committed themselves to using standards of time that are at differentials of complete hours from one another".[54]

▲21

## The Gold Standard

Compared with the other examples discussed here, the emergence of the so-called Classical Gold Standard (1870s–1914) is a slightly different case of standardisation. This standard "was the first system of fixed exchange rates to span the entire globe. By the outbreak of World War I, virtually all countries used the gold standard: either they had made their currencies convertible into gold or they had, at least, stabilised their exchange-rates with respect to convertible currencies."[55] It is, however, still not entirely clear what the moving forces behind the adoption of this standard were. While international conferences and agreements played a certain role in bringing currency standardisation about, it seems to have been a rare combination of external and internal factors that eventually led to the domino-like adoption of the gold standard after 1871.

▲22

The 1860s saw the first attempts to reach international monetary agreements. In 1865, the Latin Monetary Union (➔ Media Link #ap)– consisting of France, Belgium, Italy and Switzerland – came into existence and unified the coinage of full-bodied as well as of token silver coins in the four countries. While the French five franc silver coin served as the standard, Matthias Morys argues that a "future transition to gold was made as easy as never before. No more than suspending the free coinage of the 5 franc silver coin, the only remaining link to bimetallism, was required to switch to gold; [...] This explains why the [Latin Monetary Union] is probably better seen as a transitory agreements [sic!] on the way towards gold monometallism."[56] Two years later in 1867, representatives from twenty countries (all from Europe with the exception of the United States) attended the International Monetary Conference in Paris that aimed at the further unification of coinage on a larger scale.[57] At this conference, all but one country voted for the adoption of a general gold standard. No specific provisions were made, however. These rested with the national monetary commissions that frequently discussed the issue in the 1860s and 1870s. Based on the recommendations of its commission, Germany adopted the gold standard in 1871 and, thereby, seemingly tipped the balance in favour of the new standard. The British currency had been based on gold for some time. France, Belgium, the Netherlands and the Scandinavian countries followed in 1873. The United States adopted the standard in 1879. Until the First World War many other countries in America, Asia and Europe followed this example – more or less successfully – and a global currency and exchange rate standard had emerged.

▲23

The emergence of such a widely adopted common currency standard immensely facilitated the ongoing globalisation of trade and investments and, therefore, received decisive impulses from this direction. However, the question of how and why exactly the gold standard came into being in the first place is still disputed among researchers. Recently, Gopalan Balachandran re-emphasised that "there is no shortage of evidence that the world moved to gold 'unwillingly' from the 1870s, at least partly for fear that it would tie domestic and international monetary conditions too closely"[58]. In a similar vein, Marc Flandreau puts forward that the adoption of the gold standard was an "accident of history"[59] triggered domino-like by the adoption of the standard in just one country – Germany. On the other hand, researchers such as Matthias Morys argue that the de-facto establishment of a global gold standard was a conscious decision of the adopting countries based on specific microeconomic advantages that the standard offered to them.[60] While it is still unclear whether the move to gold was simply inevitable, a mere accident or a set of conscious decision, several factors in favour of the gold standard certainly facilitated its adoption. First, gold had a much higher value per weight than silver and was, thus, easier and cheaper to transport in times of increasing trade values. Furthermore, during the nineteenth century the value of silver fell massively against the value of gold, which would have led to inflation in silver standard countries. Also, countries having a high trade volume with gold-standard Britain would have to suffered high transaction costs when being on a silver standard themselves.[61] All these factors certainly hastened the emergence of a common monetary standard based on gold in the late nineteenth century.

▲24

## Summary

From our current perspective, the introduction and spread of a unified system of weights and measures can be seen as the first concerted and enduring effort at national and then international standardisation. In order to be successful even on a national level, it depended on a unique combination of factors and impulses provided in this particular case by the Enlightenment, the political climate of the French Revolution and the emerging processes of internationalisation and globalisation. "[T]he reform of weights and measures required action on two main fronts. There were first the scientific and technical aspects which involved the definition of a unit, the composition of a scale of measurement and the construction of accurate standards. Secondly, there was the political and legislative aspect. A remarkable feature of the revolutionary period is the extent of collaboration between these two sides."[62]

▲25

On the other hand, the desire for international standardisation also made new approaches and instruments necessary. It prepared the ground for the rise of international conventions and institutions. "There can be little doubt of the international character of the [1798–1799 metric] conference and this, interestingly enough, in a period of emergent nationalism. [...] The 1798–1799 metric conference marks a transition toward the modern idea of an international scientific congress."[63] Also, in order to be universally acceptable, a standard had to be free of national symbolism, generally reproducible and intrinsically coherent. Therefore, "the metric system was based on a standard taken directly from nature; its units were interconnected; its divisions and multiples followed the decimal scale".[64] Eventually, as Witold Kula points out, the process of metrication also led to changes in the matter of who guaranteed certain established standards. While previously at least three different types of guarantees were known – social control, supervision by the [mostly local] authorities, and religious sanctions[65] – "[t]he introduction of the metric system, within the process of the evolution of the modern functions of the state, meant that the state guarantee was now of prime importance".[66]

▲26

Each of the three eclectic examples of nineteenth-century standardisation discussed here followed a slightly different path to standardisation. In the case of nineteenth-century European telecommunications, standardisation was brought about willingly and consciously by conferences and treaties. In the case of time, the first examples of standardisation occurred in closed systems (coach or railway networks). Only later were these standards adopted more widely – eventually on an international scale by means of an international conference. In the case of the gold standard, several international conferences made suggestions or recommendations, but no international agreement actually forced national monetary commissions to switch to gold. A combination of internal and external factors eventually brought about the domino-like adoption of this standard.

▲27

All four cases, including the initial example of metrication, clearly illustrate the connection between standardisation and historical forces such as globalisation, technological progress or capitalism/imperialism that made nationwide and then international compatibility so desirable. However, the institutions, conferences and agreements behind our nineteenth-century examples were generally not permanent and comprehensive standards bodies. They aimed at fostering comparability, compatibility and co-operation in specific areas (e.g. communication, time-keeping or finance) and implemented certain standards as one means to achieve this.

▲28

Only in the early years of the twentieth century were the first standards bodies proper established – both on a national and on an international level. In the year 1901, several British engineering societies founded the Engineering Standards Committee (later the British Engineering Standards Association)[67] to introduce nationwide standards in a domain that particularly suffered from the lack of compatibility. Only a few years later, in 1906, the International Electrotechnical Commission (IEC) was established with the same overall goal, following discussion among several national organisations such as the British Institution of Electrical Engineers and the American Institute of Electrical Engineers. The IEC "developed many of the techniques and institutional mechanisms that came to typify international standard setting"[68] and thereby laid the procedural foundations for bodies such as the American Engineering Standards Committee (AESC) and the International Federation of the National Standardizing Associations (ISA). The AESC was established as the first American general standards-setting body in 1918. The ISA followed in 1926 and should be considered as the first international standards body with a road map complementary to the IEC.

▲29

The experience of the First World War had provided a strong impetus both on a national and international level to press ahead with standardisation. However, the work of the ISA was hampered by a combination of factors such as the differences between metric and non-metric member states, the disastrous state of the world economy in the 1930s[69] and eventually the international catastrophe of the Second World War.[70] By 1941, both the IEC and the ISA had temporarily stopped their work. After lengthy discussions about the role of national standards bodies in setting international standards, the ISA was superseded by a "new organization [that] could publish recommendations on *international* standards [...] This policy, which moved beyond simply coordinating national standards to actually establishing international standards, was also reflected in the name ultimately adopted for the organization: the International Organization for Standardization (eventually abbreviated as ISO), which dropped the word "coordinating" from the name initially proposed".[71] Together with the IEC – which resumed operation after the Second World War – and the International Telecommunication Union (ITU – grown from the International Telegraph Union), the ISO is one of the three principal international standards bodies today.

▲30

The three European standards bodies introduced in the opening chapter (CEN, CENELEC and ETSI) aim at the economic and governmental integration of European Union member states. They have, therefore, a focus different from that of the three international standard organisations, but have agreed in the Lisbon (1989) and Vienna Agreements (1991) to cooperate closely in the development of technical standards.

▲31

Roland Wenzlhuemer, Heidelberg

# Appendix

## Sources

Bureau International des Poids et Mesures: The Metre Convention, online: http://www.bipm.org/en/convention/ [01/02/2010].

The Council of the European Union: COUNCIL RESOLUTION of 28 October 1999 on the role of standardisation in Europe (2000/C 141/01), online: http://ec.europa.eu/enterprise/standards_policy/document/council_resolution/1999-10-28_ojc141_en.pdf [01/02/2010].

The Commission of the European Communities, Commission Regulation (EC) No 2257/94 of 16 September 1994 laying down quality standards for bananas, online: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31994R2257:EN:HTML [01/02/2010].

Standards Commission: Second report of the commissioners appointed to inquire into the condition of the exchequer (now Board of Trade) standards. On the question of the introduction of the metric system of weights and measures into the United Kingdom. 19th Century House of Commons Sessional Papers 1868–69 [4186], Volume XXIII, 6.

## Bibliography

Alder, Ken: The Measure of All Things: The Seven-Year Odyssey That Transformed the World, London 2004.

Balachandran, Gopalan: Power and Markets in Global Finance: The Gold Standard, 1890–1926, in: Journal of Global History 3 (2008), pp. 313–335.

Bartky, Ian R.: The Adoption of Standard Time, in: Technology and Culture 30/1 (1989), pp. 25–56.

Bleibtreu, Leopold Carl: Handbuch der Münz-, Maaß- und Gewichtskunde und des Wechsel-, Stattspapier-, Bank und Aktienwesens europäischer und außereuropäischer Länder und Städte [01/02/2010] (Bibliothek der Gesammten Handelswissenschaften, [5]), Stuttgart: Engelhorn 1863.

Codding, George A. / Rutkowski, Anthony M.: The International Telecommunication Union in a Changing World, Dedham, MA 1982.

Cox, Edward F.: The Metric System: A Quarter-Century of Acceptance (1851–1876), in: Osiris 13 (1958), pp. 358–379.

Crosland, Maurice: The Congress on Definitive Metric Standards, 1798–1799: The First International Scientific Conference?, in: Isis 60/2 (1969), pp. 226–231.

Crosland, Maurice: "Nature" and Measurement in Eighteenth-Century France, in: Theodore Bestermann (ed.): Studies on Voltaire and the Eighteenth Century, Banbury 1972, pp. 277–309.

Flandreau, Marc: The French Crime of 1873: An Essay on the Emergence of the International Gold Standard, 1870–1880, in: Journal of Economic History 56 (1996), pp. 862–897.

Heilbron, John L.: The Measure of Enlightenment, in: Tore Frängsmyr et. al. (eds.): The Quantifying Spirit in the 18th Century, Berkeley et al. 1990, pp. 207–242.

Kula, Witold: Measures and Men, Princeton 1986.

Meissner, Christopher M.: Art. "The Gold Standard", in: Oxford Encyclopedia of Economic History (2003), p. 431–434.

Morys, Matthias: The Emergence of the Classical Gold Standard, paper presented at the Seventh Conference of the European Historical Economics Society, Lund 2007.

Murphy, Craig N. / Yates, JoAnne: The International Organization for Standardization (ISO): Global Governance through Voluntary Consensus, London et al. 2009.

Muschalla, Rudolf: Zur Vorgeschichte der technischen Normierung, Berlin et al. 1992 (Deutsches Institut für Normung e.V. [ed.]: Din-Normungskunde 29).

Palmer, Allen W.: Negotiation and Resistance in Global Networks: The 1884 International Meridian Conference, in:

Mass Communication & Society 5/1 (2002), pp. 7–24.

Reindl, Josef: Der Deutsch-Österreichische Telegraphenverein und die Entwicklung des Deutschen Telegraphenwesens 1850–1871, Frankfurt am Main et al. 1993.

Reindl, Josef: Partikularstaatliche Politik und Technische Dynamik: Die Drahtgebundene Telegraphie und der Deutsch-Österreichische Telegraphenverein von 1850, in: Hans-Jürgen Teuteberg et. al. (eds.): Vom Flügeltelegraphen zum Internet: Geschichte der modernen Telekommunikation, Stuttgart 1998, pp. 27–46.

Reti, Steven P.: Silver and Gold: The Political Economy of International Monetary Conferences, 1867–1892, Westport, London 1998.

Saß, E.: Die Geschichte des Eichwesens von 1380 bis 1870, in: Mitteilungsblatt des Deutschen Amtes für Maß und Gewicht der Deutschen Demokratischen Republik 73/1–6 (1957), pp. 1–10.

Tegge, Andreas: Die Internationale Telekommunikations-Union: Organisation und Funktion einer Weltorganisation im Wandel, Baden-Baden 1994.

Yates, JoAnne / Murphy, Craig N.: Coordinating International Standards: The Formation of the ISO, in: MIT Sloan Working Paper 4638–07 (2007).

Zerubavel, Eviatar: The Standardization of Time: A Sociohistorical Perspective, in: The American Journal of Sociology 88/1 (1982), pp. 1–23.

Zupko, Ronald E.: Revolution in Measurement: Western European Weights and Measures Since the Age of Science, Philadelphia 1990.

Notes

1. ^ COUNCIL RESOLUTION of 28 October 1999 on the role of standardisation in Europe (2000/C 141/01), online: http://ec.europa.eu/enterprise/standards_policy/document/council_resolution/1999-10-28_ojc141_en.pdf [01/02/2010].
2. ^ Commission Regulation (EC) No 2257/94 of 16 September 1994 laying down quality standards for bananas, online: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31994R2257:EN:HTML [01/02/2010].
3. ^ Muschalla, Vorgeschichte der technischen Normierung 1992, p. 15.
4. ^ Crosland, Congress on Definitive Metric Standards 1969, p. 227.
5. ^ Crosland, "Nature" and Measurement 1972, p. 287.
6. ^ Alder, Measure of All Things 2004, p. 2.
7. ^ Muschalla, Vorgeschichte der Technischen Normierung, p. 36.
8. ^ Crosland, "Nature" and Measurement 1972, p. 277.
9. ^ Zupko, Revolution in Measurement 1990, p. 113.
10. ^ Alder, Measure of All Things 2004, p. 3.
11. ^ Heilbron, Measure of Enlightenment 1990, p. 207.
12. ^ Saß, Geschichte des Eichwesens 1957, p. Lit–1–6–1.
13. ^ Crosland, "Nature" and Measurement 1972, p. 278.
14. ^ It is no coincidence that the large-scale diffusion of the optical telegraph – the first practical telecommunication medium in the modern sense of the word – took place in this very period as well. The telegraph provided the emerging nation state with a necessary means to centrally administer its considerable territory. The star-like structure of the optical telegraph network in nineteenth-century France converging on the capital city of Paris stands testimony to the strongly centralised character of the state.
15. ^ Crosland, "Nature" and Measurement 1972, p. 277.
16. ^ Cox, Metric System 1958, p. 360.
17. ^ Crosland, "Nature" and Measurement 1972, p. 282.
18. ^ Zupko, Revolution in Measurement 1990, p. 144–147.
19. ^ See Alder, Measure of All Things 2004. Dunkirk and Barcelona had been chosen as terminal points because these cities lie on the same meridian as Paris and mark the northernmost and southernmost points of this meridian within the European landmass. A digitised version of Delambre's report can be found at the French National Library [26/04/2010].
20. ^ Heilbron, Measure of Enlightenment 1990, p. 228.
21. ^ Zupko, Revolution in Measurement 1990, p. 148–150.
22. ^ The law is still officially known as the Law of 18 Germinal An III. In October 1793, the National Convention

adopted a pseudo-decimalised calendar – the French Republican or French Revolutionary Calendar – as the new standard for date-keeping. The twelve months received new names and were divided into three ten-day weeks. Napoleon abolished the calendar with the end of 1805. Even shorter-lived was the attempt to decimalise time-keeping as well. The division of the day in ten hours at 100 minutes at 100 seconds each had been already been abandoned by April 1795.

23. ^ Heilbron, Measure of Enlightenment 1990, p. 231–232.
24. ^ Zupko, Revolution in Measurement 1990, p. 150–165.
25. ^ Crosland, "Nature" and Measurement 1972, p. 298–299.
26. ^ Ibid., p. 299–300.
27. ^ Crosland, Congress on Definitive Metric Standards 1969, p. 227.
28. ^ Heilbron, Measure of Enlightenment 1990, p. 234.
29. ^ Ibid., p. 235; Crosland, Congress on Definitive Metric Standards 1969, p. 230.
30. ^ Crosland, Congress on Definitive Metric Standards 1969, p. 230.
31. ^ Heilbron, Measure of Enlightenment 1990, p. 235.
32. ^ Ibid., p. 236.
33. ^ Cox, Metric System 1958, p. 361.
34. ^ Heilbron, Measure of Enlightenment 1990, p. 239.
35. ^ Cox, Metric System 1958, p. 362–371.
36. ^ Ibid., p. 366.
37. ^ Ibid., p. 372.
38. ^ Standards Commission. Second report of the commissioners appointed to inquire into the condition of the exchequer (now Board of Trade) standards. On the question of the introduction of the metric system of weights and measures into the United Kingdom. 19th Century House of Commons Sessional Papers 1868–69 [4186], Volume XXIII, 6.
39. ^ Cox, Metric System 1958, p. 374.
40. ^ The French Text of the Metre Convention can be found at the French Bureau International des Poids et Mesure [26/04/2010].
41. ^ Bureau International des Poids et Mesures: The Metre Convention, online: http://www.bipm.org/en/convention/ [01/02/2010].
42. ^ Reindl, Partikularstaatliche Politik 1998, p. 33.
43. ^ For a comprehensive history of the Deutsch-Österreichische Telegraphenverein see Reindl, Deutsch-Österreichische Telegraphenverein 1993.
44. ^ Reindl, Partikularstaatliche Politik 1998, p. 34–35.
45. ^ Ibid., p. 42.
46. ^ For a comprehensive history of the International Telegraph Union see Codding / Rutkowski, International Telecommunication Union 1982; Tegge, Internationale Telekommunikations-Union 1994.
47. ^ Zerubavel, Standardization of Time, 1982, p. 6.
48. ^ Ibid., p. 6.
49. ^ Ibid., p. 7.
50. ^ For an account of time standardisation in the United States of America, for instance, see Bartky, Adoption of Standard Time 1989.
51. ^ Zerubavel, Standardization of Time 1982, p. 12; Palmer, Negotiation and Resistance 2002, p. 13–15.
52. ^ Palmer, Negotiation and Resistance 2002, p. 16–18; Zerubavel, Standardization of Time 1982 p. 12.
53. ^ Zerubavel, Standardization of Time 1982, p. 15.
54. ^ Ibid., p. 16–17.
55. ^ Morys, Classical Gold Standard 2007, p. 1.
56. ^ Ibid., p. 26.
57. ^ Reti, Silver and Gold 1998, p. 34–45.
58. ^ Balachandran, Power and Markets 2008, p. 316.
59. ^ Flandreau, French Crime 1996, p. 863.
60. ^ Morys, Classical Gold Standard 2007.
61. ^ Meissner, Gold Standard 2003.
62. ^ Crosland, "Nature" and Measurement 1972, p. 279.
63. ^ Crosland, Congress on Definitive Metric Standards 1969, p. 230.
64. ^ Cox, Metric System 1958, p. 360.
65. ^ Kula, Measures and Men 1986, p. 79.
66. ^ Ibid., p. 81.
67. ^ Yates / Murphy, Coordinating International Standards 2007, p. 5.

68. ^ Murphy / Yates, International Organization for Standardization 2009, p. 12.
69. ^ Yates / Murphy, Coordinating International Standards 2007, p. 21.
70. ^ Ibid., p. 21 – However, among the few legacies of the ISA we find the omnipresent standard sizes of paper developed by the German standards body and widely known as DIN A4 etc.
71. ^ Ibid., p. 30.



---

Editor: Helmuth Trischler
Copy Editor: Lisa Landes

---

DDC: 332 [Info ] , 529 [Info ] , 530 [Info ] , 621 [Info ] , 681 [Info ]

---

Citation

Wenzlhuemer, Roland: The History of Standardisation in Europe, in: European History Online (EGO), published by the Institute of European History (IEG), Mainz 2010-12-03. URL: http://www.ieg-ego.eu/wenzlhuemerr-2010-en URN: urn:nbn:de:0159-20100921441 [YYYY-MM-DD].

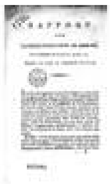
When quoting this article please add the date of your last retrieval in brackets after the url. When quoting a certain passage from the article please also insert the corresponding number(s), for example 2 or 1-4.

**Link #ac**
- Französische Revolution als Medienereignis (http://www.ieg-ego.eu/de/threads/europaeische-medien/europaeische-medienereignisse/rolf-reichardt-die-franzoesische-revolution-als-europaeisches-medienereignis-1789-1799)

**Link #af**
- Charles-Maurice de Talleyrand (1754–1838) VIAF (http://viaf.org/viaf/100212837) DNB (http://d-nb.info/gnd/118620606)

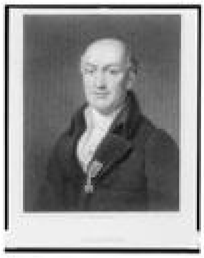
**Link #ag**
- John Riggs Miller (c. 1744–1798) VIAF (http://viaf.org/viaf/63572065)

**Link #ah**



- (http://gallica.bnf.fr/ark:/12148/bpt6k571270)
Rapport sur le choix d'une unité de mesure 1791, BnF, Gallica

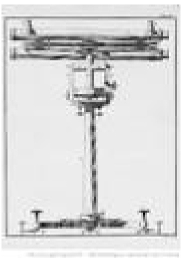
**Link #ai**
- Jean-Baptiste Joseph Delambre (1749–1822) VIAF (http://viaf.org/viaf/66494985) DNB (http://d-nb.info/gnd/118878913)

-  (http://hdl.loc.gov/loc.pnp/cph.3c34783)
Jean-Baptiste Joseph Delambre (1749-1822), LoC

**Link #aj**

- Pierre François André Méchain (1744–1804) VIAF (http://viaf.org/viaf/34483869) DNB (http://d-nb.info/gnd/119063123)

**Link #ak**

-  (http://gallica.bnf.fr/ark:/12148/btv1b2600128q.item.r=M%C3%A9chain.f1.langEN)
Cercle de Borda 1787, BnF, Gallica

**Link #am**

-  (http://museum.nist.gov/object.asp?ObjID=37)
National Prototype Meter No. 27 (USA) ca. 1875–1889, NIST

**Link #an**

-  (http://gallica.bnf.fr/ark:/12148/bpt6k56137358)
Documents diplomatiques de la conférence du mètre 1875, BnF, Gallica

**Link #ap**

-  (http://www.ieg-ego.eu/en/mediainfo/einige-muenzen-aus-laendern-der-lateinischen-muenzunion.1?mediainfo=1&width=900&height=500)
Coins from members of the Latin Monetary Union

Kompetenzzentrum für elektronische Erschließungs- und Publikationsverfahren in den Geisteswissenschaften
INSTITUT FÜR EUROPÄISCHE GESCHICHTE http://www.ieg-ego.eu ISSN 2192-7405