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# From Setting National Standards to Coordinating International Standards: The Formation of the ISO

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At the end of the First World War, some leaders of the newly established American Engineering Standards Committee (AESC) and of its slightly older British counterpart shared a vision of a comprehensive international standard-setting body. A generation later, the International Organization for Standardization (ISO) was created. The records of the AESC, ISO, and of the ISO's short-lived predecessors reveal the international conflicts and jurisdictional disputes among national standards bodies, professional engineers, trade associations, and others that had to be overcome to realize the original vision. The slow accretion of institutional innovations promoted eventual agreement. The ISO organized its work through voluntary technical committees characteristic of the earlier British and American bodies. Having different national standards bodies serve as the secretariats of different technical committees encouraged buy-in and helped finesse the conflict between those who wanted the international organization to have only a coordinating role and those who wanted it to set standards.

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In the article on "Standardization" in the fourteenth edition of the *Encyclopædia Britannica*, Paul Gough Agnew, the long-time secretary of the American Standards Association (ASA), argued:

> In the flow of products from farm, forest, mine, and sea through processing and fabricating plants, and through wholesale and retail markets to the ultimate consumer, most difficulties are met at the transition points—points at which the product passes from department to department within a company, or is sold by one company to another or to an individual. The main function of standards is to facilitate the flow of products through these

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> transition points. Standards are thus both facilitators and integrators. In smoothing out points of difficulty, or "bottlenecks," they provide the evolutionary adjustments which are necessary for industry to keep pace with technical advances. They do this in the individual plant, in particular industries, and in industry at large. They are all the more effective as integrators in that they proceed by simple evolutionary steps, albeit inconspicuously.[1]

Albeit inconspicuous, standard setting has been among the "nuts and bolts" of globalizing industrial capitalism since its beginning, assuring that things needing to work together fit from product to product, industry to industry, and country to country. The foci of the first two of the now 229 "technical committees" of the major international standards organizations (the interwar International Standards Association [ISA] and the post–Second World War International Organization for Standardization [ISO]) are iconic: "Screw Threads" and "Bolts, Nuts, and Accessories." Over the past two decades, voluntary standardization processes, invented by early twentieth-century engineers working in national, then international, technical committees, have increasingly been applied to problems that have little in common with those of fitting one mechanical part to another, such as work processes (ISO 9000), environmental pollution (ISO 14,000), and human rights (SA 8000).[2] This rapidly expanding scope and the high visibility of standards in networked areas such as telecommunications have led to a new scholarly interest in standard-setting practices.[3] The interest has been fueled by questions like Winton

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[1] Quoted as epigraph of Dickson Reck, ed., *National Standards in a Modern Economy (*New York, 1956), v.

[2] SA standards are set by the private group Social Accountability International.

[3] In international relations see, for example, Walter Mattli and Tim Büthe, "Setting International Standards: Technological Rationality or the Primacy of Power?" *World Politics* 56 (Oct. 2003): 1-42; and Jennifer Clapp, "The Privatization of Global Environmental Governance: ISO 14000 and the Developing World," *Global Governance* 4 (Sept. 1998): 295-316. In sociology, see Thomas A. Loya and John Boli, "Standardization in the World Polity: Technical Rationality over Power," in *Constructing World Culture: International Nongovernmental Organizations since 1975*, ed. John Boli and George M. Thomas (Stanford, Calif., 1999), 169-97; and Kristiana Tamm Hallström, "International Standardization Backstage: Legitimacy and Competition in the Social Responsibility Field," paper prepared for the Stockholm Centre for Organizational Research conference, "Organizing the World: Rules and Rule-Setting Among Organizations," Stockholm, 13-15 Oct. 2005. In political science, see Samuel Krislov, *How Nations Choose Product Standards and Standards Change Nations* (Pittsburgh, Pa., 1967). In social studies of science and technology, see Tineke Egyedi, "Shaping Standardization—A Study of Standards Processes and Standard Policies in the Field of Telematic Services" (Ph.D. diss., Delft Technical University, 1996). In history, see Andrew L. Russell, "Standardization in History: A Review Essay with an Eye to the Future," in *The Standards Edge: Future Generations*, ed. Sherrie Bolin (Ann Arbor, Mich.,

Higgins's, "Are they [the standard setters] not usurpers to whom (the ghost of John Locke might counsel us) we owe no obligation whatever?"[4]

ISO and ISA, as is much of the institutional architecture of standard setting over the last century and a half, are part of a relatively under-studied and under-theorized realm of institutions that have helped shape the modern global economy. They are similar to (and often include) the professional and trade associations whose interests are fundamentally different from those of any single firm, and they are similar to other voluntary transnational organizations (for example, Amnesty International) that have a kind of power, but one that gains its legitimacy from something fundamentally different than the authority of the sovereign state.

Business and economic historians have begun to differentiate the wide array of economic coordination mechanisms that exist along the dimension from "market" to "hierarchy," and we can readily understand ASA, ISO, and similar organizations as falling somewhere between the extremes.[5] Yet standardization, *per se*, can be accomplished by institutions that lie anywhere along the line. Naomi Lamoreaux and her colleagues observe that "Coordination mechanisms from one part of our scale can sometimes be made more effective by combining them with devices from other parts."[6] Similarly, early advocates of ISO-like standard setting argued that the process would improve both the efficiency of markets and the success of firms.

The political scientists and sociologists who have theorized about the development of international standardization reflect the biases of their fields: the political scientists overemphasizing the power of the state and the differences created by different state structures; the sociologists, the

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2005), 247-60; Amy Slaton and Janet Abbate, "The Hidden Lives of Standards: Technical Prescriptions and the Transformation of Work in America, in *Technologies of Power: Essays in Honor of Thomas Parke Hughes and Agatha Chipley Hughes,* ed. Michael Thad Allen and Gabrielle Hecht (Cambridge, Mass., 2001), 95-143.

[4] Winton Higgins, "Standardisation, Globalisation, and the Rationalities of Government," paper prepared for the Stockholm Centre for Organizational Research conference, 1. On the extension of ISO-style standard setting into new realms see, Kristiana Tamm Hallström, "International Standardization Backstage: Legitimacy and Competition in the Social Responsibility Field," paper prepared for the Stockholm Centre for Organizational Research conference; and Clapp, "The Privatization of Global Environmental Governance."

[5] See, especially, Naomi R. Lamoreaux, Daniel M. G. Raff, and Peter Temin, "Beyond Markets and Hierarchies: Toward a New Synthesis of American Business History," *American Historical Review* 108 (April 2003): 404-33.

[6] Ibid., 409.

impact of an emergent global culture.[7] Traditionally, historians of technology have tended to focus their work on national engineering institutions and professional societies in particular technical arenas.[8] It is worthwhile to take a broader historical look at trends in global standardization by considering the records created by national (in this case, American) and international standardizing institutions at the time of their formation. Even if we accept that complex pressures toward globalization have existed throughout the history of capitalist industrialism, and that the larger market areas needed by each new wave of lead industries have required international standard setting, those recurrent pressures tell us little about the sequence and timing of the standardizing institutions that might appear.[9]

Local and national standardizing efforts were well underway in the United States and other countries by the early twentieth century. In 1918, as Andrew Russell shows, the American Engineering Standards Committee (AESC, which became the ASA and, more recently, the American National Standards Institute [ANSI]) was established with an explicit policy of using a voluntary, consensus principle to establish industrial standards. No such general body existed to foster international standards, but standardizing activity around network technologies such as railroads, telegraph, and electricity had occurred across countries, especially in Europe, complementing intergovernmental work on weights and measures, money, banking transactions, and various areas of public administration. In fact, the original network of late nineteenth-century intergovernmental organizations and their successors, the "Specialized Agencies" of the League of Nations and then the United Nations, were—and sometimes still are—referred to as "standard setting agencies."[10] As

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[7] Mattli and Büthe, "Setting International Standards," reports on and contributes to the work in political science, and critiques sociologists Loya and Boli's "Standardization in the World Polity."

[8] E.g., Bruce Sinclair, "At the Turn of a Screw: William Sellers, the Franklin Institute, and a Standard American Thread," *Technology and Culture* 10 (Jan. 1969): 20-34; Sinclair, *A Centennial History of the American Society of Mechanical Engineers: 1880-1980* (Toronto, 1980).

[9] Craig N. Murphy, *International Organization and Industrial Change: Global Governance since 1850* (Oxford, U.K., 1994), 92-93, 196-97, and "Globalization and Governance: A Historical Perspective," in *Globalization in Europe*, ed. Roland Axtmann (London, 1998), 144-67.

[10] One of the recent important studies maintaining that usage is the U.K. Department for International Development's controversial assessment of the effectiveness of different multilateral agencies, which distinguishes operational development and humanitarian agencies that provide direct services, such as UNICEF, from the older "standard setting agencies" (e.g., the International Labour Organisation and the World Health Organization), which also now provide direct services other than their original purpose of the promulgation of standards; see Alison Scott, "Assessment of Multilateral Organisational

early as 1906, the International Electrotechnical Commission (IEC) was established with the lofty goal of standardizing the nomenclature and ratings around electrical devices worldwide. This organization represented a significant development in international standardization, but it still covered a single (if broad) domain. In 1926 the first general international standardizing body, the ISA (International Federation of the National Standardizing Associations) was established. In spite of its name and its New York birthplace, it was never truly international; its member associations primarily represented continental European countries (the "metric bloc"). The most important so-called inch countries (the United States and Great Britain) never fully participated, and consequently the ISA's work had relatively little direct effect on international industry and trade. Nevertheless, it had an indirect effect in its establishment of standardizing procedures and committees that would be reborn with the creation of a truly international standardizing body of broad scope, the ISO, at the end of World War II.

Why and by what process did this comprehensive global standardization body finally take form? The vision of such a body existed in the minds of the major standard-setters in the less-internationalist "inch countries" at the end of the First World War, yet agreement would not be reached until the end of the Second. Certainly, standards, whether national or international, were a high-stakes issue for firms and industries, because the nature and force of any standards would shape competition among firms within an industry, and, internationally, among the national industries of different countries. Nonetheless, disagreements within and among professional and trade associations and government bodies had as much to do with the slow emergence of a global standards regime as did inter-firm agreements or disagreements. The conflicts were not just about the content of specific standards, but also about jurisdiction over the relative roles of various experts (especially engineers) and other parties. Actions of individuals also played an important role, sometimes exacerbating conflicts and sometimes bridging them. We trace the establishment of the U.S. standards body and the two waves of international standardization in the wake of the two world wars.

## American Standard Setting and Anglo-American Ideas

Howard Coonley, at various times president of the ISO, the ASA, and the National Association of Manufacturers (NAM, the largest U.S. industrial trade association), describes the beginnings of the international standards movement in this way:

> While the British Engineering Standards Association was in smooth operation prior to the First World War, until then it was the only national standards agency in existence. World War I gave

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Effectiveness," International Division Advisory Department, Department for International Development, London, unpublished paper, 1 June 2005.

> the impetus to national standardization in all countries involved in that struggle and at the same time established the need of an international standards movement.[11]

In the United States, a national standards agency, the AESC, was formed in 1918 by the professional associations of civil, electrical, mechanical, and mining engineers and the American Society for Testing Materials (ASTM). The first meeting of the five organizations agreed, "after lengthy discussion of the subject," to invite representatives of the U.S. Navy, War, and Commerce departments to join the organization.[12]

At the same meeting, the representatives of the five associations approved a draft "Constitution" and "Rules of Procedure" that outlined both the justification for establishing national standards and the mechanisms by which they would be created.[13] In the draft constitution's preamble they asserted:

> At the present time many bodies are engaged in the formulation of standards. There is no uniformity in the rules for such procedure in the different organizations; in some cases the committees engaged in the work are not fully representative; and in a considerable proportion of cases they do not consult all the allied interests.[14]

What would become Sections 6 and 7 of the final Rules of Procedure provided the solution to the problem of the representativeness of standard-setting committees, and, thus, of the legitimacy of the resulting standards.[15] AESC standard-making committees dealing with "standards of a commercial character (specifications, shop practices, etc.)" would become "fully representative" by being "made up of representatives of producers, consumers and general interests, no one of these interests to form a majority." At this time, "consumers" and "producers" were largely understood as consuming and producing companies; individual consumers were not brought explicitly into the picture until the 1940s. "General interests include independent engineers, educators, and persons who are neither consumers nor producers, as defined above." The "general interest" groups would be even more important in other realms, as the draft went on to indicate: "Sectional Committees dealing with standards, of a scientific or non-commercial character shall consist of persons

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[11] Howard Coonley, "The International Standards Movement," in *National Standards in a Modern Economy*, ed. Reck, 37-45, quotation at 37.

[12] 14 May 1918, Minutes, American Engineering Standards Committee (AESC), 1 (page numbers provided until sequential numbering of minutes begins in March 1919; after that, we indicate minute number with #). The National Bureau of Standards [NBS], in charge of the US system of weights and measurement, was under the Department of Commerce.

[13] Included as appendices to 14 May 1918, Minutes, AESC.

[14] Ibid., 1, first appendix.

[15] Originally they were parts a and b of Section 3 of the draft.

specifically qualified, without regard to their affiliation." These "technical" committees became the primary mechanism through which voluntary standards would be developed.[16] A May 1919 amendment to the draft constitution assured that the role of the overall "Committee," the organization's government body, would be limited to the "approval" of standards developed through these mechanisms.[17]

As World War I wound down, the representatives of the engineering associations and the government debated both the draft documents and three larger visions of what a national standards agency should be. One group wanted the government to take the central role. In January 1919, AESC chairman Comfort A. Adams, professor of electrical engineering at Harvard University and his society's representative, reported to his colleagues that the National Bureau of Standards director, Samuel W. Stratton, had written to say that

> . . . it was his desire that the Bureau be the standardizing body for the nation and that in his opinion the American Engineering Standards Committee should act in an advisory capacity to the Bureau, but that if this arrangement was not agreeable he would accept our invitation and join in the work of the Committee according to our Constitution and Rules of Procedure.[18]

A second group, including the chair, advocated opening the organization to all of the professional associations, trade associations, and even individual firms that either produced or used standards. Most of the other representatives of the engineering societies were aghast. One asked:

> "How large would this American Standards Association be?"
> "About one thousand," replied Professor Adams.
> "If that were the case it would be impossible to arrive at any conclusions."[19]

Initially, a third view came to dominate: the AESC should slowly add additional "cooperating societies" that shared the five original members' "general" (that is, non-commercial) interest in standard setting. Yet, the rapidity with which new organizations (trade associations as well as professional organizations) and even firms were actually admitted to the AESC reflected the eventual triumph of Adams's vision.

In part, this proved a practical necessity. In 1918, Adams had stressed the importance of having the ultimate users of standards at the table, interested, and willing to pay for the often expensive work of standard setting, although another representative "expressed the vigorous opinion that this Committee should not consider the proposed reorganization on

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[16] For discussion of this mechanism and the principle of voluntary standards, see David Hemenway, *Industrywide Voluntary Product Standards* (Cambridge, Mass., 1975).
[17] 17 May 1919, Minutes, AESC, #123.
[18] 17 Jan. 1919, Minutes, AESC, 1.
[19] 18 Jan. 1919, Minutes, AESC, 3.

the grounds of financial support alone."[20] Recurrent financial difficulties marked the early history of the U.S. standards agency, however, and attempts to mitigate them through measures short of giving most standards producers and consumers a place at the table failed. When the AESC turned to private foundations in 1921, the Carnegie Corporation's James R. Angell responded, "The work ought to be carried out by the industries."[21] A simultaneous scheme to convince industrial firms to make voluntary financial contributions cost almost more than it raised, and Paul Agnew, the Committee's secretary just back from a trip to Europe, reported that the European way of funding national standards bodies was through dues paid by trade associations and firms that acted as members.[22]

In part, the eventual embrace of Adams's vision may have been a consequence of his ability to convince his colleagues that the failure of the standards movement (due to lack of funding or to the lack of legitimacy of proposed standards) would spell disaster in other arenas, such as labor. The minutes of one meeting in early 1919 recorded:

> Prompted by the remarks of some members of the Committee as to the limitation of the field of our work strictly to engineering standards, Chairman Adams pointed out the close relation which standardization in general bears to the present labor situation. Because the statement throws a new light on the discussion at hand, it is given below in full.
>
> "The industrial labor situation is no theoretical matter, but a vital one to every one of us. We are faced with a situation in which labor is beginning to feel its power, and it has power if it organizes in a democratic country. It is my opinion, that with our present productive capacity per man, (all industries considered), it is impossible to raise the wages of all occupations up to the point of the best paid ones today, even taking into account the skill involved. Put in another way, the productive capacity of the individual, on the average, is not sufficient to create the wealth he wishes as a return for his labor. We must either face the possibility of a Bolshevik movement in this country or devise some means for increasing the average productivity of labor. This can be done by cooperation and standardization, which go hand in hand.
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> ["]If anyone looks at the present situation critically, and sees it in the right perspective, he realizes the chaotic condition of the creation of standards in this country. The number of bodies involved is many and various. All kinds of methods are employed, some of them crude and unsatisfactory, some of them commercial.
>
> ["]I think you cannot fail to see the tremendous possibility and value to all industries, and to the nation as a whole, of this work of

[20] 1 March 1919, Minutes, AESC, #69.
[21] 2 June 1921, Minutes, AESC, #534.
[22] 15 Sept. 1921, Minutes, AESC, #540.

> standardization. It is not outside the field of this Committee to attempt to do this work. If we can get in these other organizations, the textile industry and the others as well, and inject into their working plans of organization the idea which we have evolved here of thorough, broad and comprehensive co-operation in the production of standards, I think we will have accomplished one of the biggest jobs which has ever been undertaken in this country. It would to more to solve the present problems of the United States than anything else we could do."[23]

Thus, he argued, the high incomes made possible by the rapid increases in productivity that effective industrial standards would encourage could quell potential labor unrest.

In 1922, Commerce Secretary Herbert Hoover, one of the most important advocates of scientific rationalization through voluntary cooperation of trade associations and professional societies, addressed the expanding AESC board with a similar productivity-based argument.[24] However, the maintenance of the U.S. export position was, for him, the ultimate object.[25]

An even grander argument had been heard three years earlier, when, just a month after the signing of the Treaty of Versailles, the head of the British Engineering Standards Association (BESA), Charles Le Maistre, came to New York to address the fledgling AESC. In 1901, at age 25, Le Maistre had become secretary of the BESA's predecessor, the Engineering Standards Committee, and in 1906, the first general secretary of the IEC.[26] In 1919 he told the Americans, ". . . if we can bring together the engineers of the English-speaking races, it will shortly be one of the greatest helps towards the peace of the world."[27] He argued for Anglo-American and worldwide cooperation among standardization bodies. Adams responded to Le Maistre's address by saying that his British colleague's remarks "have served, I think, the purpose which I have in mind." Adams returned to his theme of increasing the productivity of labor in order to provide rising incomes, and of the role of standardization in that larger process:

> . . . it seems to me that it is almost a crime that work of this sort should be blocked by what would seem,—and again I speak very frankly—to be narrow or small group interests. We have a job to do, something that is bigger than any one of the component cooperating units with which we are concerned, and we should,

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[23] 1 March 1919, Minutes, AESC, #70.

[24] See Ellis W. Hawley, "Herbert Hoover, the Commerce Secretariat, and the Vision of an Associative State," *Journal of American History* 61 (Jan. 1974): 116-40.

[25] 15 June 1922, Minutes, AESC.

[26] IEC, "Charles Le Maistre," dated March 2006, URL: http://www.iec.ch/online_news/etech/arch_2006/etech_0306/news.htm#top.

[27] 15 Aug. 1919, [Transcript of the] Committee Meeting of the AESC, p. 6 (minutes were not numbered in this transcript, so page numbers are used).

> while serving of course our constituents as best we can, see first of all the task in hand and its importance and try to so order our work that it may be as effective as possible.[28]

Le Maistre's visit helped secure the agreement of all AESC members to the principle, in Adams's words, "that the admission of other societies is desirable."[29] However, agreement on the desirability of cooperation beyond the narrow or small interest of one nation would take longer. For example, less than three months after Le Maistre's address, the AESC decided that it had no power to act in response to a request from the International Aircraft Standards Commission (IASC) that the United States set up a corresponding U.S. Commission. In this field (unlike in any other field it discussed), the AESC argued that the issue would have to be taken up by Congress before it would be able to act.[30]

Perhaps the AESC's decision had something to do with the fact that the IASC grew out of the prewar Franco-German international aviation regime (in which Britain and the United States did not participate).[31] Moreover, Le Maistre had made a particular point of the desirability of Anglo-American agreement that would build on the British experience in aviation standards.[32]

In 1921 and 1923, the Committee sent Paul Agnew to European conferences of the general secretaries of all the European national standards associations, including that of Germany.[33] Then, from 1923 through 1925, the AESC encouraged the development of standardization associations throughout Latin America, even though the report of the AESC representative to the first Pan-American Conference on Standard-

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[28] Ibid., 22.
[29] Ibid., 27.
[30] 1 Nov. 1919, Minutes, AESC, #168.
[31] Kenneth W. Colegrove, *International Control of Aviation* (Boston, 1930), 50-51. Aircraft standards remained controversial, partially as a matter of intergovernmental agreement. The International Civil Aviation Organization (ICAO), the United Nations (UN) Specialized Agency given some of those functions, was created at the same time as the ISO. The ICAO, whose headquarters were in Montreal, was the only UN agency based there, in part because it continued the functions of the largely French prewar intergovernmental regime. The ISO's Technical Committee 20 had responsibility for aircraft standards, and the British Standards Institution (BSI, the successor to the BESA) was made its secretariat. TC 20 was one of the more active ISO committees in the two decades after World War II. See ISO, *The ISO Technical Committees Shown in Figures, 1947-1964 (*Geneva, 1964), 5, 19.
[32] 1 Nov. 1919, Minutes, AESC, #168. In any event, immediately after deciding not to pursue international cooperation on aviation standards through the existing body, "The use of the term 'Anglo-American' was discussed and the Committee expressed the wish that in all correspondence the term 'international' be used in the place of 'Anglo-American.'"
[33] 12 March 1921, Minutes, AESC, #438; 12 Sept. 1923, Minutes, AESC, #1062.

ization (held in 1925), offered some cautious words about what could be expected, emphasizing,

> . . . the importance of an understanding of the fundamental differences in the two civilizations [present in America] and in the cultural background from which they developed. Such an understanding would be necessary in any active cooperation in standardization matters. The Anglo-Saxons were chiefly concerned with and interested in processes and results. The Latin peoples and Latin-American's [*sic*] in particular cared less for industrial processes and results, but were more interested in the artistic and emotional side of cultural and industrial development.[34]

Later the same year, at the third of the postwar "informal conference of the national standards bodies" held in Europe, the associations agreed to hold a further meeting, in 1926.[35] The agenda would include forming a more permanent body linking the national standards associations. In January and February 1926, the AESC debated Le Maistre's ambitious draft proposal for a federation whose secretariat would collect and publish standards in both English and French and in both English and metric units. The Americans agreed that the time was ripe, but that Le Maistre was putting too much emphasis on the creation of international standards rather than on the exchange of those that had been developed within separate countries.[36] Thus, they worked to modify the ISA draft constitution to reflect a focus on coordinating national standards, rather than on setting international standards.

## The International Federation of National Standardization Associations (ISA)

The ISA's constitution as adopted organized its work through "technical committees" covering different fields, each representing all national associations that wished to be involved. The committee's primary job was to exchange information. International standards would be proposed only "after the new organization had considerable experience."[37] The secretariat work of most of the technical committees would be given to the standardizing body of a single country, with interesting exceptions: screw threads and fasteners would be the subject of separate "inch" and "metric" committees, with the BESA and the Swiss association, respectively, in charge. Similarly, the ISA would have two secretaries, Le Maistre (for whom it probably was an honorary role, since he also continued his

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[34] 19 April 1925, Minutes, AESC, #1356.
[35] It was in fact the third, but was designated the "second," because the meeting of 1921 was not considered formal enough to be called an "informal conference," 25 Nov. 1925, Minutes, AESC, #1446.
[36] 12 Jan. and 11 Feb. 1926, Minutes, AESC, #1533 and #1554.
[37] 10 June 1926, Minutes, AESC, # 1600.

positions in the BESA and the IEC), and a Swiss engineer, Mr. Huber-Ruf.[38]

From the beginning, the ISA's work was hampered by a set of recurrent problems. There was the long-standing division between the "inch" and the "metric" countries, with Canada, Great Britain, and the United States on one side and the rest of the ISA (Austria, Belgium, Czechoslovakia, France, Germany, Holland, Italy, Japan, Sweden, and Switzerland) on the other. In fact, one of the ISA's few triumphs was agreement on a standard inch-millimeter conversion ratio.[39] Moreover, in the early years, Britain and Canada had little active support from the United States. The financial difficulties of the AESC (a consequence of its slow and only partial embrace of the principle of including all standard setters and standard users) led to an April 1928 resolution that "definite action in regard to the support of international cooperation in standardization should await further progress in reorganization of the AESC."[40]

The U.S. association finally agreed to join the ISA on October 16, 1929, the second Wednesday before Black Monday, October 28. The downward spiral of world trade that immediately followed the stock market Crash assured that the ISA would have very little impact on the scale of industry, productivity of labor, or average income of men and women in the "democratic countries"—very little impact on the causal nexus that so concerned the early Anglo-American leaders of the standards movement.

Nevertheless, some consequences of the ISA's work (beyond creating standard translations between the inch and metric systems) remain part of everyday life. Howard Coonley, the U.S. industrialist who became the first head of the ISO, later pointed out that the ISA established a global standard for the placement of sound on motion picture film, something that immediately proved to be of great importance to one of the internationally oriented U.S. industries of the Depression era.[41] Other legacies of the ISA include the standard sizing of paper (A2, A4, and so forth) worked out by the German national standards body, which served as the secretariat of the relevant ISA technical committee.[42] One of the last decisions of an ISA technical committee, taken in 1940, was to approve the

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[38] Switzerland had provided the secretariat for a sequence of "informal" meetings that led to the ISA (14 Oct. 1926, Minutes, AESC, #1657).

[39] Coonley, "The International Standards Movement," 38.

[40] 26 April 1928, Minutes, AESC, #2009.

[41] Coonley, "The International Standards Movement," 39.

[42] Markus Kuhn, "International Paper Sizes," 29 Oct. 1996; viewed 17 May 2006, URL: http://www.cl.cam.ac.uk/~mgk25/iso-paper.html. Kuhn, a University of Cambridge computer scientist, is very much an heir of the true believers in standards a century ago. He writes, "Globalization starts with getting the details right. Inconsistent use of SI units [units internationally agreed upon through ISO and other bodies] and international standard paper sizes remain today a primary cause for US businesses failing to meet the expectations of customers worldwide."

prefix "nano-" as meaning $10^{-9}$, or one-billionth (in the U.S. meaning of billion).[43] World War II triggered the next round of international standards activity.

## War and Postwar International Standardization: UNSCC and ISO

When war broke out in Europe in 1939, the ISA initially tried to keep functioning. However, by early 1941, Agnew reported to the ASA board of directors that it had been effectively mothballed for the duration of hostilities, with the files and records remaining in neutral Switzerland, in the hands of Mr. Huber-Ruf, and with a recommendation to pay him a retainer.[44] By the following month, Agnew explained to the Standards Council, "a cablegram had been received from ISA headquarters stating that all efforts to hold elections had been discontinued."[45] The IEC had similarly gone into "hibernation."

The disappearance of these international standardizing bodies came at a time when international standardization—at least standardization across the Allied forces—was more important than ever. Although the ASA was initially preoccupied with conversion of U.S. standard setting to an emergency basis and the creation of streamlined wartime procedures, by 1943 ASA officers and Council members were turning their attention toward broader international issues.[46] At its December 1943 meeting, the board of directors discussed what they referred to as "Inter-Allied Cooperation in Standardization Matters," the first of the talks that would create the United Nations Standards Coordinating Committee (UNSCC).[47] The director of the British Standards Institution (BSI, the new name for BESA, following re-chartering in 1931), Percy Good, had been in the United States for a meeting on screw threads, and on this trip he consulted informally with officers of the Canadian and U.S. standardizing associations about setting up an "agency for inter-allied cooperation in standards work."[48] As reported to the ASA general meeting the next day,

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[43] See "nano-" on the International System of Units (SI) website; viewed 17 May 2006. URL: http://www.sizes.com/units/nano.htm.

[44] 26 March 1941, Minutes of ASA Board of Directors, #3378.

[45] 10 April 1941, Minutes, ASA Standards Council. #3384.

[46] See, for example, 22 May 1942, Minutes, ASA Board of Directors, #3532, "Status of ASA Work on War Emergency Standards."

[47] 9 Dec. 1943, Minutes, ASA Board of Directors, #3635. The Allied countries began referring to themselves as the United Nations at the beginning of 1942, even though the establishment of the United Nations as an organization occurred after the war.

[48] BSI, "History of the BSI Group"; viewed 17 May 2006, URL: http://www.bsi-global.com/News/History/index.xalter; 9 Dec. 1943, Minutes, ASA Board of Directors, #3635.

> The function of the organization was to "spark plug" cooperation between the allied belligerent countries in standardization matters as an aid to production and use. The object was to secure the maximum possible coordination of standards necessary for the war efforts and the immediate postwar period.[49]

Support for such an organization was strong, but so was ambivalence about its status and relationship to the ASA. The ASA board of directors authorized affiliation with this proposed group, but requested delivery of an outline of how the ASA would interact with it to the Council at the same time that the constitution of the United Nations Standards Committee was presented for final action.[50] Director Harold S. Osborne, former chief engineer of American Telephone & Telegraph (AT&T) and representative of the American Institute of Electrical Engineers (AIEE), noted that "this new project should not be confused with international standardization in peace-time, since the plan was for establishing a war agency to handle urgent problems." Secretary Agnew, along with director Robert E. Wilson (the petroleum engineer who headed Standard Oil of Indiana), explained the role of the proposed organization (as summarized in the minutes) as follows:

> . . . the proposed United Nations Standards Committee would not have authority to set up or promulgate standards. Its purpose was to stimulate cooperation on standards work between the United Nations. The standards worked upon would be promulgated by the respective national standardizing bodies. An important object was, of course, that the work would lead to increasing uniformity between such national standards.[51]

The expanded name soon adopted made this focus on coordination and cooperation explicit: the United Nations Standards Coordinating Committee (UNSCC).[52]

Talks continued well into 1944, as the ASA members involved developed protocols for how the ASA would relate to the new organization. The ambivalence among the ASA directors and Council members about whether this organization should be seen only as a wartime institution doing emergency work or as the kernel of a postwar international standards organization continued to be displayed throughout this period. Although most saw it as primarily a wartime body, the Standards Council determined that UNSCC work should be based on the ASA's normal (voluntary consensus) standardization process, not on its streamlined wartime procedures, which at least one member considered a "violation of

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[49] 10 Dec. 1943, Minutes, Twenty-Fifth Anniversary Meeting of ASA, #3663.
[50] 9 Dec. 1943, Minutes, ASA Board of Directors, #3635.
[51] Both quotes, ibid.
[52] It was referred to by that name in the minutes of the next round of meetings in May 1944; see 18 May 1944, Minutes, Standards Council, #3674.

the ASA Constitution."[53] Indeed, the Council revised one passage of the report to say that "'standards developed under UNSCC Procedure that are acceptable to the ASA shall be published in accordance with ASA procedure for other American Standards,'" rather than according to the American War Standards Procedure.[54] Nevertheless, when the procedures for ASA-UNSCC relations were established, the directors determined that the procedure of the UNSCC should not be made an official part of ASA procedures, but a one-of-a-kind procedure.[55]

Meanwhile, a series of international meetings including members of standards organizations in Australia, Canada, Great Britain, New Zealand, and the United States, along with a Russian observer, developed the organization's ground rules.[56] When the organization was officially established on July 1, 1944, the ambivalence exhibited within the ASA was also built into the new organization's ground rules: UNSCC was authorized to exist for just two years before the need for it would be reviewed.[57] Two UNSCC offices were established—the first in London under the direction of Charles Le Maistre, and the second in New York under the direction of Herbert J. Wollner—and standards work began. Latin American countries were invited to join as well.

This organization was not established soon enough to be very useful to the war effort. Indeed, in May 1945, after hostilities in Europe had ended and only a few months before Hiroshima, the ASA Standards Council had only just agreed to several projects to be undertaken by the UNSCC (including radio interference, shellac, and testing of textiles).[58] Nevertheless, the chairman of the ASA's Advisory Committee of the Council on UNSCC reported to the ASA board of directors that his committee "was beginning to function and it looked as though the work of the UNSCC would be very valuable."[59]

When the war ended, the UNSCC technical committees continued to function to help with the recovery, but discussion immediately turned to creating a successor organization to take over its work. The war had

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[53] Ibid.
[54] Ibid.
[55] 14 Sept. 1944, Minutes, Standards Council, #3707.
[56] "United Nations Standards Committee Opens," *Industrial Standardization* 15 (Oct. 1944): 209-10. This committee, which had begun with three countries, would ultimately include eighteen: Australia, Brazil, Belgium, Canada, Chile, China, Czechoslovakia, Denmark, France, Great Britain, Mexico, Netherlands, New Zealand, Norway, Poland, South Africa, United States, and USSR (Union of Soviet Socialist Republics); see Coonley, "The International Standards Movement," 39.
[57] The 1 July 1944 date comes from an undated form letter from C. Le Maistre, Secretary-in-charge of London Office, UNSCC, inviting standards organizations in other countries to join (UNSCC files, ISO, Geneva).
[58] 24 May 1945, Minutes of ASA Standards Council, #3771.
[59] 25 May 1945, Minutes, ASA Board of Directors, #3795.

certainly highlighted the need for greater international standardization. According to the *Economist*, differences between British and American standards for screw threads alone added at least £25 million to the cost of the war.[60] From the *Economist*'s point of view, going forward with either the UNSCC (which eliminated all enemy countries, occupied countries, and neutrals) or the ISA (which was dominated by the metric bloc and consequently did not have full participation of the United States or the United Kingdom and British Empire) would not adequately forward the economic recovery of all. Within the ASA, where the president had appointed "a committee to advise the Board on the future organization of international standardization work," one member of the Standards Council asked why the prewar international association, the ISA, was not being reactivated.[61] In response

> . . . the Chairman mentioned that the enemy countries had been members of the old organization and that it might be difficult to carry on work if the old organization were reactivated. It therefore seemed desirable to organize a new body which could function free from any prejudices.

Unlike the author of the *Economist* article, the ASA leaders were obviously not yet ready to include enemy countries in any new organization, apparently wishing at least to establish procedures for the new organization with other friendly countries. Moreover, although the United States, as represented by the ASA, had played a relatively small role in the ISA, a new organization would necessarily put it in a more central position.[62] That new organization would be the ISO.

The sequence of international meetings that formed the ISO began in October 1945 in New York, followed by conferences in Paris in July 1946 and London in October 1946. In preparation for the New York meeting, the executive committee of the UNSCC, consisting of officers of the British, Canadian, and American standards bodies (ASA Secretary Agnew represented the United States) met to develop a proposal for presentation to the larger group.[63] The New York UNSCC meeting included twenty-three participants, representing the UNSCC secretariat and the standards bodies of eleven countries: Australia, Belgium, Brazil, Canada, China France, Denmark, Mexico, South Africa, the United Kingdom, and the United States.[64] Before presenting their specific proposals, the executive committee presented "the three foundation values in our [proposed]

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[60] "UNSCC," *Economist* 148 (3 March 1945): 286-87.
[61] 27 September 1945, Minutes of ASA Standards Council, #3808. Subsequent quotation from same.
[62] Coonley, "The International Standards Movement," 39.
[63] 27 Sept. 1945, Minutes of ASA Standards Council, #3808.
[64] "List of participants," in "Report of New York Conference, October 8-11, 1945" (UNSCC files, ISO, Geneva). Only the United States (with six) had more than two representatives.

organization": a) that it be composed only of national standardization bodies; b) that it coordinate, not promulgate, standards; and c) that divisions be created.[65] The discussions around these three principles at this and subsequent meetings, as well as around a few other "sticky" points, were central to the establishment of the new international standards organization.

The first value generated an extensive discussion of how to define national standardizing bodies.[66] In particular, the ASA director who was asked to chair this meeting of the UNSCC, Harold S. Osborne, repeatedly raised a fairness issue around excluding developing countries that did not have national standards bodies.[67] He wanted to allow countries to form a body for international standardization, whether or not they had a national standards body. This position was consistent with the ASA board of directors vote a week earlier that membership "should be open to the national standardizing body of each nation of the world and in the nations not having national standardizing bodies to a body established for the purpose of international standardization which is found by the new agency to be sufficiently representative."[68] In spite of his advocacy, at this meeting the first value was accepted as originally proposed, not allowing membership to countries without national standards bodies.

Subsequently the initial decision was modified very little. The draft constitution drawn up at that meeting was circulated to the national standards bodies, some of which responded by drafting three alternatives.[69] These four drafts all provided input for the consolidated draft produced for the London meeting. Article 3 of the final draft defined membership in much the same terms:

> The members of the Organization shall be those National Standards Bodies which have agreed to abide by the Constitution and Rules of Procedure, and have been admitted into the Organization in accordance with the procedure defined in the Rules of Procedure.[70]

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[65] UNSCC Proceedings of New York Meeting, 8-11 Oct. 1945 (UNSCC files, ISO, Geneva). The following account comes primarily from these Proceedings.

[66] UNSCC Proceedings of New York Meeting, 9-19.

[67] Osborne was also past President of the IEC; Osborne, "Liberating Research and Development with National Standards," 64.

[68] 28 Sept. 1945, Minutes, ASA Board of Directors, #3832.

[69] Paul G. Agnew, "Plan Merger of Standards Groups," *Industrial Standardization* 17 (Sept. 1946): 217.

[70] "International Organization for Standardization, Draft Constitution," Annex I, United Nations Standards Coordinating Committee, "Report of Conference of the United Nations Standards Coordinating Committee Together with Delegates from Certain Other National Standards Bodies," London, 14-26 Oct. 1946 (UNSCC files, ISO, Geneva), 27 [hereafter, "UNSCC Report of London Meeting, Oct. 1946"].

The Rules of Procedure stated that members would consist of those national bodies present at the London Conference, plus any others that applied in writing to the new organization and that the Council of the ISO approved, possibly giving the Council a little leeway in interpretation. The second value, that the new body would be a coordinating body, not a standardizing body, raised a key point of contention for the new organization.

The UNSCC Executive Committee's vision, incorporated in the name initially proposed for the association—the International Standards Coordinating Association—would be modified significantly during subsequent discussions. The extended discussion around it initially centered on the meaning of "coordinating" or, as the ASA delegate preferred, "harmonizing."[71] Mr. Good, the lead British representative, was particularly adamant that the new association should coordinate, not establish, standards. He argued that only national bodies could establish standards, and that nothing could be called an "international standard" without unanimous support. Indeed, he urged that the new organization not designate any international standards, but simply report annually on which nations accepted which standards. One of the underlying reasons for his strong stand emerged later in the meeting when a Chinese representative proposed a method for dealing with the metric versus foot-pound or "English" measurement systems by using a single system when possible and two standards as nearly consistent as possible when not.[72] At that point, Good invoked the "coordinating" role of this new body to state unequivocally that the United Kingdom would not participate in any discussion of this issue. Clearly, the British were unwilling to allow the proposed international organization to make decisions that could over-ride its country's perceived national interests.

The jurisdiction and powers of the new organization—in particular, whether it coordinated national, or established international, standards—continued as a source of disagreement through the rest of this and the two subsequent conferences. The proposed constitution put control over each technical committee (the primary working groups of the organization) in a secretariat that would be one of the member national organizations, thus preserving the fiction that only national bodies established standards.

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[71] Ibid., 19-33. The ASA Board of Directors saw the purpose of the new organization as bringing national standards into "international harmony" and they felt that "Such harmonizing agreements should express as nearly as possible an international consensus of opinion on the subjects dealt with and should have the status of recommendations for international use and be accepted by the member-bodies in that sense" (28 Sept. 1945, Minutes, ASA Board of Directors, #3832).

[72] UNSCC Proceedings of New York Meeting, 107-18. In the discussion, it becomes clear that at least three of the eleven countries—Mexico, Brazil, and China—have laws forbidding use of the foot-pound system.

After much debate, the delegates agreed that most publications of the association would be minutes and reports on standards work done by technical committees, including descriptions of which bodies agreed to which proposed standard.[73] The proposal that, with the consent of all member bodies of the administrative council (a body of representatives from eleven countries), the new organization could publish recommendations on *international* standards was soon altered to require only no dissent from any member body.[74] The final version thus stated that the Council could publish documents "as International Standards" as long as it received no veto.[75] This move beyond simple coordination of national standards toward promulgation of international standards was also reflected in the name ultimately adopted for the organization: the International Organization for Standardization (to be abbreviated as ISO).[76]

The third principle stated that related technical committees could be clustered into technical divisions, a position also taken by the ASA previous to the New York meeting.[77] This unifying structure was easily accepted, because it simply added a layer to the structure of technical committees already used by most national and international standards bodies. As explained in the final draft presented at the London meeting,

> The Technical Divisions may be comprised of either International Organizations interested partially or totally in standardization and which are affiliated to the Organization, or groups of Technical Committees, the activities of which are closely related and which it would be advantageous to co-ordinate more closely.[78]

Most importantly, this structure allowed the IEC, which had been functioning since 1906 as an international standards organization in the electrical field, to be incorporated into ISO as its electrical division, allowing it to retain its name and technical (though not budgetary) autonomy.[79] The delegates also agreed to create other divisions as needed.

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[73] Ibid., 123-30.

[74] The USSR wanted to establish five permanent members of the council (as in the UN itself), but they agreed instead to having five members who stayed stable for the first five years, as the other six rotated. After five years, all would rotate. The five members were the standards bodies of China, France, United Kingdom, United States, and the USSR. Ibid., 220-21.

[75] Draft Constitution, London Conference, Oct. 1946, p. 27.

[76] Ibid. The draft with explanations circulated by UNSCC in August 1946 (UNSCC files, ISO Geneva office), between the Paris and London meetings, eliminated the word "co-ordinating" from the name.

[77] 28 Sept. 1945, Minutes, ASA Board of Directors, #3832.

[78] Draft constitution, London Conference, Oct. 1946, p. 28.

[79] The committee recommendations for the ASA delegates to the New York conference made explicit the link between providing for divisions and incorporating the IEC as one such division, leaving the details to be worked out later (28 Sept. 1945, Minutes, ASA Board of Directors, #3832).

A few other issues that came up at this first conference would continue to create considerable discussion in this and the next two meetings. The issue of official languages for the organization was initially a hot one. At the New York meeting, the British had suggested that English be the only official language, but soon French was added.[80]

By the Paris meeting, the USSR, which had only sent observers to the final day of the New York meeting, had declared its interest in belonging and sent a delegation.[81] There, it insisted that the Russian language be put on the same basis as English and French. When the other delegates did not agree, the Russian delegates asked the French and American delegates to stay after the meeting for further discussion. The American delegates later reported to the ASA that a tentative agreement had been reached in those informal talks to name the Russian language as official in the text, but to require the USSR member body to do all the translating and publishing in Russian themselves (as other countries were allowed to do anyway). Reports of the London conference and its aftermath simply stated that the new organization has three official languages: English, French, and Russian.[82] Only in 1954 did the Russian language actually achieve co-equal status with English and French in the ISO.[83]

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[80] As reported in 7 Dec. 1945, Minutes, ASA Standards Council, #3851.

[81] 12 Sept. 1946, Minutes, ASA Standards Council, #3946, Agnew's "Report of the Meetings of the Executive Committee of the United Nations Standards Coordinating Committee and the Council of the International Federation of National Standardizing Associations (ISA)." It noted that "A month before the Paris meetings, however, the Russians had sent a communication through the London office of UNSCC announcing that the higher authorities of the Soviet Government had decided that Russia would participate in all important international technical meetings. The Russian representative, who had appeared through some misunderstanding, had by common consent of the delegates been allowed to remain and had not been aware of his lack of invitation." The description of how the issue was resolved also comes from this report.

[82] According to the draft constitution out of the London conference. See also 21 Nov. 1946, Minutes, ASA Standards Council, #3990, "Report of International Conference to Establish the International Organization for Standardization (ISO)"; and "Twenty-Five Countries Set Up New International Standards Organization," Industrial Standardization 17 (Dec. 1946): 297. Many decades later, Willy Kuert, a Swiss delegate to the London conference, explained the process as follows: "After a long discussion, we decided to ask a small group to work on this. The group came back and said that the Soviet Union was prepared to translate all the documents and to send translations to every member of the new organization. However, the Soviet Union wished to have no distinction between Russian and English and French. We could accept this proposal and it was set down." From Willy Kuert, interview in "The Founding of ISO," *Friendship among Equals: Recollections from ISO's First Fifty Years* (Geneva, Switzerland, 1997), 20.

[83] ISO, "List of Resolutions adopted at the Meetings of the Council and General Assembly since the Creation of ISO, 1947-1963" [ISO/RESOL 1 Oct. 1964]

A less politically fraught issue, but one that had practical ramifications, was the choice of office location. At the New York conference there had been agreement that the new organization, unlike the UNSCC, would have only one office. Agnew reported to the ASA Standards Council that:

> The British delegate had suggested that it should be in London, and the American delegation had urged that it be located in the United States. There also had been considerable sentiment in regard to having the location in the Netherlands at The Hague. It had been decided that the question should be open without recommendation because it might be found desirable for the headquarters to be in the same country as that of the office of the United Nations Organization.[84]

By the London meeting, Russia had suggested Paris as a central city in continental Europe, and Montreal and Geneva (the latter being the location for many of the Specialized Agencies and part of the secretariat of the new United Nations organization) had also been nominated.[85] During that meeting, delegates held a series of votes, and ultimately chose Geneva over Montreal by a single vote.[86]

A final complication was the ISO's relationship to the prewar and wartime associations. The first president of the ISO, Howard Coonley, would later say that the ISO was "a merger of the original Federation (ISA) and the UNSCC," and from a technical point of view, it would be exactly that, but circumstances and the actions of one individual prevented that merger from proceeding straightforwardly. At the initial New York meeting the French delegate noted that many European nations objected to what they saw as the United States, the United Kingdom, and France "cutting out" the old ISA and suggested that the demise of the ISA be dealt with explicitly.[87] The Swiss delegate suggested convening the ISA for just

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(Geneva, 1964), 29. The successful resolution of the language debate was significant. In contrast, the USSR withdrew from the simultaneous discussions aimed at creating the rest of the institutional architecture of a postwar global economy: the International Monetary Fund, the International Bank for Reconstruction and Development, and the stillborn International Trade Organization. It is perhaps surprising that the private-sector leaders who dominated the ISO discussions found it easier to accommodate Soviet concerns than did the government representatives at the other conferences, whom the Soviets, in 1947, condemned for wanting to create mere "branches of Wall Street." See Edward S. Mason and Robert E. Asher, *The World Bank since Bretton Woods* (Washington, D.C., 1973), 29-30.

[84] 7 Dec. 1945, Minutes, ASA Standards Council, #3851.

[85] Kuert, *Friendship among Equals*, 21.

[86] Ibid. See also 21 Nov. 1946, Minutes, ASA Standards Council, #3990, "Report of International Conference to Establish the International Organization for Standardization (ISO)."

[87] UNSCC Proceedings of New York Meeting, 47. The discussion continued, 47-59.

long enough to dissolve itself, but that raised additional issues. Did the ISA still exist legally? Could it meet without Italy, Japan, and Germany? Could the 1939 Executive Committee, the last elected, still act for the association? If not, who could? The participants of the New York conference ultimately decided to create the constitution for the new organization first, then to dissolve ISA and UNSCC and to bring their activities into the new organization.

Subsequently, the London meeting, originally planned for June 1946, had to be postponed to October. As Agnew reported to the ASA Standards Council, "Developments had come about as a result of a more thorough study of the situation in regard to the old International Standards Association which had made it practically essential that this meeting be postponed."[88] Meanwhile, a joint meeting of the UNSCC Executive Committee and the ISA Council was held in Paris in June to continue designing the new organization and to outline the technical agenda based on the past work of those two predecessor organizations. At that time, delegates decided that the London conference would be "convened by the UNSCC with the collaboration of the ISA Council."[89] The London Conference was planned as the occasion on which the new constitution was to be voted (though it would still need to be ratified by member bodies), the ISA and UNSCC to be dissolved, and the baton to be passed to the new organization created out of the merger of the two old ones.

Meanwhile, those who met in Paris had asked Le Maistre to travel to Switzerland to meet with Mr. Huber-Ruf, the Swiss former secretary of the ISA, who had been too ill to attend the Paris conference. At the opening steering committee meeting of the London Conference, Le Maistre reported Huber-Ruf's position that the terms of office of the former ISA Council members had expired, thus preventing them from acting with authority. Moreover, he claimed that he was still the general secretary of the ISA and that he should be made the director of the new organization, under a newly appointed general director.[90] Because Huber-Ruf's demands were unacceptable to the London delegates, they agreed to drop the ISA as a co-sponsor of that conference, ending the (brief) meeting convened under both names and immediately beginning another sponsored only by the UNSCC. Informally, members of the ISA represented at this conference took it upon themselves to liquidate the ISA legally as soon as possible.

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[88] 25 April 1946, Minutes, ASA Standards Council, #3896, "Report on Development of New International Standards Body."

[89] UNSCC Report of London Meeting, Oct. 1946, Minutes of Meeting of Steering committee, 14 Oct. 1946, p. 9.

[90] The minutes of the opening day Steering Committee meeting in the UNSCC Report of London Meeting, Oct. 1946 include Huber-Ruf's position. The minutes of the steering committee meeting do not explain more fully, but it is clear that no one there was willing to entertain Huber-Ruf's proposal.

Despite these difficulties, the ISO was provisionally created at that London conference, formal ratification by member bodies to take place subsequently. The status of the ISO was described as follows in the December 1946 issue of the ASA's *Industrial Standardization* magazine:

> While technically the new International Organization for Standardization is "provisional," it is starting active work immediately by reviewing the projects and reports of the two predecessor organizations and considering a number of new proposals.
>
> This is made possible by agreement on the part of the United Nations Standards Coordinating Committee to continue in existence and to maintain its office in London until the office of ISO in Geneva is in a position to take over.
>
> . . . The new organization will be formally completed when its constitution is ratified by 15 national standards bodies.[91]

The minutes of the November meeting of the ASA Standards Council made clear how difficult that ratification might have been had those involved with the three key meetings not been so committed to the goals of the new institution.[92] A representative of ASA's Temporary Committee on International Standardization reported on its study of the proposed constitution. Noted were two areas that particularly worried the committee: the addition of Russian as an official language and an ambiguity about whether or not the new organization could consider standards of ASA member bodies that ASA had not adopted as American Standards.[93] Then a letter from the executive secretary of a member organization, the American Society for Testing Materials (ASTM), was presented, raising some additional issues (for example, the previously noted ambiguity and the Geneva location) and recommending that more time be taken to allow member bodies to confer and present their positions to the ASA board of directors. Clearly, the more member bodies looked closely at the ISO constitution, the more issues would be raised and the harder it would be for the ASA to endorse it.

Countering this desire to dissect the constitution and find problems, however, was the ASA leadership's recognition of how difficult it was to achieve such an international agreement and belief that it was better to have an imperfect international organization for standardizing than to have none at all. Harold Osborne, the chair of the Temporary Committee on International Standardization, had not been able to attend the meeting, but he sent a brief letter for distribution to the Standards Council, which made the following point:

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[91] "Twenty-Five Countries Set up New International Standards Organization," *Industrial Standardization* 17 (Dec. 1946): 297-98.
[92] 21 Nov. 1946, Minutes, ASA Standards Council, #3991.
[93] Ibid.

> It is my view that the question of immediate ratification should be governed largely by the views of Agnew and Crittenden [the ASA's delegates to the three international meetings], based on their knowledge of the situations. I think the present document, though imperfect, could properly be made the basis of a start if they feel it important to do so.[94]

Following the presentation of this letter, the chair of the meeting framed the Standards Council's current issue as deciding whether to ask for more time or to ratify the constitution in its current form, while pointing out that they would want to make some changes later. Secretary Agnew "remarked that on the merits of the case internationally he would be very much disappointed if there were a delay in the ratification of the proposed Constitution and Rules of Procedure."[95] Although he considered the views of member bodies very important, he pointed out "the difficulty in getting agreement from 25 different countries with different industrial, technical, and linguistic backgrounds. It had been necessary to overlook many minor points in the interests of getting acceptance of more important ones."[96]

Ultimately, this view in favor of compromise won out, and the Council voted unanimously to recommend that the ASA promptly approve the constitution and rules of procedure, but also "inform all of the other Member-Bodies of ISO that recommendations will be submitted later for certain changes in the procedures, and possibly in the Constitution."[97] The subsequent discussion in the board of directors meeting covered the same ground, but ultimately the board took the same position and ratified the constitution on November 22, 1946.[98] This compromise allowed the ASA to be the first national body to join ISO.[99] By April 1947, the number of member bodies that had ratified the constitution exceeded the necessary fifteen, making the ISO official rather than provisional.[100] The first official meeting of the ISO was scheduled for Geneva in June 1947, and it had applied for consultative status with the Economic and Social Council of the

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[94] Harold S. Osborne to the Assistant Secretary of ASA, 17 Nov. 1946, transcribed 21 Nov. 1946, Minutes, ASA Standards Council, #3991.
[95] Ibid.
[96] Ibid.
[97] Ibid.
[98] 22 Nov. 1946, Minutes, ASA Board of Directors, #4020.
[99] "ASA Is First Body to Join International Organization," *Industrial Standardization* 18 (Jan. 1947): 21.
[100] "International Standards Body Is Now Officially Ratified," *Industrial Standardization* 18 (April 1947): 96. The first fifteen were Australia, Austria, Brazil, Chile, China, Czechoslovakia, Denmark, Finland, France, India, Mexico, Sweden, Switzerland, the United Kingdom, and the United States. By the 24 April meeting of the Standards Council, twenty-two bodies had ratified (24 April 1947, Minutes, ASA Standards Council, #4049, "Report on International Organization for Standardization").

United Nations. The first truly international standardization organization now existed.

## Conclusion

At the end of the First World War, Comfort Adams and Charles Le Maistre had a vision of something very much like the ISO created twenty-seven years later. The realization of that vision was delayed by divisions between the "inch" countries and the "metric" world (especially between Britain and its industrial competitors on the Continent), combined with jurisdictional disputes over who should be involved in standard setting (national standards bodies, professional engineers, trade associations, and so forth). The Depression and traditional ideas about international cooperation with recent enemies played a role as well. At the same time, the slow accretion of institutional innovations, and their repetition from one context to the next, helped eventually overcome these conflicts and shaped the nature of the ISO.

The work of the organization came to be organized around voluntary technical committees that were characteristic of the Anglo-American approach. The ISA pioneered the system of giving responsibility for the secretariat of each committee to one of the national standards bodies, assuring that there were agencies responsible for, and capable of carrying out, international standardizing work. This system also helped gain buy-in from the separate, powerful national bodies. Moreover, in the long run, it would help finesse the conflict between those who wanted the international body to have only a coordinating role and those who wanted the international body to set standards. The continuous involvement of certain key figures, including Le Maistre and Agnew, also contributed to cooperation, as, perhaps, did a sense of urgency and a desire to "get things right" after World War II, to avoid the delay and timidity that marked the creation of international institutions after the First World War.