

Learning by example – a possible curriculum model for standardization education¹⁾

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Education and
Standardization



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The purpose of standardization education should be to open up standardization in a way the student can understand it, and to act with students in a way that they get accustomed to standardization, gain knowledge about it, and are equipped to use this knowledge in practice.

Below, we present a standardization model that shows processes related to standardization and standards. We look at education in standardization by combining standardization practice and academic reflection on it with regular and on-going education.

Learning by example

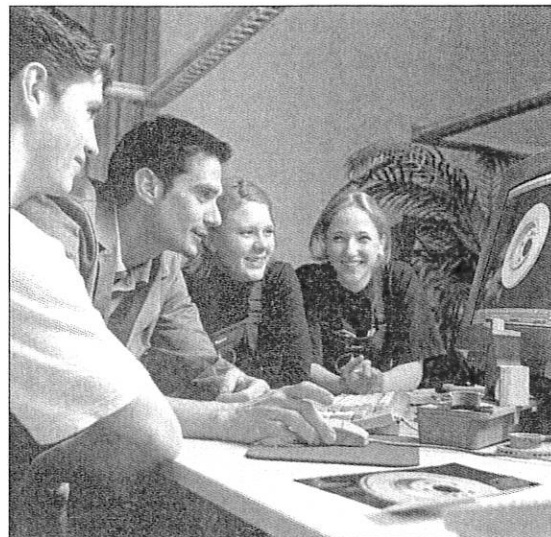
Many of those who get involved in standardization in their professional lives lack the (standardization) education that would enable them to carry out those tasks in a professional way. In general, neither regular nor on-going education takes account of standardization in any systematic way, though there are exceptions, especially in some specialist technical areas.

The principle of learning by concrete example is at the start of a broad and practical process of “revelations”: revealing the students that are apt for standardization, and revealing standardization to students. Real-life examples appeal not only to the intellectual capacities of a student but to the student as a person as well, so that they are of help in opening the students to standardization. But of course, examples do not suffice – there has to be theory, too, so that, through the example, the standardization “phenomenon” as such becomes clear.

In the standardization education we provide in the Netherlands, we apply this learning by example. At the Hogeschool van Amsterdam (HvA – higher vocational education), students have to spend 80 hours on our standardization module over a period of seven weeks. After an introductory lecture, they sit for a small exam in the second week to stimulate them to study theory right from the outset. In proceeding weeks, more lectures are held, and they have to study a book². In the sixth week they have to sit an open-book examination.

Tracing relevant standards in a systematic way

This, then, is the theoretical part, even though we mention case-studies in the lectures as well as in the synopsis. The main practical part of the module concerns a case-study that is carried out by groups of four students. They have to make an inventory of all the standards necessary for a certain product or service: in the 2001/2002 course, this concerned the requirements for wind turbines to be built on the coast. In this case, not only



International, European and national standards apply, but also requirements from energy companies and, for instance, legal requirements in European New Approach Directives and in the European Habitat Directive (this latter is relevant

1) This contribution is based on an article to be published in the *EURAS Yearbook on Standardization*, Vol. 4 (see http://www.accedoverlag.de/homo_oeconomicusE.htm).

2) C.A.J. Simons & H.J. de Vries (2002) *Standaard of maatwerk – Bedrijfskeuzes tussen uniformiteit en verscheidenheid* [Standard or tailor-made – Company choices between uniformity and diversity]. Academic Service, Schoonhoven, The Netherlands / NEN, Delft, The Netherlands, 245 pp.

as the mills are to be placed near a bird sanctuary).

In the fourth week, the students report their findings orally and outline the way they intend to continue and get feedback from the other students and the teachers. In the sixth week, they hand over a written case report, and in the last week they have a final oral presentation of their results. By tackling such a case, they learn how to trace relevant standards in a systematic way.

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At the Erasmus University, Rotterdam, we work with a module of the same length (80 hours over seven weeks) for business students as part of the speciality (‘ master ’) Innovation Management. In the course of the lectures, we present examples, and the students perform roles in a standard-development case: they have to agree on a standard format they are going to use themselves for the case they are going to demonstrate. This case is to provide strategic standardization advice to a company: they know the company already from previous assignments in Innovation Management. The group can get feedback in the meanwhile from the teachers, and must present its findings orally and in a written report. The company receives the report as well, which encourages both the students and the companies to think about standardization in a strategic way – a useful spin-off. In fact, 80 hours is not enough for this course. To be able to draw a more complete picture of standardization and to raise the quality of the strategic advice, 120 hours would be right. This raises the question of the contents of such a basic module.

Basic module

A basic learning module on standardization should ideally address:

- the company, inter-company, national and international level;
- different business sectors;
- different subject-matter areas, technical as well as non-technical;
- different kinds of standards;
- the different processes of standardization;
- the different aspects of standards and standardization;
- the characterization of standardization as such;
- the importance of standardization (for the different stakeholders).

Though initially this looks difficult as the first six issues in fact constitute a six-dimensional “matrix” of standardization topics, in practice it may be easier, as:

- The company, inter-company, national and international levels are not totally different – broadly speaking, the processes are identical.
- Differences in kinds of standards remain, but the processes related to developing and applying them do not differ fundamentally, so that in fact these differences can be a separate topic in a standardization course.
- Standardization differs by business sector, but these are practical differences, not fundamental. In some sectors, not all kinds of standardization apply.
- The same applies to subject matter areas: practical differences, not fundamental ones.

Application of the model

The concept of ‘aspects of standardization’ needs some clarification. We will do this by applying it to one standard.

A standard has a certain number of pages – this is its arithmetic aspect. It may be available for free or at a certain

price – that’s an economic aspect. It may be beautifully or awfully designed – an esthetic aspect. The Dutch philosopher Dooyeweerd has listed 15 separate aspects: arithmetic, spatial, kinematic, physical, biotic, emotional, logical, historical, linguistic, social, economic, esthetic, juridical, ethical and faith aspects, each of which we can distinguish in reality. Related to each are “laws” that must be honoured. For the first aspects mentioned above, these are laws of nature. For instance, mathematical laws of adding, subtracting, multiplying, etc, apply to the arithmetic aspect. For later aspects, these “laws” are normative principles that man, in his freedom, can obey, ignore or oppose.

The “aspects” approach

Let’s take the example of the linguistic aspect, an aspect that is related to more than just language. For example, reserving the best parking place, next to the company’s main entrance, for the general manager is a powerful form of non-verbal communication that reveals something about the organization’s internal relationships. The normative principle for the linguistic aspect is clarity. Applied to standards and standardization: the linguistic aspect concerns communication related to the development of a standard and the informative function of the standard itself. The normative requirement of clarity means that standards should be easily understood by the people to whom they are destined, and the development of these standards should be transparent for those interested in it.

These aspects themselves should not constitute a standardization curriculum; such a curriculum could better be built on the model below, and will also depend on the target group of the module. For law students, for instance, the legal aspect will get more attention, for economists, the economic aspect will be more important. But everyone needs to get an overall picture.

In designing a standardization curriculum, it is important to distinguish

between teaching the subject matter and providing access to further data and information on that subject matter, as other data and information could be made available so that scholars with specific questions concerning specific issues may find their way around. A teaching module should show the way to reach such sources. The Internet provides the ideal medium for this latter addition of information, whereas, for a basic teaching module, contact with a real-life teacher may be more suitable, with support in the form of, for instance, textbooks, videos and the Internet.

Basic module structure

In our experience, the best point to start out a basic module on standardization is with simple examples of standards, such as McDonald's, credit cards, light bulbs, cameras and films, units of measurement, petrol, paper sizes, barcodes, wine classifications and traffic signs. In these cases, standards benefit consumers directly, and everybody therefore understands their importance.

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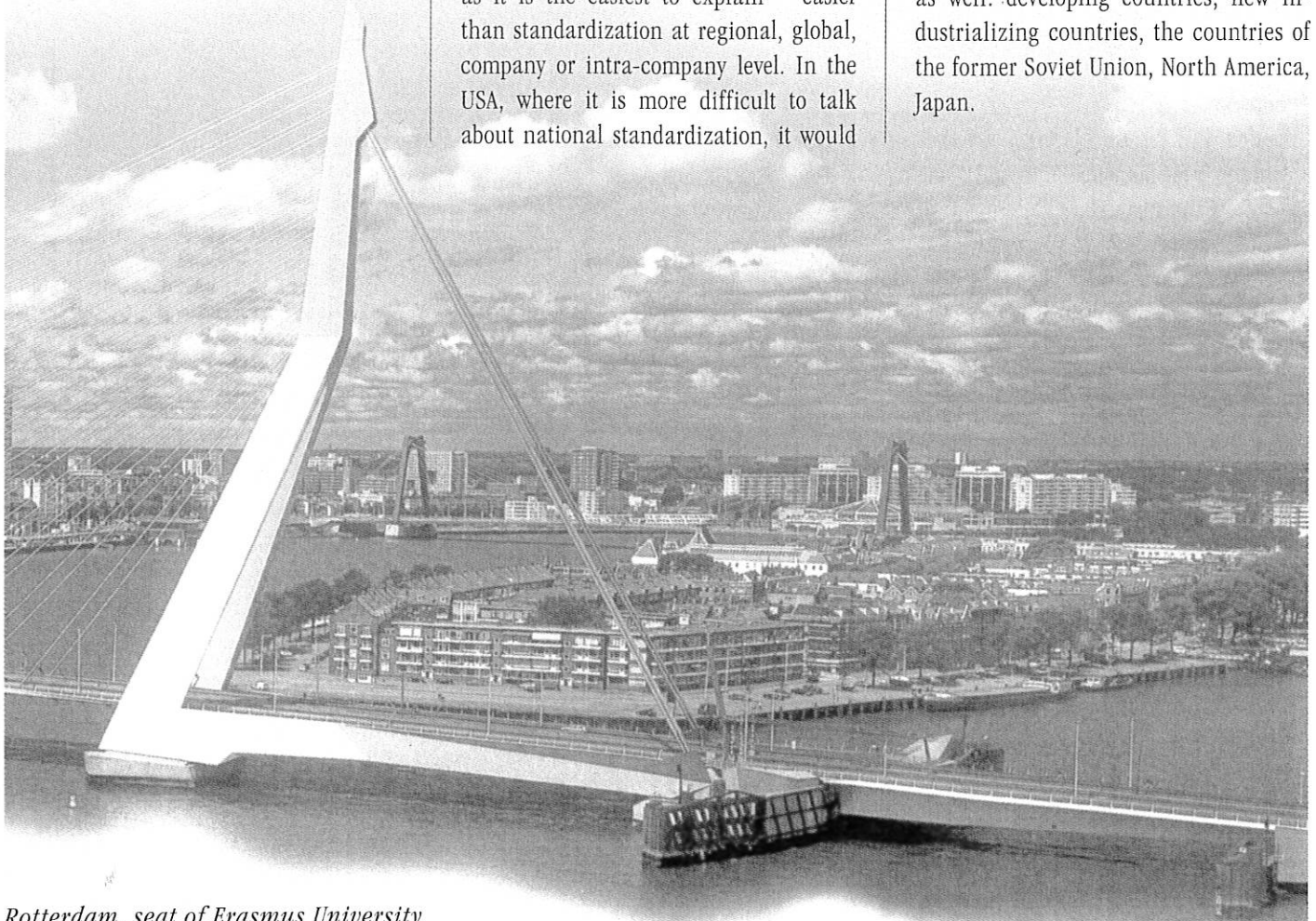
Subsequently, business-to-business examples should be added. Following these examples, generalizations about the concept of standards and standardization are possible, including the general advantages of standardization, definitions, decision-making in standardization, different types of standards, and different ways to arrive at standards.

Formal standardization

Next step in our courses is to explain (formal) national standardization. This is no longer the most important level of standardization, yet we start with it as it is the easiest to explain – easier than standardization at regional, global, company or intra-company level. In the USA, where it is more difficult to talk about national standardization, it would

be simpler to start with standardization in a certain sector. In Europe, the topic of national standardization encompasses all elements of the “standardization model”. Again, examples can be used to illustrate the topic. One of our examples concerns the development of a national standard for bicycles. We explain why the standard has been developed, which parties were involved, what the stakes were, and which elements have been included in the standard. In this case, to a large extent a business-to-business example, selling of the standards is not really important: most of the intended standards users have been involved in its development as well.

After discussing the national level, it is relatively easy to turn to formal standardization at the international level: ISO and IEC (International Electrotechnical Commission). Since standardization in other regions of the world is less complicated than in Europe, information can be made available without adding the topic to the curriculum, though for Europe it should figure. Typical differences in other regions may get some attention as well: developing countries, new industrializing countries, the countries of the former Soviet Union, North America, Japan.



Rotterdam, seat of Erasmus University.

Once formal standardization has been explained, we can turn our attention to *de facto* standardization, followed by a mention of hybrid forms, such as sectoral standardization. Next would come standardization within companies: as this includes the company use of external standards and the company's strategy in influencing external standardization, it should not be studied earlier on within the curriculum. Knowledge of company standardization is necessary before the next topic can be discussed: intra-company standardization, especially standardization in supply chains. Time and again, cases should be presented, from different business sectors, different subject matter areas and different kinds of standards.

After this general overview, the time has come to focus on the different elements of the model. For instance, the element "Choice of organizational form" refers to the topic of "markets" and "committees", the element "Standards development" may mention methods and theories of standards development: "Standards implementation" is best illustrated by telling about those standards for which implementation is the most difficult: standards for management systems.

In this way, the six "layers" of standardization are channelled into the "one dimension" of a standardization course, with a start and a finish. In mathematics, there are many ways of projecting a six-dimensional object into a one-dimensional space. Taking this parallel, there are many ways of projecting the six-dimensional standardization topic into a single-dimensional course. The Internet possibility of hyperlinks allows addition of an extra dimension, but equally this can blur a clear picture of standardization, with a start and a finish, and leave the reader lost. So in fact, while hyperlinks may be used to find additional materials, they are less suitable for the main core of the course.

For each topic in the main course, four basic questions should be addressed: what is done in standardization practice, how is it done, why is it done, and why is it done in this way?

Theory and practice

To develop a course as the one above, practical knowledge about actual issues is a necessity. For instance, in the European Union and EFTA countries, many European standards are linked to European legislation in the form of New Approach Directives. More than 50 % of the products have to meet the requirements laid down in these Directives, and conformity to the related standards is the easiest way to demonstrate conformity to these essential requirements. Thus a basic standardization module in Europe has to take this into account. If the above model is applied in a systematic way, the New Approach will be "discovered," making its presence felt in several ways – at least when discussing standardization at the European level.

One of the stakeholders is the "government" at the European level: the European Commission. When discussing the stakes involved in their case, the New Approach figures as one of the topics, since it is an obligatory passage in view of the ambition to aim for one single market without barriers to trade (the economic aspect) and of the role that this plays in legislation (the legal aspect). When discussing the legal aspect of standards, their relationship to legislation at the European level is one of the topics needing investigation.

However, the importance of the New Approach does not appear from the systematic approach in designing the curriculum, but just from practice. Given its importance, for some people, this topic could deserve full attention, and the question arises of where to place such a topic in the curriculum. In fact, there are two possibilities:

Figure 1. Processes in company standardization.

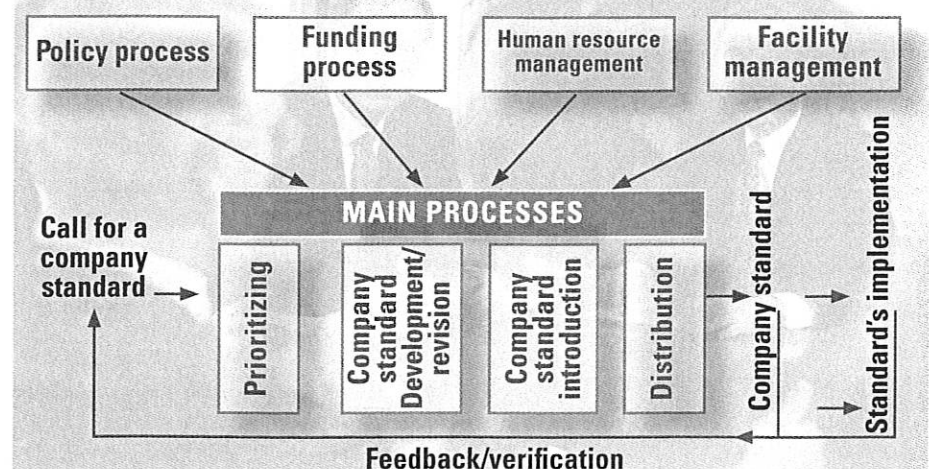
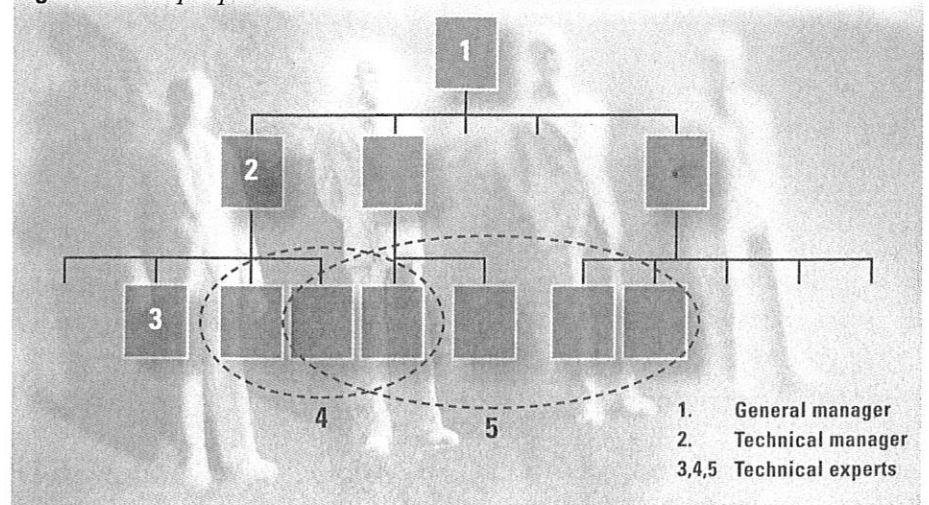


Figure 2. The people involved in external standardization.



- somewhere where you “discover” it, in this case, when discussing European standardization ;
- somewhere separate, in an “annex”, to which the central body of the curriculum refers.

Topics for special treatment

Other topics that might be treated in this way include :

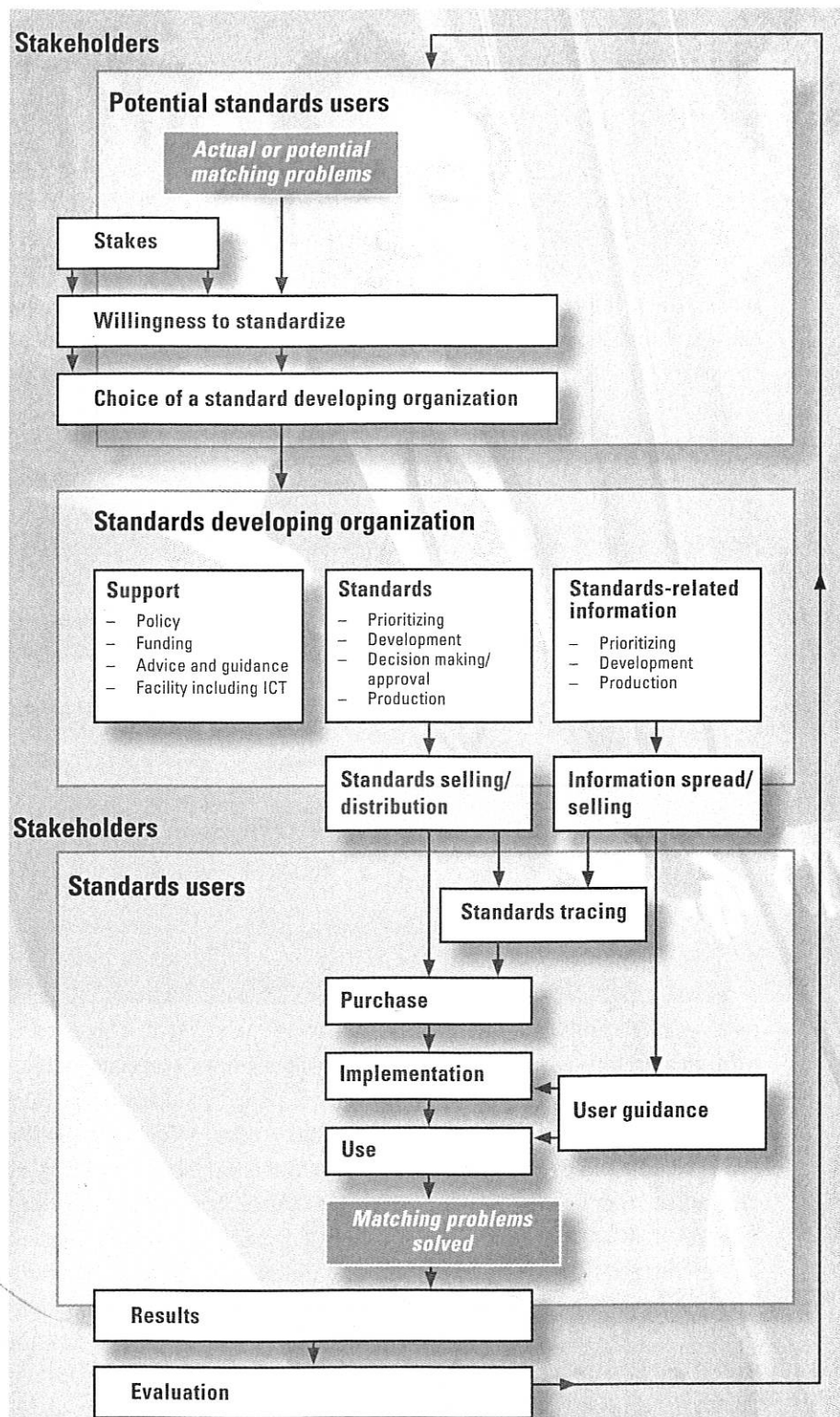
- standardization and innovation (apparently antagonistic, the two aspects of this topic can subsequently be related to standards application, then to the interests of stakeholders and, finally, to the way standards are developed) ;
- macro-economic benefits of standardization (related to the stakes and the evaluation of the use of standards – the economic aspect) ;
- standardization and intellectual property rights (legal and economic aspect of standards, with implications on the choice of standards developing organizations (SDOs) and on the paths of standards development) ;
- last but not least: the problem that many available standards are not used in practice. The Y2K problem with data representation in computer systems would not have existed had ISO 8601 been applied systematically.

A practical way to complete this non-exhaustive list is to examine existing standardization curricula, discuss the importance of the topics tackled, and place them within the basic skeleton or in the list of “annexes.”

Lastly, there can also be pragmatic considerations to determine the breadth and depth of the curriculum. It depends on the level of the students, the available time, the level and experience of the teacher(s), and the availability of textbooks and other materials.

If “the market” does not yet in a big way ask for education (or research) in standardization – with the exception of

Figure 3. Processes in formal standardization.



education on the application of certain specific standards – courses on standardization such as those proposed are gradually imposing themselves as highly motivating and useful. Next year, Prof. Albert J. Feilzer (professor in standardization) and I intend to further develop a standardization curriculum together with the Chair on Standardization at the University of the Federal Armed Forces Hamburg, Germany, and colleagues in

China, Indonesia, Sri Lanka, and Vietnam. For more information on the topic, we refer to the above-mentioned article in the EURAS Yearbook on Standardization II, which provides more underpinning, references to literature, and discussions on who should know what about standardization, and should this be part of regular education and/or of continuous education. □