Asia-Pacific
Economic Cooperation

APEC Sub-Committee on Standards and Conformance (SCSC)
Education Guideline 5: Standards Professional Development

Inspiring the Next Generation of Standards Professionals:

Towards Job Profiling in Today's Global World

10 March 2015

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PREFACE

On 10 Dec 2014, the author participated in a panel titled 'Standardization: an Excellent Career Path for Senior Engineers' at the 2014 IEEE Globecomm Conference held in Austin, TX. USA. During the panel discussion, I asked one other panel member, Dr. Alexander Gelman, the IEEE ComSoc Director of Standardization Programs Development, "Can you roughly assume how many standards experts work in the U.S.?" His quick response was "I presume it would be over 200,000." It is presumed that tens of thousands are working in standards developing organizations, testing/inspection laboratories; and hundreds of thousands are working for standards in R&D divisions and on quality teams in manufacturing and non-manufacturing companies.

Although there are no comprehensive statistics about the number of standards professionals and the related job market size in the APEC region as yet, our small survey of 26 companies in this project indicates that around 11.4% of these employees have standards-related tasks. According to 'Worldwide Testing Laboratories Industry 2013' by Barners Reports, it is estimated that around 0.63 million employments (jobs) exist in 2013 in testing laboratories industry in the sixteen APEC economies. Given that the estimation is largely limited to the conformity assessment, there are likely around one million jobs in the APEC region that are related to standards, conformity assessment, and metrology.

Under the umbrella of the APEC Sub-Committee on Standards and Conformance (SCSC), Member economies have collaborated in the areas of standards and conformance education, noting the views expressed by the 2006 APEC Ministerial Joint Statement on the importance of education on standardization and 2014 APEC Ministerial Joint Statement on Human Resource Development and Skills Training. Even though standards education activities have increased since 2006 in the region, the concept of a ***'Standards Professional'*** has been hardly defined and the needs of stakeholders have not yet been clearly disclosed.

This project is designed to contribute to APEC members by defining and sharing good practices on how to develop the next human resources for standards and conformance, the most important technical infrastructure, and furthermore how to set up a strategic plan for cooperation throughout the region. The outcome will hopefully narrow the gap among member economies and further enhance common understanding fo the standards and conformance area and facilitate free and open trade in the APEC region.

The main outcomes of this project will prepare and train different levels of interest groups. To implement project recommendations, follow-up projects will be further discussed and considered by APEC SCSC.

Given this opportunity, I would like to thank all the participating experts who made this study available as well as all the SCSC member delegates. The governments of the proposing economy is and the eight co-sponsoring economies of this project are – China, Indonesia, Japan, Peru, Singapore, Thailand, the U.S., and Viet Nam.

Special thanks should be given to the project overseer, Dr. Sanghern Seo in Korean Agency for Technology and Standards (KATS) for his support, and Dr. Sooyoung Kang in Korean Standards Association (KSA) for her assistance in implementing the project.

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Chief Researcher, Korean Standards Association (KSA), Republic of Korea

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1. INTRODUCTION

1.1 Background and Objective

(1) Background

This project titled, 'Inspiring the Next Generation of Standards Professional Development - Phase I: Identifying Stakeholder Requirements' is proposed and implemented under the APEC Committee on Trade and Investment (CTI) in its Sub-Committee on Standards and Conformance (SCSC) . Standards, a conformity assessment, and technology regulations have been increasingly important for strengthening the multilateral trading system in the APEC region, and its education and human resources development have become one of the key priorities of APEC CTI SCSC.

However, there has as yet been no common understanding or definition on the 'expert or professional for standards and conformity assessment' in the region, and this circumstance makes problematic the developing of human resources and further, the designing and operating of education programs effectively. This task is particularly important for those developing economies that have limited experience and financial resources for human resource development in the standards and conformity assessment field.

This report was proposed and approved in order to provide a venue for discussing and building a common understanding on what kind of standards professionals are needed for the current and future workforces in both the developing and developed economies of the region. The project will present a strategic opportunity for APEC in the field of standard and conformance.

(2) Objective

The objective of this project is to explore the skill-set required by standards professionals to meet the needs of businesses, government agencies, education institutes, and standards-related organization in the APEC region. The objectives of the project are the following:

- Define and categorize standards professionals
- Analyze current workforce requirements of standards professionals

- Identify gaps (if any) in workforce demand and education supply
- Analyze skill-sets, training programs, and materials and develop effective standards professionals
- Present actionable recommendations and a collaborative action plan in 2015-2020 within the region

This project is directly relevant to the following APEC project priorities from 2013 as derived from the instructions of the Leaders and Ministers:

- Standards, conformity assessment, technical regulations and regulatory cooperation (Rank 1)
- Next generation trade and investment issues (Rank 1)
- Education (Innovative Growth); Human resources development (Inclusive Growth) (Rank 2)

In the APEC CTI SCSC, the education on standards and conformance is set as one of the key priority activities. This education is included in all key priority documents, including SCSC's Terms of References (ToR) and the Collective Action Plan (CAP) and also set as one of the seven regular agenda items of the SCSC.

In principle, APEC SCSC has four main goals for advancing trade facilitation in the region — aligning national standards with international standards in priority areas; improving participation in the international standardization process through capacity building activities; promoting cooperation for technical infrastructure development; and enhancing both information exchange and knowledge on matters related to standards and conformance.

This project is designed to contribute to APEC members by defining and sharing good practices on how to develop the next general human resources for standards and conformance, the most important technical infrastructure, and further still, by setting up a strategic plan for cooperation among the region. The outcome will narrow the gap among member economies, enhance common understanding in the standards and conformance area, and help facilitate free and open trade in the APEC region.

1.2 Previous Efforts for Human Resources Development in APEC SCSC

(1) Capacity Building Activities (since 1994)

Since its inception in 1994, improvement of the capacity building of Member economies has been the major priority of the APEC SCSC. These capacity building activities have been mainly, but not limited to, seminars, training programs, or conferences on common interest areas of the Member economies. A few examples of these capacity building activities are:

- 8th Good Regulatory Practices (GRP) Conference (2015)
- Medical External Quality Assurance Capacity Building Program (2014)
- Improved Food Inspection Capacity Building using Risk analysis: Risk-based Food Inspection (2012)
- Seminar and Training Courses in Legal Metrology (2005)
- APEC/WTO Capacity Building: SPS Implementation Program (2002)

Also, it should be acknowledged that the APEC SCSC has been instrumental in bringing together the five APEC Specialist Regional Bodies (SRBs) to provide a coordinated approach to standards and conformance infrastructure development and capacity building in the region. The five SRBs are Asia Pacific Laboratory Accreditation Cooperation (APLAC), Asia Pacific Legal Metrology Forum (APLMF), Asia-Pacific Metrology Programme (APMP), Pacific Accreditation Cooperation (PAC), and Pacific Area Standards Congress (PASC). These organizations have contributed significantly in developing capability of professionals across the standardization, conformity assessment, and metrology in the Asia-Pacific region.

(2) Standards Education Activities (since 2006)

In 2006, the APEC Ministers expressed the importance of standards education and encouraged Member cooperation with the 2006 APEC Ministerial Statement. “Ministers recognized the importance of standards education and encouraged members to develop reference curricula and materials to address the significance of standards and conformance to trade facilitation in the region.”- 2006 APEC Ministerial Statement (Hanoi, Viet Nam, 15 – 16 November 2006) -

To implement the Ministerial statement, APEC SCSC started the ***APEC SCSC Education Initiative*** with three phase projects conducted by the SCSC during 2007-2011.

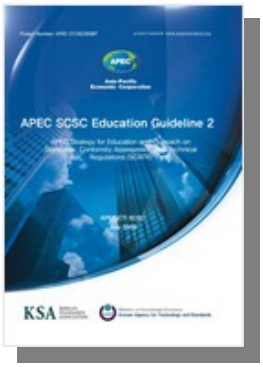
- [Phase I] Case Studies and Curriculum Development (CTI 21/2007T, completed in March 2008)
- [Phase II] Textbooks and Teaching Manual Development (CTI-SCSC 20/2008T , completed in June 2010)
- [Phase III] Exchange Program for Higher Education (CTI-SCSC 37/2010T, completed in October 2011)

The lead economy of the projects was Republic of Korea and co-sponsoring economies were China, Indonesia, Japan, Peru, Singapore, Thailand, USA and Viet Nam.

The outcomes of these three APEC SCSC education projects include seven APEC workshops, four publications (guidelines) as well as active discussion in APEC SCSC plenary meetings. So far, the four education guidelines have been accessed more than 230,000 times on the APEC publication website, while the Guideline 3 “Textbook for Higher Education - Standardization: Fundamentals, Impact, and Business Strategy” is recognized as one of the most accessed APEC publications as of January 2015. A summary overview and access information for prior APEC SCSC Education Guidelines are listed in Table1.

<Table 1> List of Prior APEC SCSC Education Guidelines

Education Guidelines	Access
 (APEC SCSC Education Guideline 1) **Case Studies on How to Plan and Implement Standards Education Programs and a Strategic Curriculum Model** Published in March 2008 Pages: 298 Contents: 7 Chapters Author/Editor: Dong Geun CHOI APEC Publication Code: APEC#208-CT-03.2 ►link: http://publications.apec.org/publication-detail.php?pub_id=69	11,133

 (APEC SCSC Education Guideline 2) **APEC Strategy for Education and Outreach on Standards, Conformity Assessment, and Technical Regulations** Published in July 2009 Pages: 47 Contents: 8 Chapters Author/Editor: ANSI APEC Publication Code: APEC#209-CT-03.3 ►link: http://publications.apec.org/publication-detail.php?pub_id=807	14,925
 (APEC SCSC Education Guideline 3) **Textbook on Higher Education - Standardization: Fundamentals, Impacts, and Business Strategy** Published in June 2010 Pages: 288 Contents: 10 Chapters Editors(3): Dong Geun CHOI et al Chapter Authors(7): Manabu ETO et al APEC Publication Code: APEC#210-CT-03.4 ►link:http://publications.apec.org/publication-detail.php?pub_id=1032	152,886
 (APEC SCSC Education Guideline 4) **Teaching Standardization in Universities: Lessons Learned From the Trial Program** Published in October 2011 Pages: 210 Contents: 15 Chapters Editor: Dong Geun CHOI Chapter Authors (15): Mingshun SONG et al. APEC publication code: APEC#211-CT-03.3 ►link:http://publications.apec.org/publication-detail.php?pub_id=1196	53,449
Total Access in the APEC Website (as of 12 Jan 2015)	***232,393***

(3) Human Resources Development Activities (since 2013)

This project titled "Inspiring the Next Generation of Standards Professional Development - Phase I: Identifying Stakeholder Requirements (CTI 07 2013T)" is based on a follow-up to the APEC SCSC Education Initiative and its projects.

After the completion of the education projects in 2007-2011, a number of Member Economies commented on the further need for education activities, in particular, to connect the education programs and actual stakeholder requirements in the workforce. These connections include identifying workforce requirements, developing more specialized education materials, and training needed trainers.

This report is, therefore, designed to contribute to identifying the workforce requirements and better connecting the demand side (i.e. industry and businesses) and the supply side (national standards bodies and education institutions) in order to develop the next generation of standards professionals.

The expected readers or beneficiaries of this report are APEC Member economies and their stakeholders who are interested in developing their human resources for standards and conformity. This project will offer the opportunity to APEC economies to share and benchmark experiences in different sectors and economies for the whole life cycle of standards and conformity – private business standards organizations, testing and inspection laboratories, certification or accreditation bodies, and metrology institutes.

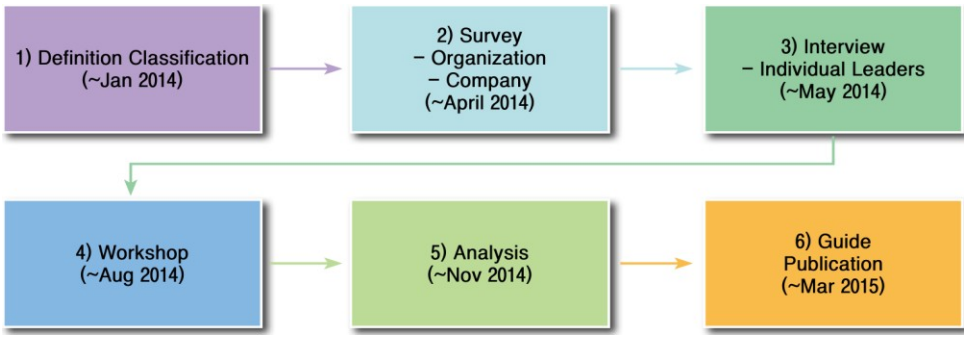
The chapter, which is *1. Introduction* is followed by *2. Project Design*, *3. Towards Definition and Classification of Standards Professionals*, *4. Standards Professionals in Companies, 5. Standards for Professionals in Standards-Specialty Organizations.* The final two chapters of this report are *6. Discussion and 7. Recommendations*. The Two chapters offer a summary of key issues and submit recommendations to APEC SCSC Members. Follow-up projects can be discussed and implemented using this report depending on the discussion at upcoming APEC SCSC meetings.

2. PROJECT DESIGN

2.1 Methodology

This project used three different methods to collect and analyze data related to standards professionals — 1) a survey of company/standards specialty organizations; 2) written interviews with thought leaders on standards and conformance, and 3) an experts' conference (workshop) to identify policy recommendations.

<Figure 1> Project Methodology and Schedule



To prepare the survey and the interview questionnaire, two project researchers worked with an advisory group (seven experts) from Nov 2013 – Feb 2014. The team developed a draft definition/classification for standards professionals. The draft definition has been modified and revised as noted in Chapter 3 after receiving comments and input from survey and workshop participants during 2014.

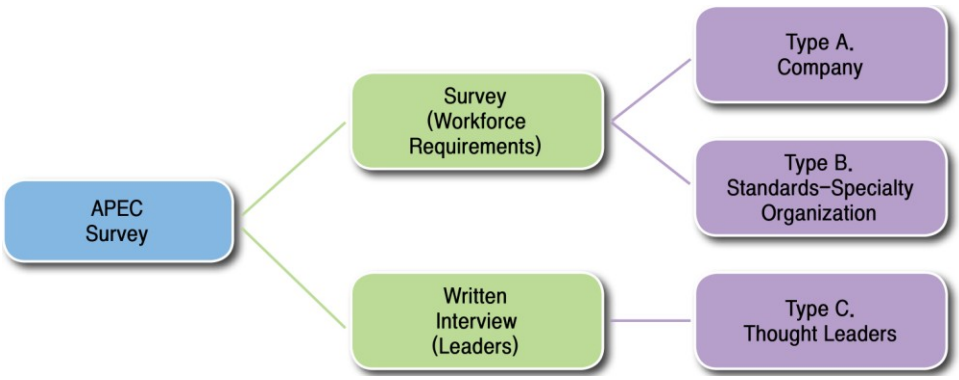
The survey and the interviews were mainly conducted during February-May of 2014.

First, the objective of the APEC wide-survey was to collect actual workforce information from each economy, including business, standards and conformity- related organizations. This survey was mostly conducted via SCSC representatives. The survey questionnaire is available in Annex C. Overall 30 companies and 35 standards specialty organizations responded in total.

Secondly, written interviews additionally invited input from executive level thought leaders in standards and conformance in the APEC region and also certain international organizations. Also, interviews with three young standards professionals were included in

order to share the viewpoints of the younger generation. As a result, a total of 22 thought leaders and 3 young professionals participated in the interviews.

<Figure 2> Project Survey and the Written Interviews



Third, a two- day APEC conference (workshop) was organized to review the survey responses, exchange ideas, and identify the priorities for future cooperation in the region in order to develop standards professionals. In the conference, nearly 60 experts p from 15 Member economies and non-member organizations participated. The conference goals was to have face to face, in-depth discussion on the following issues:

- Reviewing the definition/classification for standards professionals
- Job market and job(tasks) analysis
- Identifying needs and discussing recommendations for them

The conference was held on 9-10 August 2014 in the Beijing Hotel, Beijing, China. The conference program is available in Annex B. Conference speakers came from education institutions, SCSC representatives (survey collection), companies, and standards specialty organizations. The conference ended with open enlightening discussion and a final wrap-up.

2.2 Survey and Interviews

(1) *Survey Questions*

A project survey questionnaire was circulated to APEC SCSC representatives to collect and analyze current job characteristics and workforce requirements in companies and standards-specialty organizations in the region. Standards-specialty organizations included standards development organizations (SDOs), testing/inspection laboratories, certification/ accreditation bodies, metrology institutes – both governmental and non-governmental. The survey questions were separated for companies and standards-specialty organizations because the jobs and workforce requirements of each are quite different. The full text of these questions is attached in Annex C-1(Company) and Anaex C-2(Organization).

<Table 2> Survey Questions

1. Org/Company Overview

1.1 Employees and Budget of entire company
1.2 Number of Employees in Standards-related Tasks
1.3 Number of Senior Executives in Standards-specialty Positions

2. Job Analyses and Profiling

2.1 Jobs for Standardization
- 2.1.1 Standardization – Current Status Profiling
- 2.1.2 Standardization – Requirement Profiling
- 2.1.3 Standardization – Sample Requirements (Advertisements)
- 2.1.4 Standardization – Training Program: Status and Needs
- 2.1.5 Standardization – Personnel Certification: Status and Needs

2.2 Jobs for Conformity Assessment
2.2.1~2.2.6 (same questions)
2.3 Jobs for Metrology
2.3.1~2.3.6 (same questions)

3. Overall Recommendations to APEC SCSC

3.1 Comments on Definition/Classification of the Standards Professional
3.2 Career Path and Vision for Standards Professional
3.3 Recommendations for APEC SCSC Members

- Full text of the survey questionnaire is available in Annex C-1 and C-2

(2) ***Interview Questions***

An interview questionnaire was circulated to both APEC SCSC representatives and individuals to share different career development experiences and ideas of the thought leaders in the standards arena. Most had more than 25 years' experience in standards-related tasks. The full text of these questions is in Annex C-3. Also, the full text of the written interviews result is available in Annex A.

<Table 3> Interview Questions

1. Would you please describe your career path -- when and how you started your career and then developed it throughout your professional life by far?
2. What do you think are the most important event(s) or experiences(s) in your professional career as a standards professional?
3. What kind of standards professionals did you hire or will hire? What kind of knowledge, skills, experiences, or attitudes do you expect from them?
4. How do you see conceptually professional development or practically the job market for standards professionals? Can you share your vision or prediction on standards professionals with the next generation or with current experts' working in standards-related tasks?
5. Finally, please share your suggestions or recommendations to inspire standards professional development for the APEC Member Economies, their organizations, or companies, in terms of regional and/or international cooperation.

- The full text of the survey questionnaire is located in Annex C-3

2.3 Collected Data from the Survey and Interviews

Thankfully, in the Type A survey for companies, 28 companies responded to the Type A survey for companies, and 2 additional companies provided a similar level of information in the project workshop held in August 2014 at the Beijing workshop. These companies included SMEs and large enterprises in the steel, electronics, chemical, and defense industries. The eight participating economies in the Type A survey were China, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, and Chinese Taipei.

In the Type B survey for standards specialty organizations, 35 organizations responded. The specialty organizations consisted of ISO members (government and non-government), standards development organizations, testing/inspection labs, certification bodies, and metrology institutes. The 13 participating economies in the Type B survey were Australia;

Canada; China; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Peru; Philippines; Chinese Taipei; Viet Nam; and the U.S.

In the Type C interviews given to thought leaders, 22 thought leaders on the executive and middle management level participated. Additionally, based on the input from the advisory committee and the project overseer, we added interviews with three young professionals (YP) in Korea to hear their youthful perspectives on the human resources development of standards professionals. The full responses for the 25 written interviews are available in Annex A. (see Table 4>

<Table 4> Survey and Interview Responses

Economy	***Type A Companies***	***Type B Specialty Organizations***	***Type C Leaders & YP***
Australia	--	1	--
Canada		1	1
China	2	1	1
Hong Kong, China	--	4	--
Indonesia	2	2	4
Japan	7	7	2
Korea	8	5	2 plus 3 YP
Malaysia	2	1	2
Peru	-	1	1
The Philippines	2	3	1
Singapore	2	--	--
Chinese Taipei	5	6	
Viet Nam	--	2	1
United States	-	1	1
*International	-	--	6
합계	30 Companies	35 Organizations	22 Leaders & 3 YP

*YP: Young Professional

3. RESULTS – TOWARDS DEFINITION AND CLASSIFICATION OF STANDARDS PROFESSIONALS

3.1 Definition of Standards Professionals

When we discuss and cooperate how to develop the next generation of standards professionals, there is a prerequisite to find common understanding on 'who and what standards professionals' are — a definition and classification of standards professionals. Because there is *no universally used or accepted definition of standards professional as yet*, this project proposed and the used the following definition of standards professionals and drawing on their tasks.

By definition, a professional is someone who has a job that requires special training, education, or skill, while an amateur does the same for pleasure, not as a job. (see Table 5) Therefore, s**tandards professionals are *those people who have job or business activities in the standards areas — standardization, conformity assessment, and metrology***.

Standards professionals are those people who have a job or business activities in the standards areas — standardization, conformity assessment, and metrology.

<Table 5> Professional vs. Amateur (by Webster Dictionary Definition)

Professional - *someone who does a job that requires special training, education, or skill* - *someone who is a member of a profession* - *someone who is paid to participate in a sport or activity* - *someone who has a lot of experience or skill in a particular job or activity* *(source: http://www.merriam-webster.com/dictionary/professional)*
Amateur - *a person who does something (such as a sport or hobby) for pleasure and not as a paid job* - *a person who does something poorly : A person who is not skillful at a job or other activity* *(source: http://www.merriam-webster.com/dictionary/amateur)*

3.2 Classification of Standards Professionals (the task-based approach)

(1) ***Overview***[1]

The different standards-related activities can be clustered into three groups – standardization, conformity assessment, and metrology.

Standardization includes the developing, adopting, and disseminating of standards for products, processes, and management systems. *Conformity assessment* includes activities and procedures that fulfil specific requirements of standards, such as testing, inspection, certification, and their accreditation. The metrology pillar includes the process for a scientific and legal metrology system that ensures that measurements are made with appropriate accuracy and reliability both domestically and internationally[2]. A standards system of an economy can serve as the foundation for a national quality system and, further still, as a system for national technology innovations [3].

Applying this classification of standards-related activities, we developed a preliminary classification of standards professionals in early 2014, which we then used as the basis of the project survey. After we have received comments from survey participants, interviewees, and project workshop participants throughout 2014, the classification was revised as described in this report.

Usually, these professional activities require a certain level of knowledge, skills, experiences, and education. These standards-related activities may be their primary (major/full) duty or a secondary (partial) duty in terms of task priority or time allocation. The duties and responsibilities of standards professionals may include the following tasks, but not limited to, the three domains of standardization, conformity assessment, and metrology, respectively.

Since the jobs and tasks in companies and standards-specialty organizations may be different, we distinguished the tasks where necessary. In this report, standards-specialty

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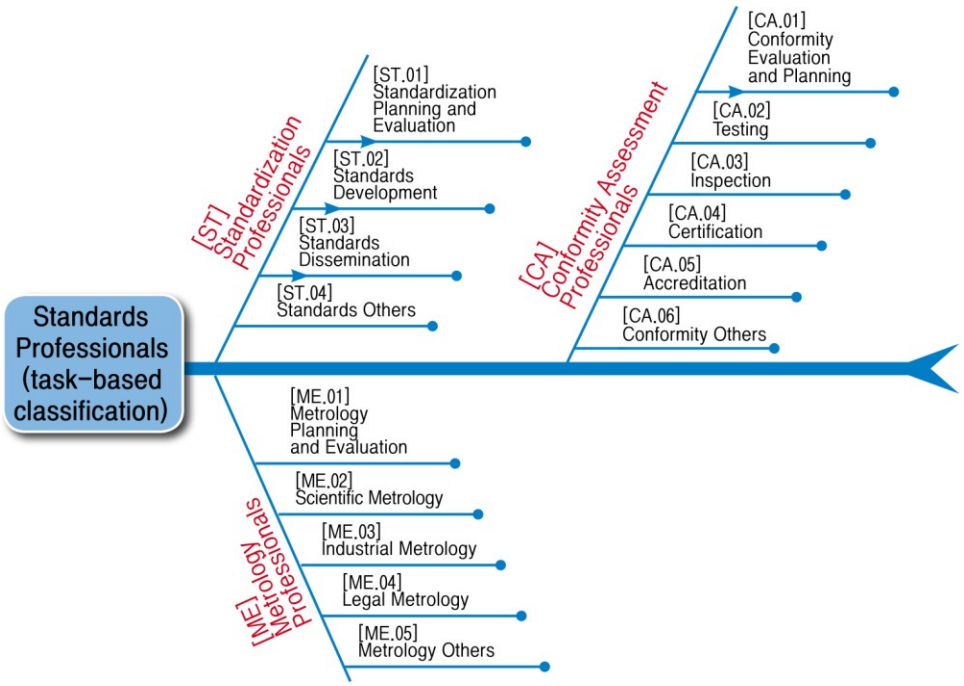
[1] The terms used here are defined in the following references:
- ISO/IEC Guide 2 (Standards, Standardization)
- WTO/TBT Agreement (Standards, Regulations, and Conformity Assessment)
- BIPM website (Scientific/ Industrial/ Legal Metrology)

[2] ISO, UNIDO, 2009. The Conformity Assessment Toolbox. ISO/UNIDO, Geneva

[3] Choi et al, 2014, Standards as a catalyst for national innovation and performance – a capability assessment framework for late-comer countries. Total Quality Management & Business Excellence

organizations are those specialized organizations that are mainly dedicated to standardization, conformity assessment, and metrology. These organizations include national standards bodies (NSBs, usually members of ISO or IEC), standards developing organizations (SDOs), testing laboratories, certifications bodies (CBs), accreditation bodies (ABs), and national metrology institutes (NMIs). The organizations can be governmental, public, or private (either not-for profit or for-profit). Governmental regulatory agencies may be considered a specialty organization in the sense that they set and enforce mandatory standards (technical regulations).

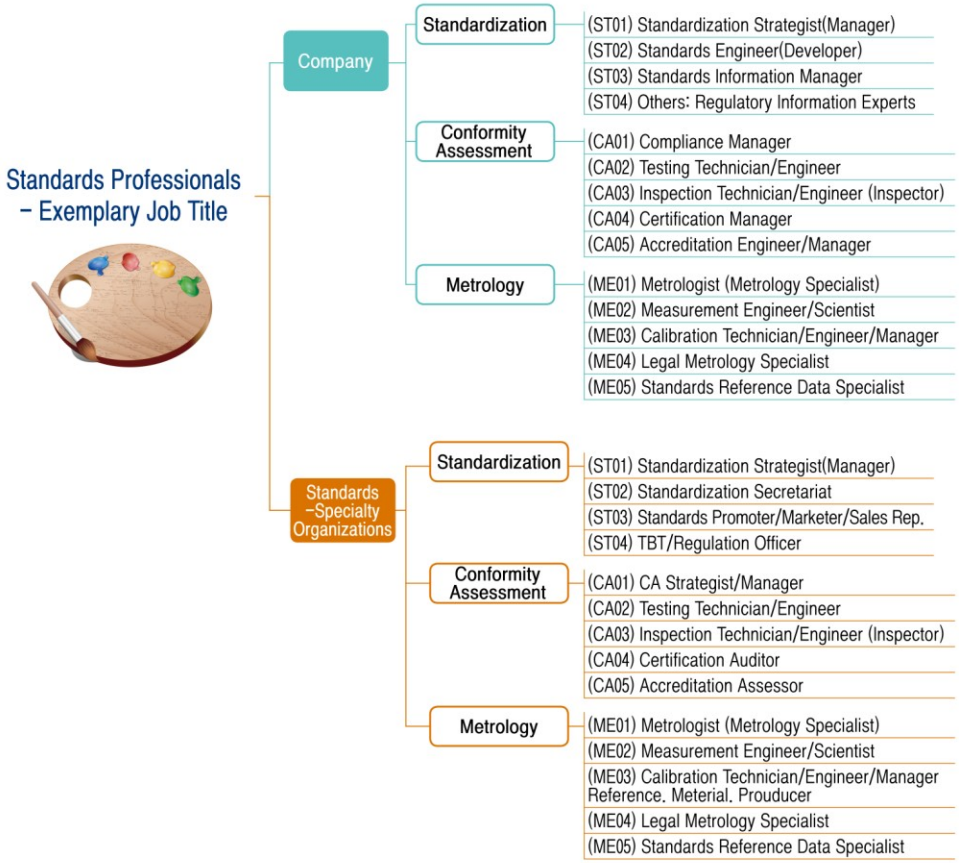
<Figure 3> Standards Professionals – Classifications (the Task-based Approach)



(2) ***Job Titles***

Based on our project survey and additional web survey and the project advisory group, we developed exemplary job titles for standards professionals both in companies and standards-specialty organizations. Some of the most commonly used job titles are *standards engineer* (company) or standardization secretariat (specialty organization).

<Figure 4> Standards Professionals - Exemplary Job Title



3.3 Classification of Standards Professionals – Sub-Categories

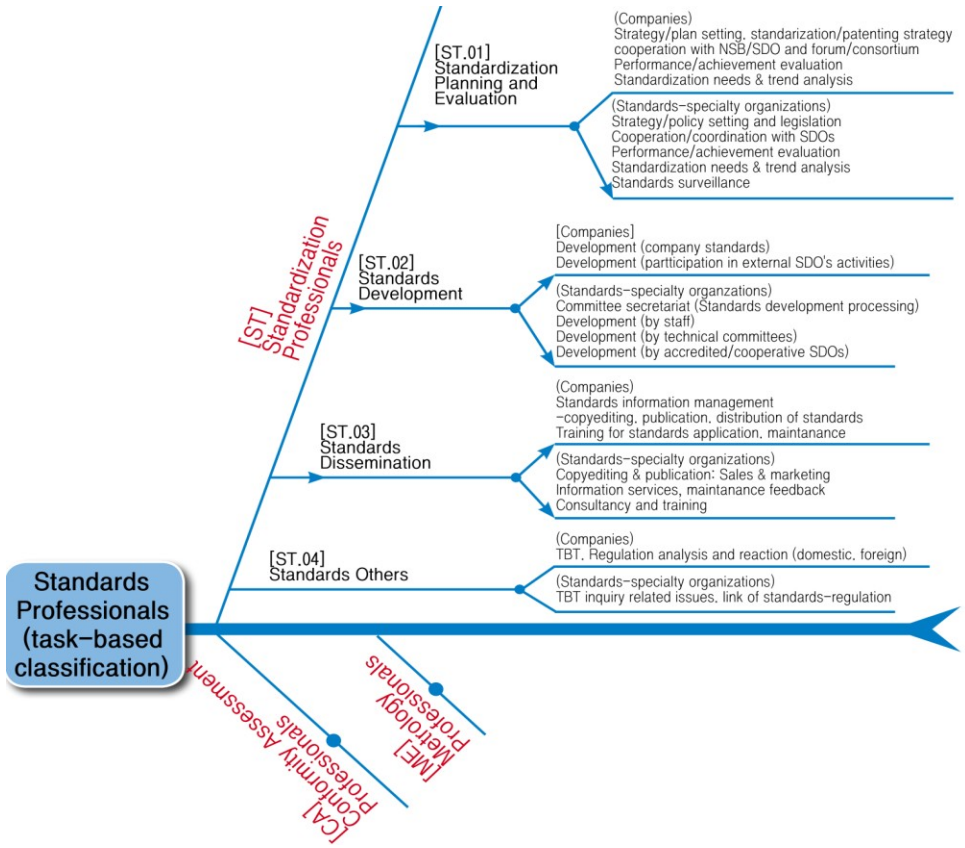
(1) [ST] Standardization Professionals

Standardization professionals are those who are involved in the tasks of Standards planning and evaluation [ST.01], Standards development [ST.02], Standards dissemination [ST.03], and Other Standards-related tasks [ST.04].

The major tasks of standards planning and evaluation [ST.01] include standards strategy/policy setting and legislation, standardization cooperation/coordination with SDOs, performance/achievement evaluation, and standardization needs and trend analysis in standards-specialty organizations. In companies, they also include the tasks of strategy/plan setting, standardization, and patenting strategy.

The more detailed tasks of standards planning and evaluation [ST.01], standards development [ST.02], standards dissemination [ST.03], and standards-related tasks [ST.04] are described in Figure 5.

<Figure 5> [ST] Standardization Professionals

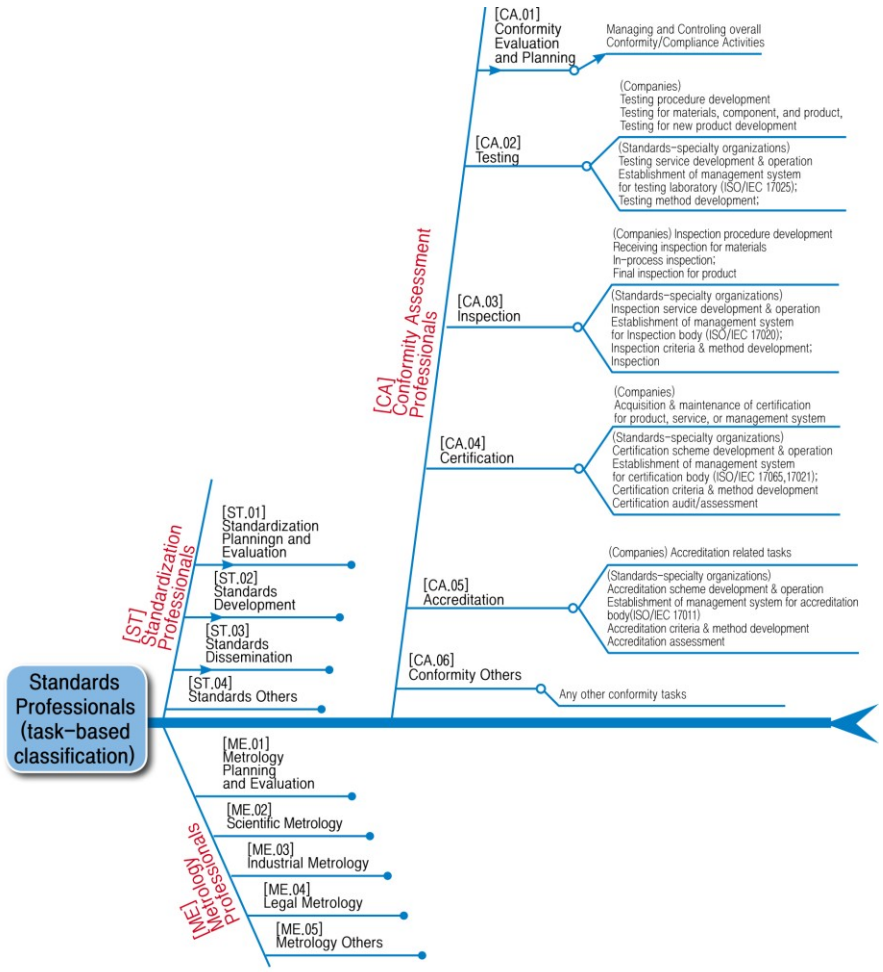


(2) [CA] Conformity Assessment Professionals

Conformity assessment professionals are those who are involved in the tasks of Conformity planning and evaluation [CA.01], Testing [CA.02], Inspection [CA.03], Certification [CA.04], and Accreditation [CA.05].

The major tasks of Testing [CA.02] include, in standards-specialty organizations, testing service development and operation, establishment of a management system for a testing laboratory (ISO/IEC 17025), testing method development, and testing. In companies, these tasks also include testing procedure development, testing for materials, components and products, and testing for new product development. The more detailed tasks of Conformity planning and evaluation [CA.01], Testing [CA.02], Inspection [CA.03], Certification [CA.04], and Accreditation [CA.05] are illustrated in Figure 6.

<Figure 6> [CA] Conformity Assessment Professionals



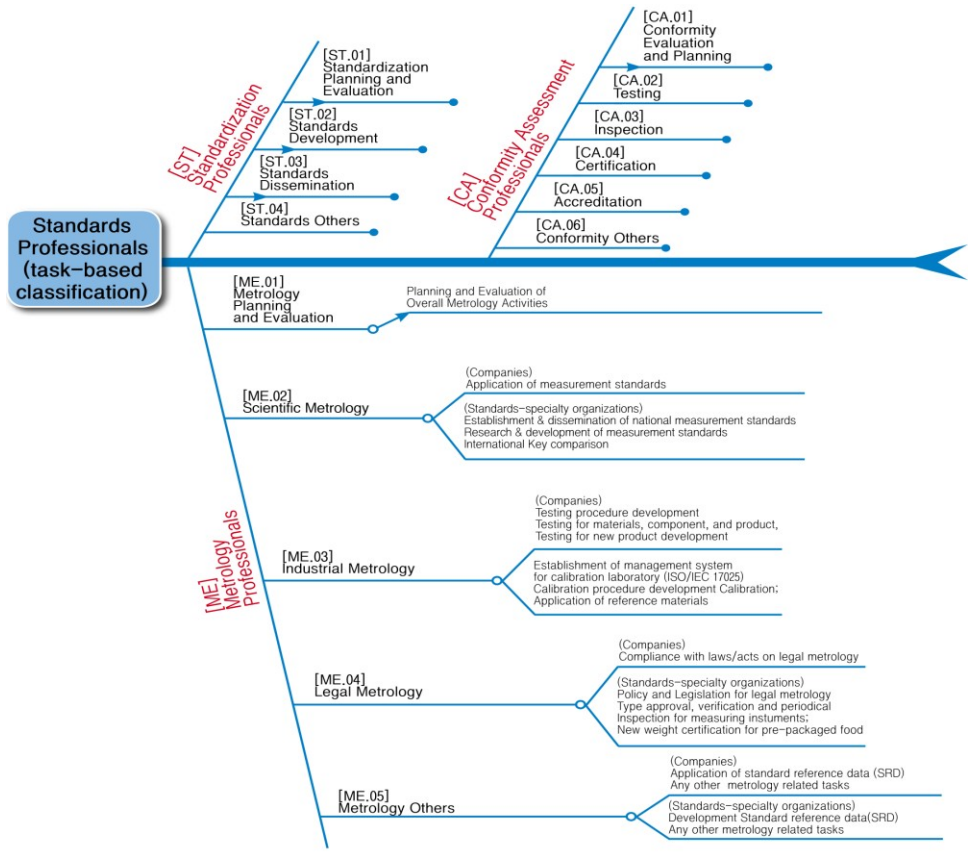
(3) [ME] Metrology Professionals (Metrologists)

Metrology professionals or metrologists are those individuals who are involved in the tasks of Metrology planning and evaluation [ME.01], Scientific metrology [ME.02], Industrial metrology [ME.03], legal Metrology [ME.04], and other Metrology- related tasks [ME.05]

The major tasks of legal metrology [ME.04] include in standards-specialty organizations policy and legislation for legal metrology, type approval, verification and periodical inspection for measuring instruments, and net weight certification for pre-packaged food. In companies, a major task is to secure compliance with the laws/acts applying to legal metrology.

The more detailed tasks of Metrology planning and evaluation [ME.01], Scientific metrology [ME.02], Industrial metrology [ME.03], legal Metrology [ME.04], Metrology-related other tasks [ME.05] are shown in Figure 6.

<Figure 7> [ME] Metrology Professionals (Metrologist)



4. Results – Job Market And Job Profiles In Companies

4.1 Number of Standards Professionals in Companies

(1) 11.4% of Total Employees are involved in standards-related tasks

The responses from the 26 companies show that around 11.4% of their total employees are involved in standards-related tasks. Although this figure should not be over -generalized, 24 companies do have employees who are in charge of standardization, conformity assessment, and metrology -related tasks.

<Table 6> (In Companies) On average 11.4% of the Total Employees Have Standards-related Tasks

No.	*Total Employees*	*Standards-related Employees*	*Ratio (%)*	*Industry Sector*
1	120	0	0.0%	Energy
2	190	0	0.0%	Steel
3	30,000	65	0.2%	Electronics
4	146,300	300	0.2%	Electronics
5	70,000	280	0.4%	Electronics
6	300,000	1300	0.4%	Electronics
7	306	4	1.3%	Non-profit
8	29,394	450	1.5%	Electronics
9	1,500	45	3.0%	Steel
10	400	16	4.0%	Food
11	8,500	350	4.1%	Electronics
12	8,000	430	5.4%	Construction
13	500,000	29534	5.9%	Aerospace
14	1,200	100	8.3%	Energy
15	1,600	137	8.6%	Automobile
16	40,000	3600	9.0%	Electronics
17	1,031	103	10.0%	Construction
18	252	33	13.1%	Food
19	15,000	2000	13.3%	Steel
20	25,000	3700	14.8%	Electronics
21	470	85	18.1%	Chemical
22	120	22	18.3%	Electronics
23	86	29	33.7%	Non-profit
24	2,200	830	37.7%	Energy
25	153	64	41.8%	Electronics
26	1,500	650	43.3%	Automobile
Total	**1,183,322**	**44,127**	**296%**	--
Average	**45,512**	**1,697**	**11.4%**	--

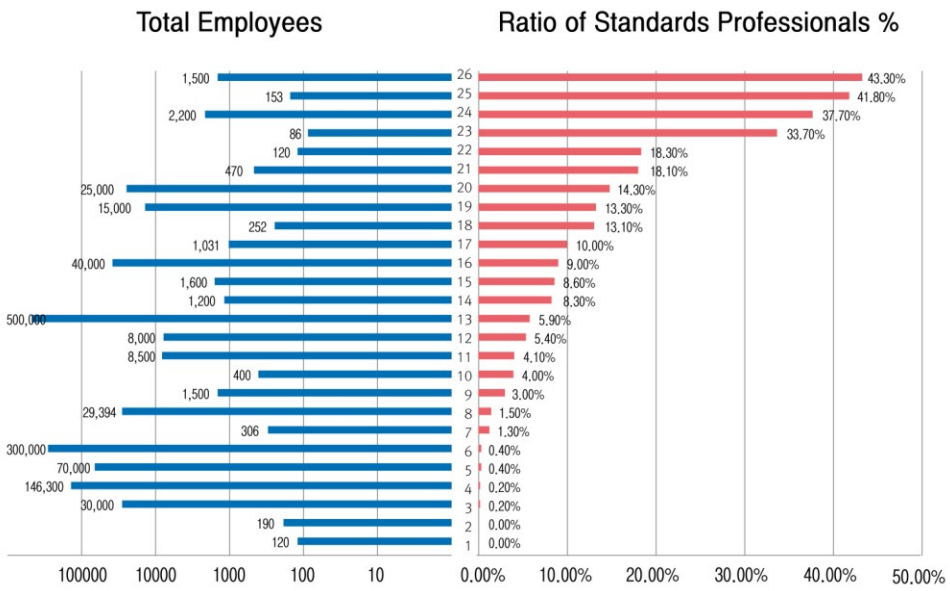
4.2 Comparison of Large and Small Companies

Due to the confidentiality concerns expressed by some of the participating companies, we decided not to disclose all the company information. However, the results do show that the ratio of standards-related employees (standards professionals), are neither directly nor inversely proportional to the number of total employees or the size of company as shown in Figure 8. The same observation applies to the industry sector. The average ratio of the 10 companies in the electronics sector was 9.1%, but the ratio varied from 0.2% (a company with 30,000 total employees) to 41.8% (a company with 153 total employees).

Such ratio variations could originate for different reasons. One main reason could different counting for the survey; some companies may have counted only direct or full-time standards engineers, while others may have counted all employees who handle somewhat standards-related tasks, but as secondary duties.

Regardless of this data limitation, these responses do provide us with sound evidence that there is a job market for standards professionals in private companies of different sizes and from different industries in the region.

<Figure 8> (In Companies) Ratio of Standards Professional to Total Employees is Not Proportional

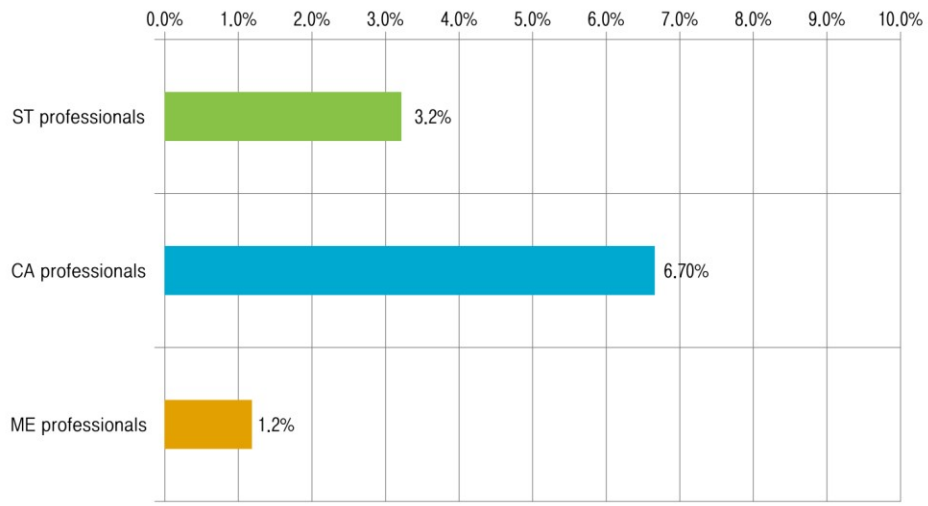


4.3 Standards Professionals in Three Domains of ST, CA, ME

Drawing on the 26 responses, on average, 3.4% of these total employees have tasks related to standardization, 6.7% related to conformity assessment, and 1.2% have tasks related to metrology. Again, the average ratio was also calculated as the average of 26 ratios, respectively, to avoid any distortion caused by big company partiality.

Among these three domains, conformity assessment professionals ranked first, followed by professionals of standardization and metrology. This result indicates that more employees are involved in the application/use of standards (conformity assessment) than in the development/dissemination of standards (standardization). Metrology professionals showed the lowest number in all three domains. (see Figure 9)

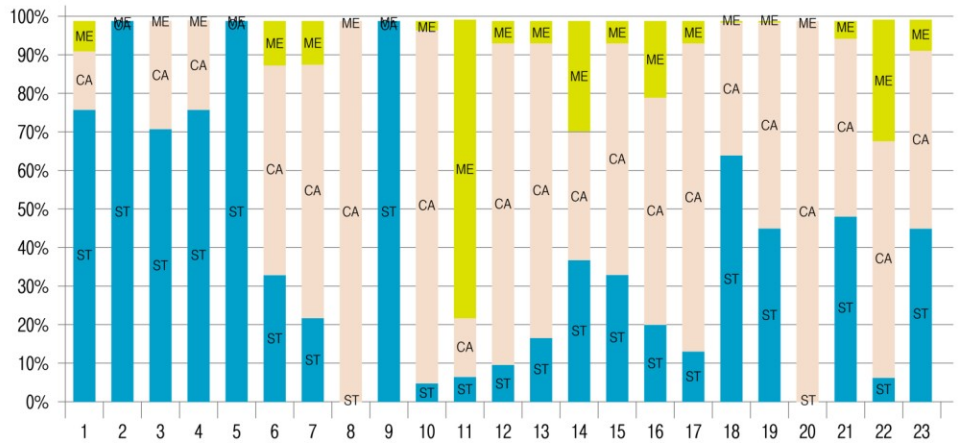
<Figure 9> (In Companies) On Average, CA professionals Hold the Largest Number of Jobs



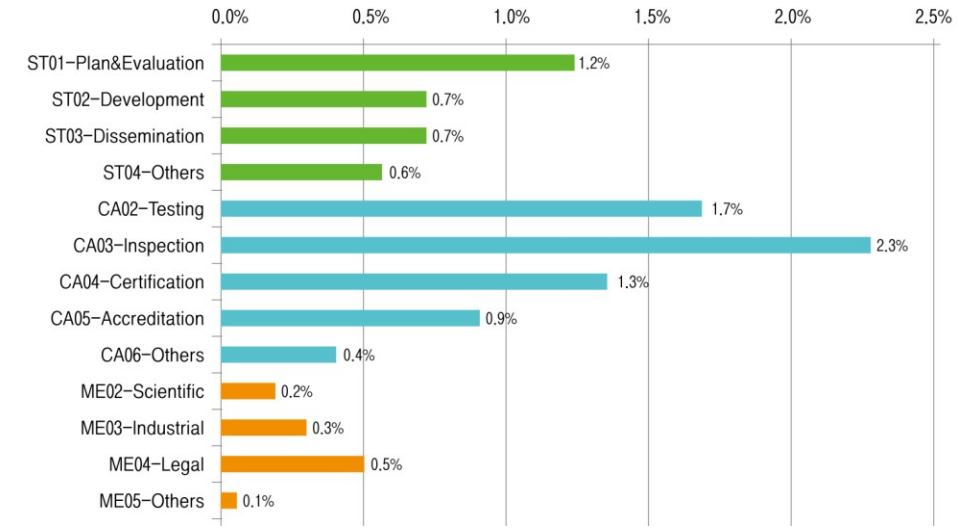
The composition ratios for standardization (ST), conformity assessment (CA), and metrology professionals (ME) in the 26 companies, respectively, showed no common tendency. Standardization professionals are the largest group in some companies (Company 1, 2, and 3) while conformity assessment professionals were the largest group in many other companies. In only one, Company 11, were metrology professionals the largest group. The ratio may also be linked to the products and services these companies

provide, so future study should investigate that linkage between the characteristics of a company and its standards professionals.

<Figure 10> (In Companies) The Composition of Standards Professionals in Respective Companies Are Dissimilar



<Figure 11> (In Companies) On Average ST01 (Plan), CA02 (Inspection), ME 04 (Legal) hold the Largest Number of Jobs



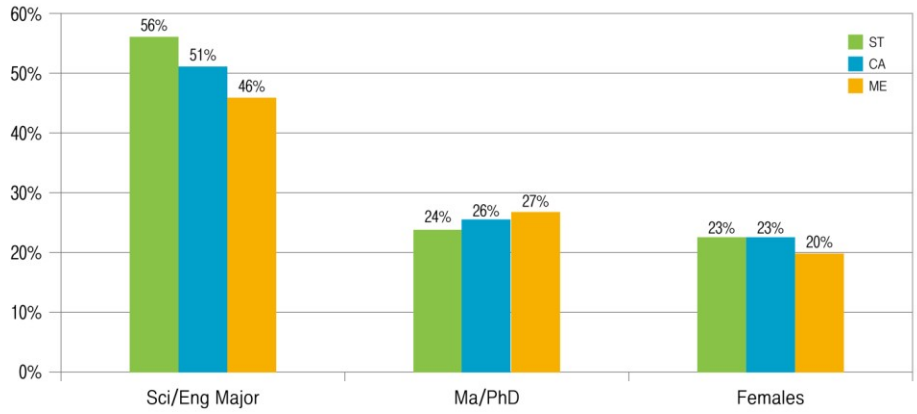
The survey also inquired on the number of employees in each sub-classification of standards professionals as described in Chapter 3. Figure 11 summarizes this result. In the standardization category, standards planning and evaluation (ST01) has the largest

number of jobs on average, followed by standards development and dissemination. In conformity assessment, Inspection(CA02) and Testing(CA01) have the largest number jobs followed by certification (CA03). In metrology category, legal metrology (ME04) has the largest numbers jobs on average followed by industrial metrology (ME02). Please note that these survey results do not include Conformity planning & evaluation (CA01) and Metrology planning & evaluation (ME01) because these two sub-categories were added after the survey was conducted.

4.4 Competency Characteristics of Current Employees

To understand the job market better, we collected information on the basic characteristics of standards professionals – science/engineering degree holders, master/PhD degree holders, and females. We note Figure 12 that nearly half of the standards professionals majored in science and engineering. Standardization professionals in these companies had the highest rate of science/engineering majors while metrology professionals had the lowest. For advanced degree holders, there was very little difference among the three category professionals, as around one quarter hold Master/PhD degrees. A total of 22 Companies responded to this section of the survey

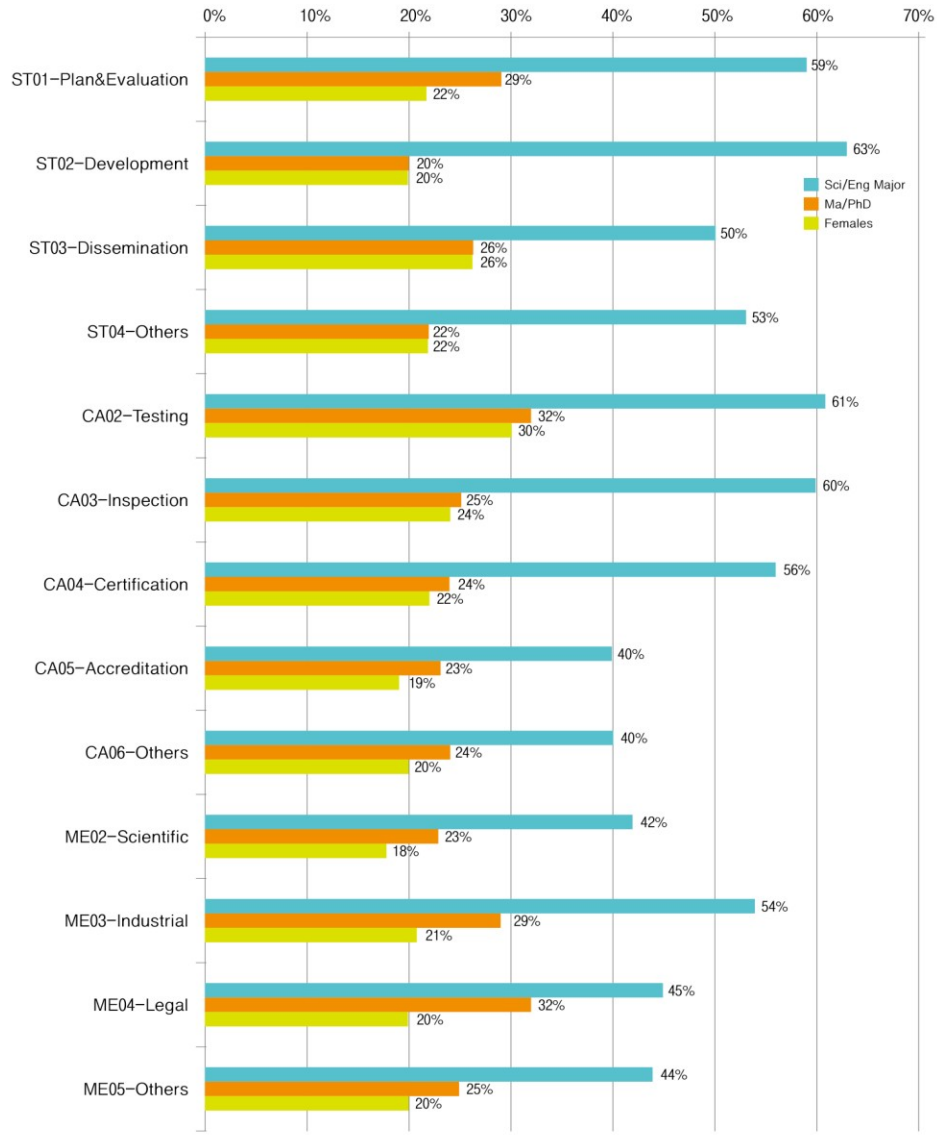
<Figure 12> (In Companies) Current Employees – Half of the Employees Majored in Science/Engineering; about One-Quarter Hold Advanced Degrees and Are Females



Here Figure 12, the characteristics are matched to each sub-category of the standards professionals. For science and engineering majors, professionals in standards development (ST02) and testing (CA02) had the highest numbers, while accreditation

(CA05) had the lowest. For the advanced degree holders, testing (CA02) and legal metrology (ME04) showed the highest ratio. Testing(CA02) professionals held the highest ration of female experts. Again, these results should not be over-generalized but considered as an adequate sample of information, we tested but a small part of the real job market only.

<Figure 13> (In Companies) Current Employees – Characteristics According to Each Category

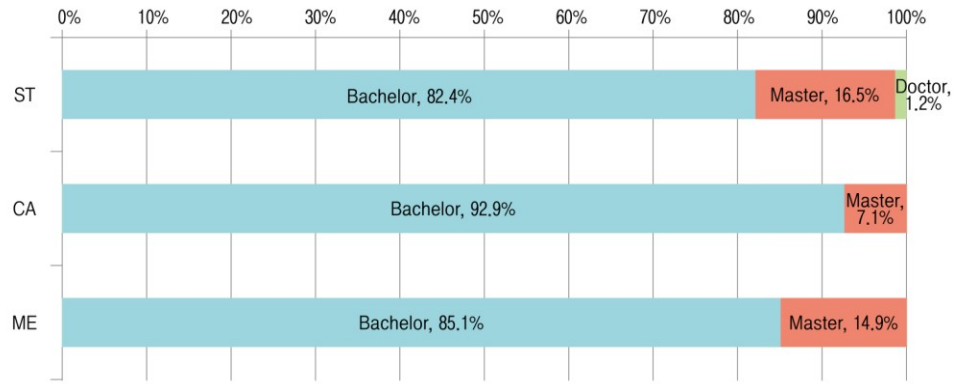


4.5 The Expected Competency Requirement of New/Potential Employees

When companies have any vacancies, they will have in place certain internal requirements or expectations when recruiting new employees. This section analyzes the minimum or preferred requirements for their potential employees by education degree, education major, work experience, required/preferred personnel certification, and future needs for personnel certification.

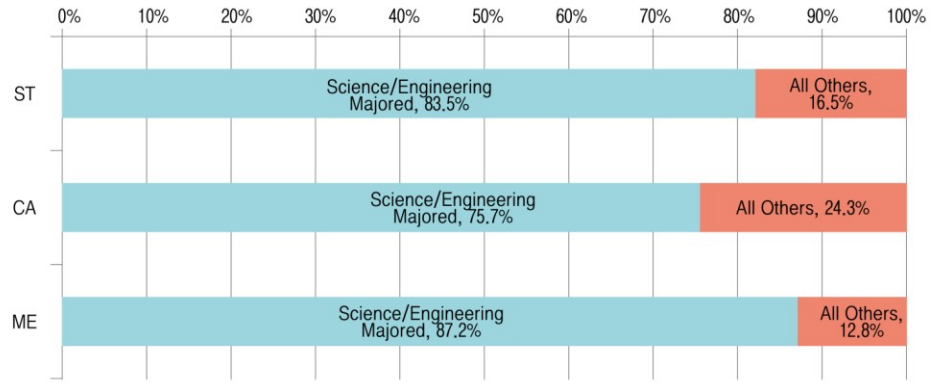
In terms of a required education degree, a Bachelor degree is the most common, and while some employees do require a Master's degree, very limited positions require a PhD. Overall, standardization professionals need a slightly higher academic degree than do those in conformity and metrology positions. For standardization positions (ST), about 82.4% require a Bachelor degree, 16.5% require a Master's degree, and only 1.2% require a Ph.D degree. For conformity assessment positions (CA), about 92.9% require a Bachelor degree, and 7.1% require a Master's degree as a minimum education**.** For metrology positions, 85.1% require a Bachelor's degree, and 14.9% require a Master's degree as a minimum education.

<Figure 14> (In Companies) Minimum Degree Requirements



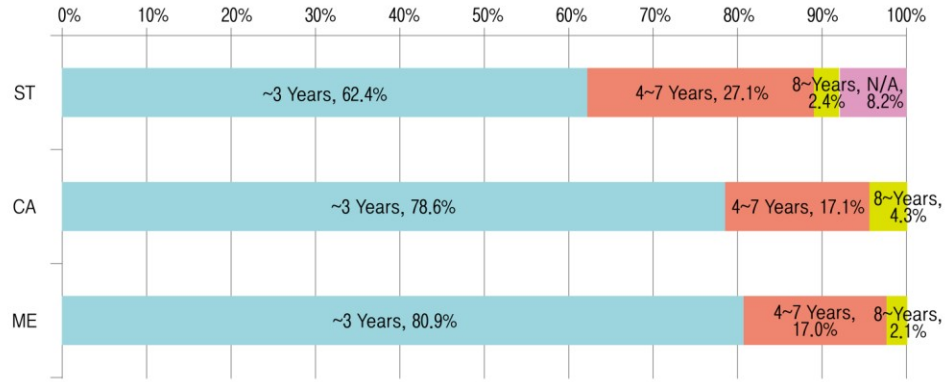
To determine the required or preferred major, we simply asked whether employers require or prefer science/engineering majored employees or do not. The results show that most positions do require science/engineering major. Metrology positions require the highest rate at 87.2%, while standardization positions are 83.5%, and conformity positions require 75.7%. (see Figure 15)

<Figure 15> (In Companies) Preference for Science/Engineering Majors



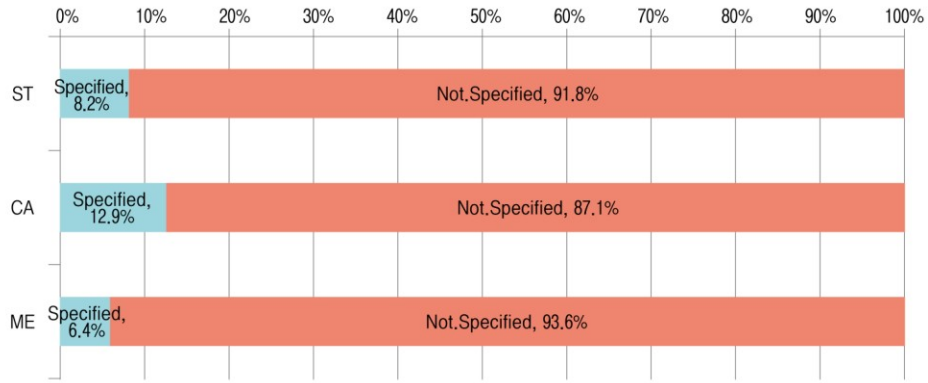
For the required minimum work experience, nearly 37.6% of the employers require more than 4 years of work experience in standardization positions, while 21.4% require 4 years in conformity assessment positions and 19.1% require above 4 years' experience in metrology positions. (See Figure 16)

<Figure 16> (In Companies) Minimum Work Experience Requirements



Personnel certification is not popularly used in job postings seeking for standards professionals. Only around 10% of the survey positions required certification. Conformity assessment positions used personnel certification more than standardization and metrology field as a requirement. (See Figure 17)

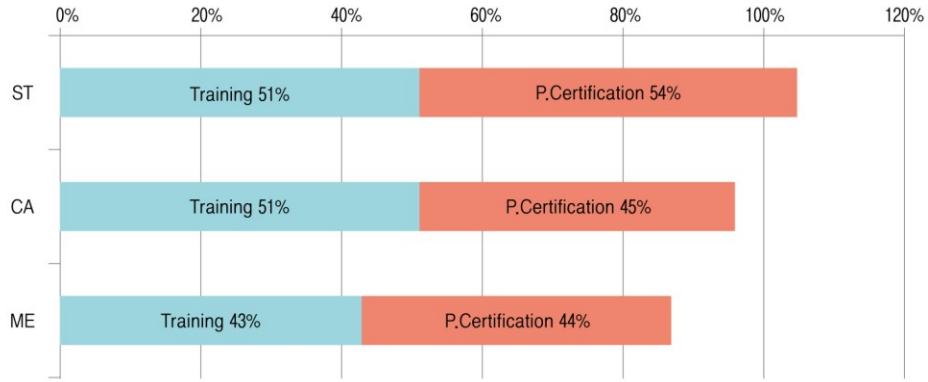
<Figure 17> (In Companies) Personnel Certification Requirements



4.6 Future Need for Training and Personnel Certification

Among the three fields, those positions related to standardization needed the highest level of training and personnel certification. In particular, a future need for personnel certification was the highest (54%) for the standardization field.

<Figure 18> (In Companies) Future Needs for Training and Personnel Certification



4.7 Examples of Typical Job Postings

Job advertisements provide us with a good opportunity to recognize the valid needs of industry for standards professionals. Table 7 presents thirteen real sample advertisements from nine different participating companies and notes the position title, descriptions of the major tasks, and minimum and/or competency requirements for each position.

<Table 7> (In Companies) 13 Company Job Posting Examples

1) **Position Title** : **Standards Manager [ST01]**

> **Description**

1. Plan standards strategy;
2. Place technology innovation projects into international or national standards;
3. Participate in the international standards organization, contribute to meetings and related standardization activities;
4 Organize and put forward proposals for international and national standards;
5. Establish international standard library resources for company.

> **Requirements**

- Degree: Ph.D
- Major : Science & Engineering
- Experience:3 + years。Strong communication and coordination abilities demonstrating clear and logical thinking

2) Position Title : Engineer [ST02]

> **Description**

- Standards development

> Requirements

- Master's majoring in Science or Engineering with minimum 3 years' related experiences

3) Position Title: Technical Chief Assistant [ST02/ST03]

> Description:

- Prepare the Technical Project Proposal; Technical design; Technical Implementation

> Requirements

- Engineering degree; Technical experience; Standardization experience

4) Position Title : ISO Specialist [ST04]

> Description: Plan, execute, and review yearly ISO action plan. > **Requirements** :

- Master's degree with major in Business Management preferred.
- At least 3 years' working experience as internal auditor or experience applying the ISO 9001/ 27001 system.
- Certified Quality Manager.
- Fluent English in both speaking and writing.

5) Position Title : Compliance Engineer [CA01, CA04]

> **Description**

- According to the R&D and market demand, obtain product certification certificate for the Production Line to make sure orders of product are timely and effectively delivered;
- Organize implementation of production safety system inspection to guarantee the consistency of production and meet factory audit requirements;
- Develop and revise product safety design handbook for guidance of product design and evaluation to ensure zero potential in safety design.
- Promote product safety risk assessment and establishment of safety risk prevention system
- Maintain files on the related certification agency, manage related affairs, and deal with the communication to and coordination of business with certification agency.

> Requirements

-Bachelor's degree or above (electronic, electrical, electronics, energy, or engineering majors.)
- 5+ years of work experience; Fluent English skills

6) **Position Title : Engineer [CA01, CA02, CA03]**

> **Description:** Conformity assessment of electrical products

> **Requirements**: Bachelor's degree with major in Science or Engineering , minimum 2 years of related experience

7) **Position Title: Management Representative [CA01**]

> **Description**

- Coordinate preparation of document ISO 9001 : 2008 and HACCP.
- Create a work plan for implementation and maintenance of management system ISO 9001 : 2008 and HACCP.
- Monitor achievement of the target application for ISO 9001: 2008 in each section.
- Check and validate quality manual, quality procedures, and quality document.
- Review renewal of management system ISO 9001:2008, HACCP and provision of that document based on revision of management system.
- Deal with external parties to implement QMS ISO 9001:2008 and HACCP.
- Report on the implementation of management system ISO 9001:2008 and HACCP by all sections and report to top management on the management system.
- Conduct internal audit function.

> Requirements - Candidate must possess at least a Bachelor's Degree
- At least 2 year(s) of work experience in a related field is required .
- Communication skills and presentation experience.
- Management skills; Leadership skills; Good Analytical ability

8) Position Title : Quality Control Engineer [CA01, CA03, CA04]

>**Description**

- Inspect all material, process production, and finish product.
- Review results for status decision and initiate action for investigation to coordinate with production.
- Plan, coordinate, and direct handling material for incoming quality analysis.
- Review results for status decision and initiate action for investigation to coordinate with procurement and QC team.
- Follow analysis validation program and ensure the reager used is valid.
- Undertake lab analysis; coordinate with QC team supervisor and QA teaml.

> **Requirements** - - Candidate must possess at least a Bachelor 's degree in Chemistry, Food Science, or Biology.

- Required language is English and Indonesian
- At least 1 year(s) of work experience in related field.
- Preferable specialization in Quality Control /Assurance or the equivalent.
- Good knowledge of quality management system ISO.
- Good personality and health.
- Ready to work to tight deadlines with high expectations.
- Knowledge of basic root cause analysis

9) **Position Title: Research & Development [CA02, CA03]**

> **Description**

- Perform test and inspection laboratory scale to ensure quality of products and materials.
- Verify the sample for organoleptic parameters, chemical and microbiological
- Analyze the results of laboratory tests to used to determine quality of product.
- Ensure accuracy of all test Results.
- Undertake research and development.

> **Requirements** - - Bachelor's Degree in Biology, Chemistry, Food Technology or the equivalent.

- Required language: English and Indonesian.
- At least 4 year(s) of worki experience in 2 related fields required - Applicatant must be willing to work.
- Preferably the head of Research and Development specializing in food.
- Good analytical skills
- Knowledge of analysis methods

10) Position Title: Quality Inspector [CA03]

> Job Descriptions

- Inspector in Final 1 area
- Static and dynamic inspection of completed vehicles

> **Requirements**

- Candidate must understand Quality standard requirements and qualification methodology
- Basic understanding of measurement instruments and tools
- Very keen sight and hearing
- Knowledgeable in Microsoft programs
- Driver's license preferable
- Excellent communication and interpersonal skills
- Willing and able to work in Sta. Rosa, Laguna

11) Position Title : ISO Supervisor [CA03, CA04]

> **Description**

- Review, implement and revise quality management systems according to ISO standards.
- Handle customer contact and communication of customer needs related to ISO system.
- Report on executive performance of ISO system to CEO yearly.
- Arrange internal auditor training.
- Be responsible for ISO system documentation.

> Requirements

- Master's degree in Business Management preferable.
- At least 5 years' work experience as Internal Lead Auditor or experience constructing ISO 9001/ 27001 system.
- Chief inspector for ISO 9001/27001.
- Fluent English in both speaking and writing.

12) Position Title : Internal Auditor [CA04]

>**Description**

- Perform conformity assessment requirements for quality and food safety.
- Deliver advice and recommendations on solution quality system implementation in accordance with the standard
- Ensure consistent implementation of Quality Management System.
- Ensure continual improvement program is implemented.

> **Requirements** - University degree in Biology, Food Technology, Chemistry
- Minimum of 1 year audit -related work experience.
- Good analytical and problem solving skills.
- Excellent interpersonal and communication skills
- Good presentation skills and audit reporting.
- Good command of both written and spoken English.
- Expert in ISO 9001:2008 and HACCP

13) Position Title: Internal Calibrator [ME03]

> **Description**

- Plan a program of testing and calibration of instruments and equipment in accordance with the scheme, technical guidance, and other specifications.
- Modify component parts and circuit operations to specifications, using precision instruments ujidan equipment.
- Analyze and evaluate calibration results to ensure conformity with the level of use for results of calibration for measuring instruments and inspection.

> **Requirements** - - Candidate must possess at least a Bachelor's degree in Engineering or the equivalent.
- At least 2 years of work experience in a related field is required .
- Possess comprehensive knowledge of ISO 9001:2008 and HACCP.
- English proficiency (writing and reading) preferred.
- Understand calibration, terra and testing method.
- Have knowledge of statistical analysis methods.
- Understand validation and verification of mechanical equipment

5. RESULTS – JOB MARKET AND JOB PROFILES IN STANDARDS-SPECIALTY ORGANIZATIONS

5.1 Number of Standards Professionals in Standards-Specialty Organizations

In total, 36 standards-specialty organizations responded, and 32 responses included valid numbers of total employees and standards professionals. The 32 responses showed that nearly58.7% of their employees are involved in standards-related tasks.

The ratio is a bit distant from 100.0% because some responding organizations were government agencies and non-profit associations that deal with standards-related tasks as a part of their mission; their ratio of standards professionals ranged from 8.3% to 100.0%. As they are standards-specialty organizations, their average ratio is quite high compared to that of companies. Table 8 offers an overview of the survey responses.

5.2 Organizations Grouped by Three Domains: ST, CA, ME

Among the study responses, 28 included a detailed proportion of 3 domains for standardization, conformity assessment, and metrology. Figure 19 summarizes the composition of standards professionals by these three domains, and their organizations are described by type and number of standards professionals notted in parentheses.

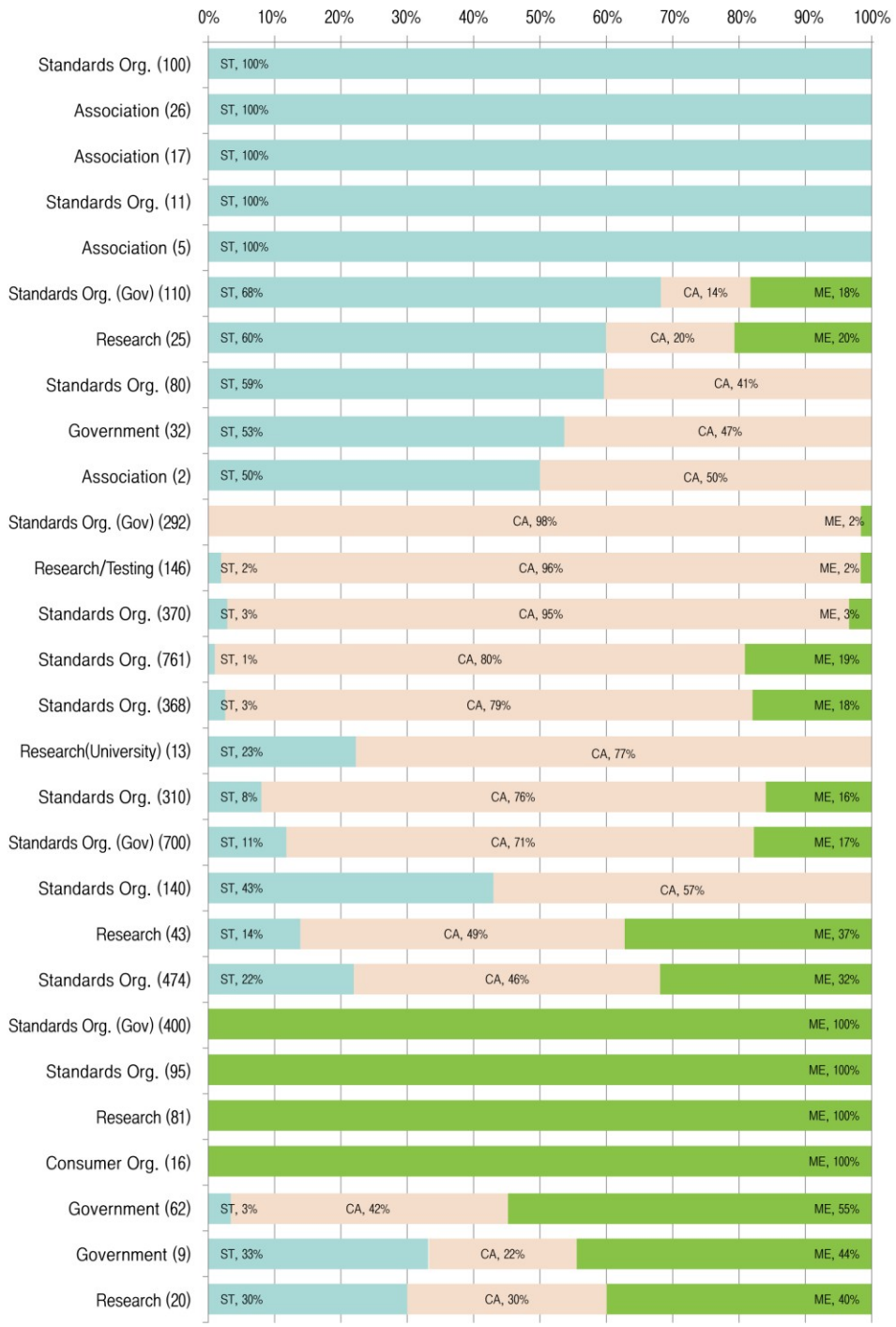
Figure 19 visibly explains how the first six organizations can be considered standardization-specialty organizations because more than two -thirds (68% to100%) of their standards professionals focus on standardization- related activities. Another eight organizations can be considered conformity-specialty organizations using the same rationale (71% to 98%). Also, in four organizations, all the standards professionals were metrology professionals (100%). The other ten organizations showed a mixture of three domain tasks within the proportion of standards professionals.

There is a very limited relationship between the types of organizations (government, association, and research) and the proportion of standards professionals. Unlike the job market analysis of companies in the previous chapter (4.2 and 4.3), the data of standards-specialty organizations are not meaningful because the number of standards professionals will depend on the characteristics of each organization.

<Table 8> (In Organizations) On Average, 58.7% of the Total Employees of Participated Organizations Have Standards-Related Tasks

No.	*Total Employees*	*Standards-Professionals*	*Ratio (%)*	*Types*
1	300	25	8.3%	Research
2	349	43	12.3%	Research
3	150	20	13.3%	Research
4	67	9	13.4%	Government
5	89	17	19.1%	Association
6	100	26	26.0%	Association
7	61	16	26.2%	Consumer Org.
8	227	62	27.3%	Government
9	260	80	30.8%	Standards Org.
10	430	146	34.0%	Research/Testing
11	330	140	42.4%	Standards Org.
12	30	13	43.3%	Research (University)
13	180	81	45.0%	Research
14	1500	700	46.7%	Standards Org. (Gov)
15	67	32	47.8%	Government
16	4	2	50.0%	Association
17	475	292	61.5%	Standards Org. (Gov)
18	584	370	63.4%	Standards Org.
19	243	155	63.8%	Standards Org.
20	127	95	74.8%	Standards Org.
21	115	92	80.0%	Standards Org.
22	580	474	81.7%	Standards Org.
23	368	310	84.2%	Standards Org.
24	822	761	92.6%	Standards Org.
25	338	313	92.6%	Standards Org. (Gov)
26	380	368	96.8%	Standards Org.
27	5	5	100.0%	Association
28	11	11	100.0%	Standards Org.
29	96	96	100.0%	Standards Org. (Gov)
30	100	100	100.0%	Standards Org.
31	110	110	100.0%	Standards Org. (Gov)
32	400	400	100.0%	Standards Org. (Gov)
Total	8898	5364	1877.4%	--
Average	278	168	58.7%	--

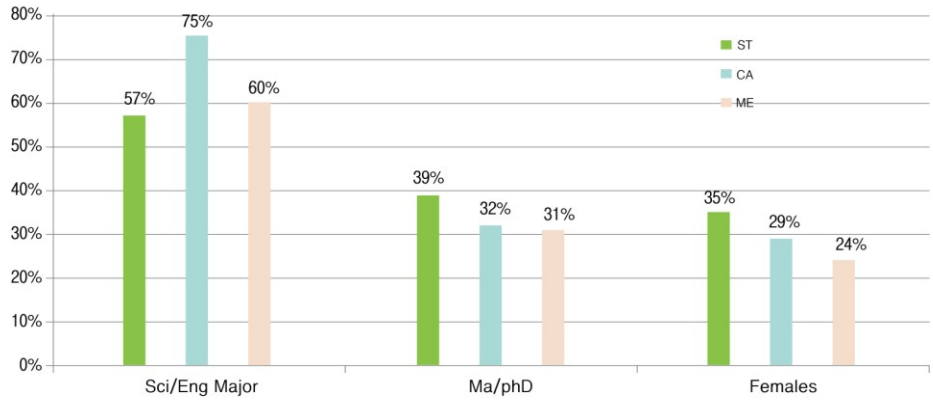
<Figure 19> (In Organizations) Organizations Sorted by Proportion of Three Specialty Domains



5.3 Competency Characteristics of Current Employees

To understand the job market better, we collected information on the basic characteristics of standards professionals – science/engineering degree holders, Master/PhD degree holders, and females/women. We note in Figure 20 that nearly two- thirds of the standards professionals majored in science and engineering, slightly higher than the number of companies which is around 50% in previous chapter. Conformity assessment professionals in these companies had the highest rate of science/engineering majors, while standardization professionals had the highest rate in companies in previous chapter. For advanced degree holders, there was very little difference between the three categories professionals, as around one- third do hold Master/PhD degrees. In terms of the female ratio, standardization showed the highest ratio in the survey.

<Figure 20> (In Organizations) Current Employees – Two-Thirds are Sci/Eng Majors; Around One-Third Hold Advanced Degrees and Are Females



Here <See Figure 21>, the characteristics are matched to each sub-category of standards professionals. For science and engineering majors, professionals in testing (CA02), certification (CA04), and inspection (CA03) had the highest numbers, while dissemination (ST04) had the lowest. For advanced degree holders, standardization planning/evaluation (ST01), standards development (ST02), and scientific metrology (ME02) showed the highest ratio. Females seemed to be the most active in areas of standardization planning/evaluation (ST01), standards development (committee secretary) (ST02), and standards dissemination(ST03). Again, these results should not be overgeneralized, but rather considered as an adequate sample of information that we tested. But only a small part of the overal real job market.

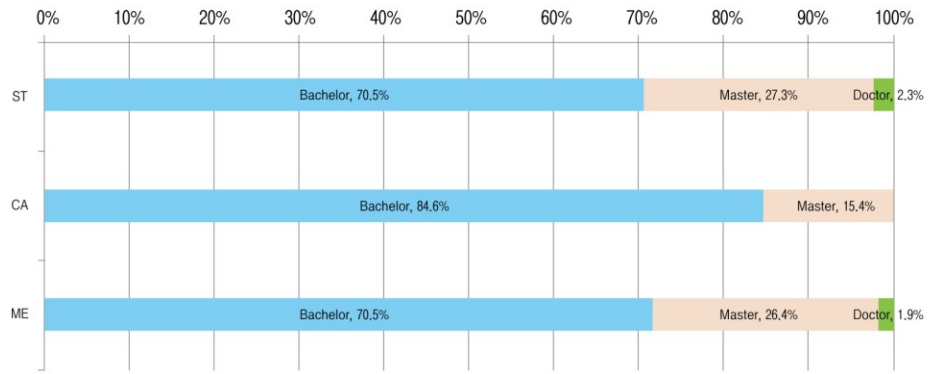
<Figure 21> (In Organizations) Current Employees – Characteristics According to Each Category

5.4 Expected Competency Requirements of New/Potential Employees

When the specialty organizations have vacancies, they use internal requirements or expectations when recruiting new employees. This section analyzes the minimum or preferred requirements for these potential employees by education degree, education major, work experience, required/preferred personnel certification, and future need for personnel certification.

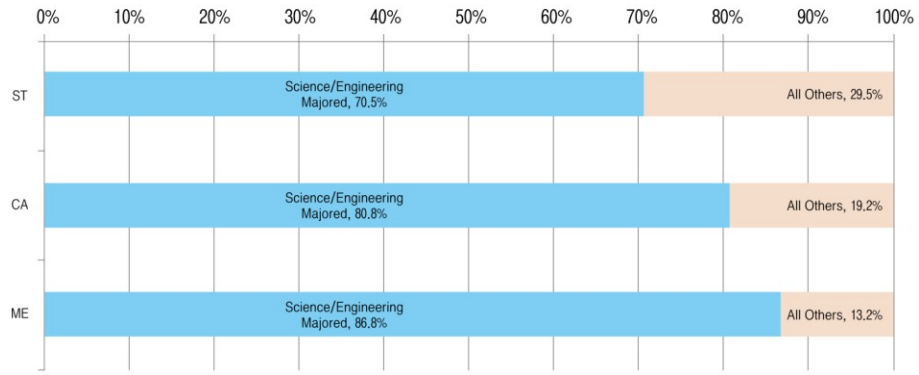
In terms of a required education degree, the Bachelor's degree was the most common while some do require a Master's degree. Very limited job positions require a Ph.D degree as the minimum. Overall, standardization professionals require a slightly higher academic degree than conformity and metrology job positions do. For standardization positions (ST), about 70.5% require the Bachelor's degree or above, 27.3% require a Master's degree, and only 1.2% require the Ph.D as a minimum degree. For conformity assessment positions (CA), about 84.6% require a Bachelor's degree or above, and 15.4% require a Master's degree. For metrology positions, 71.7% require a Bachelor's degree, and 26.4% require a Master's degree as the minimum academic degree. (See Figure 22)

<Figure 22> (In Organizations) Minimum Degree Requirements



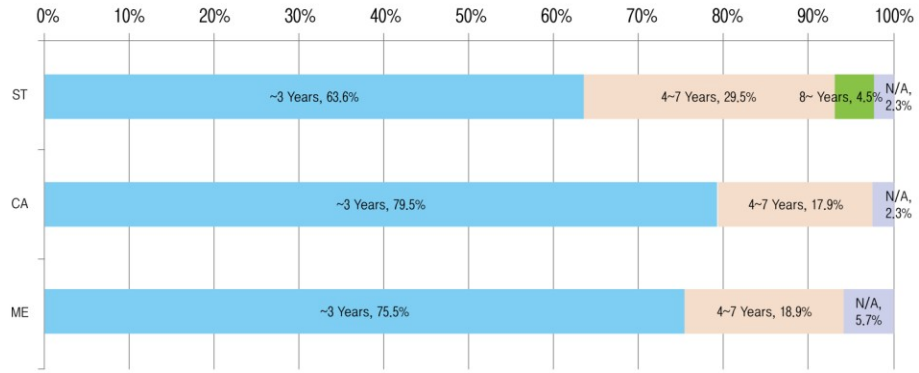
In terms of a required or preferred major, we simply asked whether the job positions require or prefer science/engineering majors for employees or do not. The result shows that most job positions require a science/engineering major which is similar for companies. Metrology positions require the highest rate of 86.8%,while conformity assessment requires 80.8%, and standardization requires70.5% (See Figure 23)

<Figure 23> (In Organizations) Preference for Science/Engineering Majors



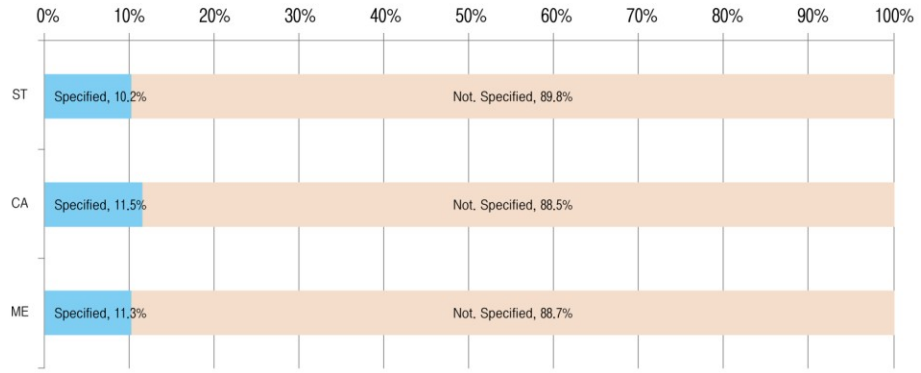
In terms of required minimum work experience, around 36.4% require more than 4 years of work experience in standardization positions while 20.5% required more than 4 years for conformity assessment positions and 24.5% required more than 4 years for metrology positions. (see Figure 16)

<Figure 24> (In Organizations) Minimum Work Experience Requirements



Personnel certification is not commonly required for most standards professional job positions. Only around ten percent of the survey positions required certification. Conformity assessment uses personnel certification more than the standardization and metrology fields as a requirement. (See Figure 25)

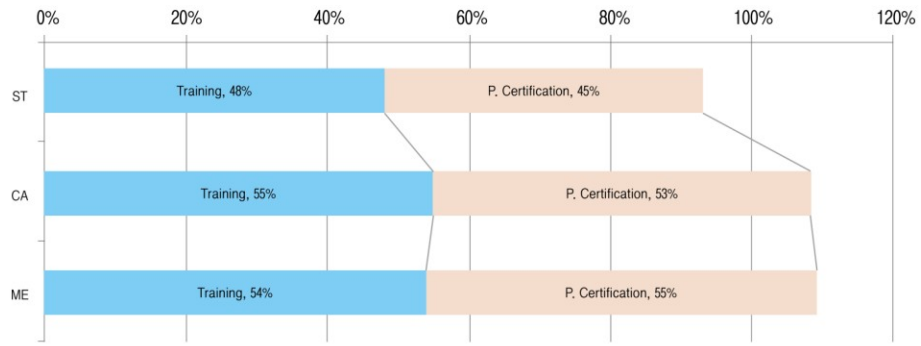
<Figure 25> (In Organizations) Personnel certification Requirements



5.5 Future Needs for Training and Personnel certification

Among the three fields, those job positions related to standardization need the lowest level of training and personnel certification, a finding contrary to that for companies. Future needs for personnel certification was the highest (55%) in the field of metrology followed by conformity assessment (53%) and standardization (45%).

<Figure 26> Future Needs for Training and Personnel certification



5.6 Examples of Typical Job Postings

Job advertisements provide us a good opportunity to recognize the valid needs and details for standards professionals in standards-specialty organizations. Table 9 presents nine real job postings from seven different participating organizations to include position title, major task description and minimum/preferable competency requirements.

<Table 9> 9 Organization Job Posting Examples

1) Position Title : Specialist in Standardization [ST01]

> Description

- Research and analyze proposals received from NTP industry sector for development of the Technical Standards.
- Present technical proposals using NTP guidelines for Standardization
- Revision of draft NTP and related technical documents at each stage
- Support Standardization Technical Committees Industry in general
- Coordinate and support the review, updating, and repeal of the Peruvian view
- Offer technical assistance and training in Technical Committees and Subcommittees for Standardization.

3. Requirements

- Preferably a Master's degree
- 4+ years' experience in the food industry, Chemical Industry, Electrical and Electronics, Civil, Software and more.
- Good writing skills. Knowledge of basic level English and the Windows operating system,

MS Office, and Internet Explorer.

2) Position Title : Committee Secretary [ST02]

2. Description

- Prepare annual working plan of the committee;
- _Proceed with standard development procedure according to national policies and regulations;
- Prepare standards within the committee; prepare committee reports;

Arrange for committee meetings; Handle any other committee tasks.

3.Requirements

- At least a Bachelor's degree in Electrical Engineering or related concentration.
- 3 years' experience working in electrical engineering/standards is preferred;
- Word processing skills; Computer skills; Language skills; Communication skills.

3) Position Title : Compliance Manager [CA01]

> Description

- Construction policies, strategies for managing conformity assessment of domestic and foreign (testing body, inspection body, certification body); propose measures to popular organizations and guide implementation after approval **> Requirements**
- Bachelor's degree or higher
- Work experience in a related field
- Knowledge of the requirements of laws and regulations guiding and operating conformity assessment
- Skills to collect and synthesize information and solve problems; ability to research, analyze and evaluate

4) Position Title : **Product Quality Manager [CA01]**

> Description

- Manage product and goods quality as prescribed by legislation and technical regulations from the Ministry of Science and Technology and issued under authority of the Directorate for Standards, Metrology and Quality

> Requirements

- Bachelor's degree or higher
- Work experience in a related field
- Knowledge of the requirements of laws and regulations' guiding conformity assessment
- Skills to collect and synthesize information and solve problems; have the ability to research, analyze, and evaluate precisely

5) Position Title : Senior Researcher in Conformity [CA02/CA03/CA04]

> Description

-Test and inspect electric products and components, machines, or energy equipment
-Review and certify all test reports

> Requirements

- Higher than Bachelor's degree in Science and Engineering
- Minimum of 10 years' experience in Science or Engineering fields
- High level of understanding of testing, inspection, certification, and standards
- High level of operability in testing equipment and measuring instruments
- High level of ability for interpreting test results
- High level of ability to inspect and manage testing equipment

*To meet the above requirements and abilities, complete training programs in a designated educational institute and pass auditor examination.

6) Position Title : Full-time Assessor [CA05]

> Description

- Manage assessment
- Assess Accreditation
- Operate related committees

> Requirements

- Bachelor or higher education in Science or Engineering
- Technical professional experience 8 years or longer
- Knowledge and experience with quality system management of ISO/IEC 17025

7) Position Title : Junior Researcher in Calibration [ME03]

> Description

- Operate calibration service
- Develop calibration procedures
- Establish and implement management system for calibration laboratory (ISO/IEC 17025)

> Requirements

- More than Bachelor's degree in Science and Engineering
- Minimum 3 years' experience in Science or Engineering fields
- High level of understanding of testing, inspection, certification, and standards
- High level of operability of testing equipment and measuring instruments
- High level of ability to interpret testing results
- High level of ability to inspect and manage testing equipment

*To meet the above requirements and abilities, complete training programs in designated educational institute and pass auditor examination

8) Position Title : Calibration Lab Technician [ME03]

> Description

- Calibration and testing; Handle management system for calibration laboratory

> Requirements

- Bachelor's degree in Science or Engineering; Good English reading and writing skills
- Proficient skills with Microsoft Office software.

9) Position Title : Senior Researcher [ME03]

> Description

- CRM Development & Management
- Proficiency testing program ; Development & Management

> Requirements

- Fluency in English
- 7 years' experience
- International activity (proficiency testing, standardization, etc)

6. DISCUSSION

In truth, there were as yet no common definition of standards professionals and very limited information on the job market and competency requirements for standards professionals either regionally or internationally.

This research was proposed and approved in order to provide a useful venue for discussing and building a common understanding on what kind of standards professionals need to contribute to current and future workforces in the APEC region. The objective of this project was first to define and categorize standards professionals, secondly, explore the current status and the expected requirements for standards professionals, and thirdly, identify actionable recommendations and a collaborative action plan for years 2015-2020 within the region.

6.1 Value of Defining 'Standards Professionals'

In Chapter 3, as a key part of this report, standards professionals are defined and classified using the task-based approach. Standards professionals are defined as "those people who have a job or business activities in the three standards areas — standardization (ST), conformity assessment (CA), and metrology (ME)." The three domains of standards professionals were divided into fifteen sub-domains, for example, professionals in standards planning/development (ST01), testing (CA02), legal metrology (ME04) that involves experts in standardization (standards development), conformity assessment, and metrology.

The definition and classification of a standards professional as presented here becomes the starting point for further discussion, and as such, that definition and classification is strategically important, not only for effective communication in the standards community, but also to enhance awareness. That is done precisely because the definition issue can be straightforwardly linked to an occupational standard and competency requirements. Most economies have their own domestic 'Standard Classification of Occupation (SCO)' usually managed by their Labor Ministry (agency), and the domestic standards are based on the International Classification of Occupation (ICO) for which the International Labor Organization (ILO) is held responsible.

Incorporating the concept 'standards professional' into both a domestic and international occupational standard can be a strategic way to increase awareness of standards as a profession and identify both domestically and internationally an accepted definition and classification of the standards professional. Once we set that definition and classification, developing the next generation of standards professionals can be more feasible at economic, regional, and international levels.

6.2 Value of Identifying Competency Requirements for Standards Professionals

In order to develop the next generation of standards professionals systematically, identifying the key competency requirements is of critical importance. This report collects and illustrates the evidence of job markets, the characteristics of current employees, and the expected requirements for new/potential employees in companies and standards-specialty organizations. We determined that around 11.4% of total employees in 26 companies are standards professionals who handle standards-related tasks. At a minimum, we observed that there does exist a certain job market size and also a respective category of standards professionals that requires a different competency.

Although the leaders we interviewed have some common understanding of the competency requirements for standards professional, we found some variations. Some emphasized an experience/participation- based approach, while others focused more on a young generation program and formal education curricula development.

In general, the requirements for standards professionals seem to be quite inclusive, namely, a combination of technical knowledge and non-technical skills. Non-technical skills include interpersonal and negotiation skills, the ability to work with others across internal organization boundaries, both with other companies, and with people from different cultures. In some of the interviews, standards professionals often were reduced to two general types. One type is the standards engineer who is able to develop and deploy standards – a vertical expert in a specific technology field. The other type is a standards manager who plans and evaluates standards activities – a horizontal expert in the management or operation field. However, the reality is much more complex, as many different types of standards professionals were found, as described in the previous chapter discussion on the classification of standards professionals, and their respective requirements are naturally very complex.

Although very limited research is currently publically available to describe 'the competency requirements' of standards professionals, that effort has started. Among the existing information, two studies on Japan[4] and Korea[5] are notable. These two studies describe very well the wide-ranging requirements or skill-sets for standards professionals. Noting that the 'development of competency requirements' or the 'introduction of personnel certification' are a few of the most frequently mentioned recommendations gleaned from the project interviews, these two studies can be useful stepping-stones for developing a regionally acceptable standard for competency requirements for standards professionals overall.

6.3 Chief Standards Officer (CSO) in Companies

In the project interviews and the workshop, certain participants[6] constantly emphasized that standards should be elevated to a strategic position in a company's management and its decision-making processes.

One good method to use is to verify the position of standards professionals in companies and check whether a company has a senior executive level for a standards professional. Specifically, Professor Byung-Goo Kang classified a company's activities into an operational level, a managerial level, and a strategic level. He recommends the introduction of a Chief Standardization Officer (CSO) in a company and offers the example of a Chief Information Officer (CIO). A CSO is not a wholly new concept. Already, a few large IT companies, like Microsoft Sun Microsystem, do have a 'Chief Standards Officer (CSO)'. Although APEC SCSC does not currently have a mechanism

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[4] IIEEJ (Kurokawa et al.), 2013, Skill standard - Evaluation for human resource skills of required for standardization (version1.03ices), Presented at the ICES Conference 2013 (The study was sponsored by METI, the Japanese Ministry of Economy, Trade, and Industry) (http://docbox.etsi.org/Workshop/2013/201306_ICES/Presentations/7-Papers%20and%20posters/Kurokawa%20et%20al%20IIEEJ%20Japan%20Skill%20standard.pdf)

[5] KSA (Choi and Cho), 2013, Standards Professionals – Survey, Knowledge, Certification (Findings from Korea in 2009~2013), Presented at the ICES Conference 2013 (The study was sponsored by KATS, the Korean Agency for Technology and Standards)

[6] These experts included George Arnold, USA (Annex A.15), Rob Steele (Annex A.17), and Professor. Byung-Goo Kang (APEC workshop presentation)

to promote the CSO type of concept in private companies, it is worthwhile for individual APEC SCSC Members to monitor the increases in this position in a range of companies.

6.4 Remaining Issues for Future Study and Action

In this report, standards professionals involved experts in standardization (standards development), conformity assessment, and metrology. The definition and classification of standards professionals presented herein is thus the starting point for further discussion, and as such, that definition may not be considered the final version. To guide any future efforts to continue the discussion and improve this definition, certain issues remain and are noted here.

First, there is the language issue. During project implementation, there was a question raised about the terminology, i.e., the difference between 'standards professional' and 'standardization professional'. Which one of these terms is more appropriate or more comprehensive for including conformity assessment or metrology professionals? While 'standards professionals' is the more widely used terminology in the general community[7], we did note that some experts preferred using 'standardization professional'. Some consider standards professionals to be 'documentary standards experts', while others see 'standardization professionals' as being involved with 'standards development activities' only. This language issue may not be a matter of right or wrong; more than likely, it is a matter of decision-making Therefore, in future communications, Members should clearly note that such concerns do exist.

Second, a scope issue was noted. Many experts expressed the view that metrology professionals, and in particular scientific metrology experts, have very different characteristics compared to those for standardization and conformity assessment professionals. Because the scope of APEC SCSC includes metrology, we intentionally included 'metrology experts' as a sub-set of standards professionals in APEC SCSC. Future efforts may choose to differentiate between standards professionals (standardization and conformity assessment) and metrology professionals.

[7] For instance, offline and online standards professional societies exist - The Society of Standards Professionals (SES, www.ses-standards.org) and the Informal Network of Standards Professionals (LinkedIn Group).

Third, the relationship between the standards and the quality infrastructure should be further investigated. During the project workshop, the participants acknowledged that sometimes a national standards infrastructure and a national quality infrastructure are used interchangeably. This terminology mixture of 'standards' infrastructure with 'quality' infrastructure is directly related to individual specific human resources development.

Although both standards' and 'quality' do have certain things in common, standards infrastructure may not be fully interchangeable with quality infrastructure. Standards infrastructure is not only the core foundation for quality infrastructure; it also has additional important objectives in terms of supporting technology innovation, increasing safety, and protecting environment, etc. Therefore, the objective and plan used to inspire standards professionals should be clearly differentiated from the actual development of quality professionals. These three issues do need to be noted and discussed further in the standards community.

7. CONCLUSIONS

– RECOMMENDATIONS TO APEC SCSC

As an outcome of the project survey, interviews, and workshop, Members shared various ideas and then offered suggestions for APEC SCSC to improve regional cooperation when developing and managing the next generation of human resources in the area of standards and conformance.

The preliminary recommendations were presented and discussed at the plenary of the 2014 APEC SCSC II meeting in Beijing. At that meeting, four prioritized actions items were put on the table for consideration, and Members then expressed their support for the following three actions — (1) More active information exchange and programs on the next generation that involve students, internships, and young professionals; (2) Developing Career Path/Model Best Practices (Case Studies) ; (3) Developing Competency Requirements (Blueprint). More detailed sub-actions items for APEC SCSC are further described below in this chapter.

7.1 More Active Information Exchange and Joint Programs

This recommendation supports in general the joint programs in APEC SCSC to encourage further development of the next generation of standards professionals. From the workshop and survey/interviews, the following specific items were suggested:

- Organize APEC young generation program

  (example) Standards Australia Young Leaders Program

  (example) Korea 'Standards Olympiad Program – inviting foreign students'

  (example) U.S. NIST Curricula Development Cooperative Agreement Program
- Engagement of young generation in international programs

  (example) IEC YP programs
- Develop an APEC standards professional bank
- Organize APEC Training of Teacher Program
- Establish APEC standards and conformance HRD center

- Promote participation- based programs
- Promote joint activities to improve awareness levels of standards and standards professionals
  (example) PASC Guide to setting up a Young Professionals program for PASC members

7.2 Developing Career Path/Model Best Practices (Case Studies)

A career path or model is a good way of showing the next generation the precise paths/models for current leaders or executives in small and large companies, standards specialty organizations, governments, and for women. The following actions can be considered for future collaboration within APEC SCSC:

- Develop & promote APEC good practices for standards professionals
- Develop & disseminate a Career Map(Guide) for standards professionals
- Initiate an APEC award for best practices of standards professional career development -- for companies, standards specialty organizations, and individual experts through sharing best practices of standards professionals

7.3 Developing Competency Requirements (Blueprint)

In general, project survey responses and speaker recommendations indicated a high level of interest in competency requirements. The development of competency requirements may first of all provide guidance to individuals and companies and their policy- makers. Second, it can raise awareness and organize professional networking/associations, and finally, it can enhance the mobility of skilled experts in the region.

It should also be explained here that the SCSC has discussed 'Developing a qualification scheme or personnel certification'. It was agreed in the 2014 SCSC II meeting that the personnel certification issue may require more discussion before taking joint action in the SCSC. A few economies have concerns that, at this stage, it might be too early to collaborate on personnel certification of standards professionals, but did suggest that this idea merits further study. Noting these concerns, the personnel certification issue may require additional discussion before any joint activities are undertaken.

In terms of developing competency requirements, the following actions were recommended for SCSC future collaboration:

- Develop competency requirements

  (example) Korea developed 'competency requirements for the standards professional'

  (example) Japan developed 'skill standards for standardization professionals'
- Pay attention to the job (occupation) standards
- Promote Incorporation standards professionals for a domestic classification of occupations

  (example) China incorporation includes 'standard engineering technical personnel' in the National Occupation Classification (NOC)
- Collaborate on incorporating standards professionals into an International Standard classification of occupations (ISCO) by the International Labor Organization (ILO)

Although APEC SCSC is responsible for regional cooperation in developing capacity building and promoting professionals in the areas of standards and conformance, it is recommended to closely collaboration with other APEC fora and external organizations. The primary APEC fora for future collaboration would be the HRDWG, which is responsible for higher education and professional development in general. Also, future collaboration with the five Specialist Regional Bodies (SRBs), and International Cooperation for Education about Standardization (ICES) is recommended.

Based on these recommendations, any follow-up projects and joint activities will be proposed, discussed, and decided on by APEC Members mainly through the umbrella of APEC SCSC with the goal of inspiring the next generation of standards professionals and increasing competitiveness of both private and public stakeholders in the region.

(This is the end of the main report followed by Annex A, Annex B, and Annex C)

Inspiring the Next Generation of Standards Professionals

Annex A.

25 Interviews with Thought Leaders and Young Professionals (Full Original Text)

Korean Standards Association

Korean Agency for Technology and Standards

For APEC Sub Committee on Standards and Conformance (SCSC)

CONTRIBUTORS OF WRITTEN INTERVIEWS

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A.14 Renato V. Navarrete, Managing Director, CIP Inc., Philippines

A.15 George Arnold, CEO At Tercio Solutions LLC, USA

A.16 Nguyen Minh Bang, Director–Standards Department, STAMEQ, Viet Nam

INTERNATIONAL FEATURES

A.17 Robert Steele, Secretary-General, ISO

A.18 Hitomichi Fujisawa, Vice-President, IEC

A.19 Teresa J. Cendrowska, Vice President, ASTM International *(female)*

A.20 Erik Puskar, ICES Chair 2014

A.21 Henk De Viries, ICES Chair 2013

A.22 Mingshun Song, ICES Chair 2012

YOUNG PROFESSIONALS IN KOREA

A.23 Jinjae Park, Researcher, KTR, Korea

A.24 Kyongho Park, Researcher, LSIS Co., Ltd, Korea

A.25 Woojung Yoo, Researcher, KTL, Korea

ANNEX A.1 (APEC MEMBERS)

BONNIE ROSE, PRESIDENT, CSA GROUP, CANADA

The core competency of developing standards is the ability to achieve consensus while managing a wide range of agendas, expectations, and personalities; the very same competencies one would look for in a good leader or see in a person of influence

1. A Starting Point of Career Path to be a Standards Professional

I was first exposed to the application and development of standards as an electrical engineer responsible for new product development at Amphenol. The organization supported me in participating as a technical committee member in the development of the IEEE 802.3 standard, and that experience was life-changing. Throughout my career I participated in the application of standards, but I fully dedicated my career to standards when I joined CSA as Vice President, Certification and Testing. Standards are more about what people do not see. Numerous committees develop safety and performance standards, products are tested to those standards, and the society benefits from their implementation. For the last 4 years, I have been President of CSA Standards. We work with subject matter experts to develop standards for Canada and US in 54 technology areas. We represent Standards Council of Canada as International Secretaries to ISO and IEC committees. Our work has taken us to the global arena.

2. Important Event as Standards Professionals and Major Success Factors

I believe that knowing that the standards we develop protect lives and the environment, reduce human injuries, and promote trade is what keeps me motivated every day. I see evidence of the social good that standards bring to the society on a regular basis. My staff is very proud to be working with our subject matter experts and stakeholders to develop these standards, and we receive positive feedback on our work on a regular basis.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

The ability to understand and relate to the technology areas they will be working on is a given; however, the more important skills delve into emotional, social and customer focused behaviours. Is the candidate good at relationship building, can they manage conflict, negotiate, easily adapt to change and influence? We look for people with great listening and customer service skills as we need to be responsive to the needs of our stakeholders. Having strong project management skills or having the capability to develop them quickly is crucial as well, because stakeholders are asking for standards to be developed in a shorter period of time. In addition, we look for candidates that share our values of integrity, mutual respect, continuous learning, safety, and sustainability.

4. Job Market and Future Prediction on Standards Professional

The core competency of developing standards is the ability to achieve consensus while managing a wide range of agendas, expectations, and personalities; the very same competencies one would look for in a good leader or see in a person of influence. I see the development of standards professionals having much more focus on emotional and social competencies than on technical expertise. I see an increasing demand for these skills in many sectors and think it provides a great opportunity for individuals to grow either in standards or their associated sector.

My vision for the next generation of standards professionals is the ability to use these competencies on a global scale; breaking cultural, political, and geographic boundaries to develop globally informed standards products.

5. Recommendations to Inspire Standards Professional Development

International cooperation is key to the success of our global society. We will all benefit from learning from each other and collaborating on an international scale. There is a need to serve our stakeholders faster, and we can do that by identifying and implementing best practices. There is also a need to promote trade by developing more regional and international standards.

ANNEX A.2 (APEC MEMBERS)

PING WANG, FORMER DEPUTY ENGINEER,
CNIS, CHINA

I recommend promoting the certification of standardization engineers, Starting training programs, conducting evaluation and certification of qualifications, and promoting third party certification organizations for standardization professional with the help of the government, etc.

1. A Starting Point of Career Path to be a Standards Professional

In my opinion, in order to have a deep understanding about standardization, one should have experience in working in industry.

From 1979 to 1989, I worked in a subsidiary enterprise of the Ministry of Railways -- Beijing Railway Equipment Factory -- for 10 years. During this period, I worked as a chief of Equipment and Facility Department and the vice director of the research institute and studied the TQC of Japan. This all proved beneficial to my later career in the area of standardization.

In 1989, I began to work in China National Institute of standardization and information classification and coding (now, it's named China National Institute of Standardization(CNIS), until I retired in 2011. During this period, I presided over the research project of the Ministry of Science and Technology on standardization, served as Secretary General of SAC/TC159/SC4 (China National Technical Committee for Automation Systems and Integration Standardization, Industry data sub-committee), and participated in the standardization work of ISO/TC184/SC4(ISO Technical Committee for Technical Industrial automation systems and integration, Industrial data sub-committee). From 1993 to 2001, I was the official representative of China at SC4, and formulated an ISO standard ISO 13584-511 Industrial Automation Systems and Integration - Parts library, as the leader of the project. From 2000 to 2001, I worked as the Director of Research Projects Management, Director of International Cooperation Department, and Deputy Chief Engineer of CNIS.

2. Important Event as Standards Professionals and Major Success Factors

Experiences in the enterprise make me understand what standardization means to industry. Participating in the formulation of international standards makes me understand the basic principle and rules of standardization. Undertaking national research projects about standardization makes me think deeper about industrial innovation and standardization. Working as the Director of Research Projects Management, Director of International Cooperation Department, ,and deputy chief engineer of CNIS gives me the opportunity to deal with standardization organizations from European, Asian, and American economies. So I can compare the standardization systems, governance and institutions of different economies and conduct researches on their strategies, and governmental, industrial, and innovative strategies. This will influence my further researches after retirement.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

When a company recruits standardization staff, it should require all-round technology. Aside from the knowledge background(education), the candidate should have rich experience in his/her working area, together with good communication skills.

If a standardization organization recruits someone, the candidate should have experience working in industry. On the other hand, they should have good coordination abilities, nice personality, and strong ability to organize meetings.

4. Job Market and Future Prediction on Standards Professional

Since standardization is not yet a mature discipline, schools do not offer this major. Moreover, I don't think a period of learning in school equates to experience in work. Therefore, it is very difficult to recruit qualified employees on the market. It all depends on the further education in enterprises and standardization organizations. As the international community pays more attention to standardization, researches on standardization from colleges and universities have multiplies. We also see more and more theses in the academic circle, covering different areas including business administration, economics, industrial innovation, public management, sociology, organizational behavior, etc. I think it might take a decade or two or even longer for standardization to become a major discipline. By that time, colleges will produce graduates with enough professional knowledge for the society. But even if the day comes, fresh graduates still need real practice in industry.

5. Recommendations to Inspire Standards Professional Development

I believe to cultivate standardization talents, the government, standardization organizations, colleges, and some big enterprises should cooperate. They can make a contribution in various areas:

- conducting related researches,
- opening seminars,
- launching publicity activities;
- Writing textbooks at different levels, pushing some college majors to include standardization contents, setting qualifications for standardization persons(standardization engineers);
- Promoting the certification of standardization engineers (Microsoft has begun to do this in their own company, as I known);
- Starting training programs, conducting evaluation and certification of qualifications, and promoting third party certification organizations for standardization professional with the help of the government, etc.

ANNEX A.3 (APEC MEMBERS)

ARIFIN LAMBAGA, PRESIDENT, PT MUTUAGUNG LESTARI, INDONESIA

From my point of view, the role of standard will increase substantially as part of increasing globall market and globall trade. The use of standard also increase as many organisations, as well as governments organisation, perceive the standard is a way to improve performance of organisation. Therefore, I predict that the standard professional demand increase every year and in the future. My company (CAB) has been double in recruiting the new employee (related to standard task) during 3 years.

1. *A Starting Point of Career Path to be a Standards Professional*

In 1981 – 1984, I started my career in Tanjung Pandan (Belitung) Sumatera, PT Kaolin Indonesia as Shift Head Production. PT Kaolin Indonesia is the company which produce Kaolin/Clay. Kaolin is widely ised in Ceramic industry, Tire Industry, paint industry and also is used as a coating in paper industry. My role was to control the Kaolin production in one shfit (8 hours working period), in term of quality and quantity.

After that, from 1995 to present, I have been worked in PT Mutuagung Lestari as President and Director. PT. Mutuagung Lestari is a Certification company which established in 1990. The company provide certification services in: ISO 9001,ISO 14001, ISO 22000, JAS Certification for wood panel products, CARB Certification (Certification for Formaldehyde Emission based on California Air Resource Board Standard), CE Marking for wood product (Cooperate with WKI Braunsweight), SVLK (Timber Legality Certification System, an Indonesian mandatory certification system for legality) for all woodbased product and the forest, SFM (Sustainable Forest Management) for Natural and Plantation Forest.

The company also has the laboratory facilities to carry out the Formaldehyde. Emission testing from wood products, physical and mechanical testing on wood products, food laboratory testing, environmental testing facilities, and agriculture products testing.

The company has been accredited to ISO Guide 65; ISO 17025; ISO19021. The role is to coordinate all of organization operation and activities, included set up the goal, target and strategy. Responsible for the whole aspects of organisation.

2. Important Event as Standards Professionals and Major Success Factors

The most important event in my standard professional when I assigned as a Laboratory and R&D Supervisor. At that assignment, I must learn alot of standard, CRM and other

relevant procedure that must be implemented without no tolerance. I had to find the refference and develop the new standard when the certain standard was not available. During the period, I contacted many people to discuss the problem were facing in implementing the standar. That time I realized that standard is really important to ensure the work was carried out properly.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

In recruiting the new employee, the important aspects to be considered are the knowledge and skills. The skills might be reviewed thru the certificate and training he/she has attended. But the most important aspects is attittude. I really concern about this aspects, since the role of employee, especially auditors, are as reflection of the proffesionalism of the CA Company. It is beneficial for new employee when he/she has attended the ISO 9001 Auditor Course.

4. Job Market and Future Prediction on Standards Professional

From my point of view, the role of standard will increase substantially as part of increasing globall market and globall trade. The use of standard also increase as many organisations, as well as governments organisation, perceive the standard is a way to improve performance of organisation. Therefore, I predict that the standard professional demand increase every year and in the future. My company (CAB) has been double in recruiting the new employee (related to standard task) during 3 years.

5. Recommendations to Inspire Standards Professional Development

I suggest to take part or participate in Standard Related Meeting and Seminar to absorb the information. It is really adventage to participate in ISO Meeting as we can use the information to develop our programe to anticipate the upcoming standard

ANNEX A.4 (APEC MEMBERS)

SUPRAPTO, DEPUTY DIRECTOR GENERAL, NATIONAL STANDARDIZATION AGENCY (BSN), INDONESIA

I recommend to develop competency requirements for standards professionals to be harmonized with international standards, such as: ISO /IEC 17021-1 to 5 and develop Personnel Certification Body (PCB) based on ISO/IEC 17024. Certified personnel from accredited PCB should be recognized and accepted at regional and international levels.

1. A Starting Point of Career Path to be a Standards Professional

I started my carreer in 1978 as a management staff of Indonesian Institute of Sciences (LIPI). My primary tasks were to draft the development of national system for standardization in Indonesia and to prepare the establishment of the National Standardization Council of Indonesia (DSN). During 1986 – 1998, my responsibility as the Secretary of the Commission for Standard Implementation – DSN was to develop the system for standard implementation, testing, and certification. As the Head of Sub-Division of Development Accreditation System – Centre for Standardization, LIPI, during 1987 – 1991, I was responsible for development, monitoring & management of system for calibration & testing laboratories network. During 1990-1998 as the Head of Division of Standard Development and implementation System, Centre for Standardization, LIPI, my task was to develop the national standardization and standrd implementation system.

In 1992, Indonesia established the National Accreditation Body of Indonesia (KAN). . During 1994-1998, as the Excecutive Secretary of KAN, I was responsible for accreditation of certification bodies and laboratories. During 1998-1999, as the First Secretary of KAN, I was in charged for accreditation of certification bodies.

In 1997, the Standardization Body of Indonesia (BSN) was established. During 1998-2001, as the Director of Standard Implementation and Accreditation of Certification Bodies – BSN my responsibility was to develop accreditation and certification system. During 1998 -2001, as a researcher at BSN, I was in charged to conduct research in standardization & conformity assessment. As an Accreditation Lead assessor at KAN, during 1999 – 2006, I was responsible to lead KAN assessment team. During 1999 – 2001, as an Executive Senior of KAN, I was in charged of accreditation of certification bodies.

During 2001-2006, as the Head of Accreditation Centre for Certification Body, BSN, I developed the national accreditation and certification system. During 2003-2006, as the member of Pacific Accreditation Cooperation (PAC) Executive Committee, I was responsible to support operational activity of PAC. As the Head of the Centre for Standard Implementation System, BSN, during 2006-2011, I developed the national standard implementation system. Since 2011 up to present, I have been appointed as the Deputy of Director General of BSN for Standard Implementation & Accreditation. My primary task was to develop the national standard implementation and accreditation system. At the same time , I also served as the Secretary-General of KAN.

2. Important Event as Standards Professionals and Major Success Factors

The most important event(s) or experiences(s) are:

- To participate in formulation of national standardization system of Indonesia;
- To participate in the establishment of the National Standardization Council of Indonesia (DSN);
- To participate in the establishment of the National Standardization Agency of Indonesia (BSN);
- To participate in obtaining MRA with ILAC, APLAC and MLA with IAF, PAC;
- To participate in drafting standardization & conformity assessment law.

Impact on my career: I was promoted from Echelon IV up to Echelon I in the government position. The most important success factors: discipline, honesty, hard work, consistency, and professionalism.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

Kinds of standards professionals: Quality infrastructure (metrology, standardization and conformity assessment).

Kind of knowledge: technical education.

Kinds of Skills: standard formulation, auditing, sampling, inspection, testing, calibration.

Kinds of Experiences: accreditation, certification, laboratory, inspection, and industrial process.

4. Job Market and Future Prediction on Standards Professional

In international trade, standard will be considered as secondly important factor after price. This makes standards and conformity assessment become cirtical in improving the compatitiveness of a nation's economy. All industries (goods or services) in the world will use standards and conformity assessment as the tools to achieve good quality and improve product competitiveness. Therefore, standards professionals will be in high demand both in domestic and international job markets.

5. Recommendations to Inspire Standards Professional Development

I recommend to develop competency requirements for standards professionals to be harmonized with international standards, such as: ISO /IEC 17021-1 to 5 and develop Personnel Certification Body (PCB) based on ISO/IEC 17024. Certified personnel from accredited PCB should be recognized and accepted at regional and international levels.

ANNEX A.5 (APEC MEMBERS)

TAR. HANAFIAH, THE FORMER GENERAL MANAGER, NATIONAL STANDARDIZATION AGENCY (BSN), INDONESIA

By knowing the detail of standardization professionals needed in a standardization organization, there will be appropriate management for recruitment, training, education and refresment program for next generation standardization professionals development especially in APEC member economies

1. A Starting Point of Career Path to be a Standards Professional

As my educational background is Agricultural Product Technologies, I started my career in 1979 as a researcher at Research Institute for Marine Fishery. Much of my work was in doing researches dealing with post harvest technology of fish in general. The research institute I was working with regularly had coordination work with the DG of Fisheries which was working as the host of some TCs related to Fisheries. Some of my work were used as the basis for developing our national standards, among others were flying fish roes, dried sea cucumber, salted-boiled fish and dried-smoked skipjack (katsuwobushi).

My educational background also led me joining the new established institute at the Ministery of Agriculture at that time (1994), the Agency for Agribusiness. I was assigned as the head of division for Accreditation at the Center for Standardization and Accreditation. Here in this center I learnt for the first time about ISO 17025 and we manage to accredit some laboratories within the Ministery. After some years, I moved to another divisions which was Division for Standardization. Here in this division, my work mainly dealt with national standards (SNI) development, establishing our National Standardization Syatem, standards implementation and dissemination of our SNIs to the related stakeholders throughout the economy. In late 1990s I was moved to another division which was Standards Cooperation. In this new division, I broadened my experiences working with other standard institutions in harmonizing standards to facilitate the trade. I joined the national committee for Codex Alimentarius Commission, working with Victorian gouvernment of Australia in SQF 2000, HACCP as well as working with ASEAN Consultative Committe for Standards and Quality (ACCSQ).

In 2002 I was promoted as the Head of the Center for Standardization Cooperation in the National Standardization Agency of Indonesia (the BSN). Later, in 2006 I moved to the Center for Standards Development BSN, four years afterwhich I was finally promoted as the Deputy DG for Research and Standardization Cooperation and retired in 2013. Capacities I developed through out my career enable me to continue working in standardization field as an auditor in a certification body for ISO 9001 (QMS), ISO 22000 (FSMS) and now I am in the process of training to get certificate for ISO 50001 (Energy Management System). With these capacities, some consultant companies offered me a job as trainer in developing management system for certification.

2. Important Event as Standards Professionals and Major Success Factors

Developing capacities related to standardization activities formally are very important. In my case, I took formal trainings for ISO 9001, ISO 22000 including HACCP, ISO 50001 and some other training still related to standardization like ISO 17025, International Standards Development (ISO/IEC), TBT/SPS Training courses etc. Attending event related to capacity building in standardization is also important to build a self confidence to move forward in this area as we are able to know other people from different part of the world with different opinion or system possibly and are able to echange view on standards related activities. At the same time I also improves my english alot to be able to communicate with other experts further.

To me the most important success factors is in ourselves; it is the willingness to understand standardization not only in the surface but also in depth, as a system and focus ourselves in one area at a time. Likewise, the wilingness to use any opportunity for capacity building seriously is also important. Since these kind of opportunities are limited, conducting a kind of dissemination training in the same area will more improve our capacities.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

It would be much easier probably to recruit technical people for professional in standardization since they will work in a more technical aspect of standardization, either professionals in standards development, standards implementation, coformity assessment (accreditation and certification) as well as metrology. In my case, for standards development we recruited technical staffs according to their educational backgroud. For electro-technical standards we recruited staff with electrical engineering back ground. For food and agricultural standards we recruited staff with agricultural or food processing back ground. For chemical and mines standards we recruited staff with chemical engineering or geological science back ground. But for system standards we can recruite staffs from different diciplines. But generally industrial engineering usually acceptable for certification professional as well as professional in standards cooperation and TBT matters.

Since we do not have university graduated staffs majoring in standardization, therefore we continually conduct trainings or capacity buildings related to a specific area of standardization. For example, national/international standards development, editor/drafter for national standards, TBT, etc. In the other deputy in BSN, they conduct training in ISO 17011, ISO 17021, ISO 17024, ISO 17025, ISO 17065 etc. We mainly expect the the technical knowledge from the new recruited staffs.

4. Job Market and Future Prediction on Standards Professional

My perspective is in the growing demand of standardization activities related to assuring quality and safety of pruducts throughout supply chains. This is especially true in certification area. There will be more and more requirement in certification area especially as auditors for ISO 9001, 22000, 27000, 50001 and the newly come 55001. On the other side, the same amount of knowledgable staffs will be needed to support the implementation of the standards at the industries, not mentioning the demand for

consultancy business. In the mean time, standards development organization will also need standardization professionals in the area of standard writers/drafters, editors, TBT/SPS handling staffs etc.

5. Recommendations to Inspire Standards Professional Development

Standardization is an instrument for trade and is implementated to facilitate the trade. To enable the implementation of standardization as an instrument of trade, there should be a harmonized code of conduct to be implemented by the joining economies. Therefore, every single element of standardization should be underststood and implemented in a harmonized way including in preparing the professionals in standardization so that the qualification will be more or less the same. By knowing the detail of standardization professionals needed in a standardization organization, there will be appropriate management for recruitment, training, education and refresment program for next generation standardization professionals development especially in APEC member economies.

ANNEX A.6 (APEC MEMBERS)

DR. SUNARYA, SPRING INSTITUTE, INDONESIA

After I retired I have been working as a Trainer and Consultant for standard and conformity assessment. The need to provide trainings and consultancy on standardization is in great demand. This proves that standards professionals are in high demand in the job market, both for government organizations and private sectors.

1. A Starting Point of Career Path to be a Standards Professional

My knowledge on chemical test and quality control that I learned at the university plus my two years of experience as a staff at the Ministry of Agriculture (MOA), have contributed significantly in my work as the chief of Standardization at MOA in 1982.

In my early work as the coordinator in the development of standard on fisheries and agriculture, there was a great deal interaction with my seniors who were experts in developing standard. The learning process through discussion as well as hands on experience were very helpful in thoroughly understandingng the principles of standardization.

After completing my PhD in 1987, I worked at National Center for Fish Quality Testing and Quality Control. I was in charge in drafting standards, inspection and testing.

In 2001, I was apponited as the Deputy Chairman at the National Standardization Agency of Indonesia (BSN). In this capacity, I had ample opportunities to improve my knowledge on standardization, through intensive interactions and discussions with many experts from national, regional and international.

At the end of 2009, after I retired from BSN, I continued to work as the owner and leader of the Spring Institute (Training and Consultation on Standard and Cconformity assessment). It is my responsibility to provide training and consulting on standardization. My knowledge and experiences working in standardization, enabled me to write a book entitled: "Standardization in Industrial and Trade", published in 2012. The central theme of the book is the concept of standardization and its application in the globalization. The book is intended for executives and lecturers/teachers and presently is being translated into English.

2. Important Event as Standards Professionals and Major Success Factors

My knowledge and experiences on Quality Control have been very helpful for me to enhance the philosophy of standardization and its aplication. In standard application, conformity assessment is the most important concept. These have contributed in my carreer as the food scientist to expand my capability to other fields, such as: railway safety aspects, forestry, general agriculture, fisheries, industry and trade, as well as in ministry of sports.

According to my opinion and observations, the understanding of standardization can be devided into three levels:

1. Level one, those who understand a standard as it is written in the standard document including the technical requirements (what it is);

2. Level two, those who understand a standard as it is written in the standard document and also understand the consequences of non compliance with the requirements (what it is and how it should be);

3. Level three, those who understand a standard as written in the standard document, understand the consequences of non compliance, and the compelling reason of requirements (what, how and why).

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

Based on my observations and experience, someone who has the basic knowledge in quality control and experience in conformity assessment, can understand easily the substance of standardization. Standardization activities are closely related with technical aspects. Therefore in the job market, standards professional sometimes is also named as a Standardization Engineer.

4. Job Market and Future Prediction on Standards Professional

After I retired I have been working as a Trainer and Consultant for standard and conformity assessment. The need to provide trainings and consultancy on istandardization is in great demand. This proves that standards professionals are in high demand in the job market, both for government organizations and private sectors.

5. Recommendations to Inspire Standards Professional Development

The concept of Standardization is very important in all kinds of jobs and even in our lives. Therefore, standardization mindset needs to be dissiminated extensively to all stakeholders who deal with standardization activities. APEC SCSC can play an important role in out reaching the standardization mindset to the concerned stake holders in the APEC members economies.

ANNEX A.7 (APEC MEMBERS)

TADASHI EZAKI, THE CHIEF DIRECTOR OF STANDARD, SONY, JAPAN

"I was an electronics engineer and involved in video processing development and circuit design for consumer video cassette recorders, such as VHS, Betamax and 8mm video. At that time, measuring methods of consumer video cassette recorder was discussed in an industry association in Japan and I participated in the WG. It was my start of my standardization career."

1. A Starting Point of Career Path to be a Standards Professional

I was an electronics engineer and involved in video processing development and circuit design for consumer video cassette recorders, such as VHS, Betamax and 8mm video. At that time, measuring methods of consumer video cassette recorder was discussed in an industry association in Japan and I participated in the WG. It was my start of my standardization career. Although I have been involved in the other works, such as content protection, content distribution, personal identification, etc., I continued involvement to the association's standardization committee. When I was in mid 40s, I decided to move to standards department in my company to concentrate in standardization activity. I'm involved in education, promotion, coordination for standards in my company and finally I became a secretary of IEC TC 100.

It will be a typical career that an engineer starts his standardization activity as an expert of a specific technology and takes key position of the relevant committee or WG along with his promotion from an expert to PL and Convener. It will be preferable to have engineering knowledge related to the committee. However, the management skill will be more important than engineering knowledge for the key positions such as chairperson and secretary and the engineering background will not be mandatory.

2. Important Event as Standards Professionals and Major Success Factors

I think that actual participation in the face to face meeting of national mirror committee and international meeting was most impressive in my career. To develop and write a specification also gave me a kind of self confident for standardization. It will be very helpful to know all the standardization processes for standards career.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

I look at the experience and possibility for the following items to hire new team member:

- Self-directed personality to be able to coordinate and decide our company's standardization policy and to act as a company representative

- Having cooperative mind to be able to have good communication with other companies in a standards community

- Standards development experience, contribution to standards development, editing work of standards and convener ship in a WG or committee especially de-jure standardization

- Patient person to be able to negotiate standardization issue in the community and contribute to the community for a long time

4. Job Market and Future Prediction on Standards Professional

There will be several types of standards professionals.

- A kind of company business professional who can develop business planning utilizing standards as a tool

- A kind of standards professional who has entire knowledge on standardization and can help any engineer and department in his company for standardization

- A kind of expert who has deep technical knowledge and can develop standards efficiently

- A kind of corporate standards professional who is involved in promotion and education of standardization in their company and provides center functionality of the company Of course, a standards professional may have ability for all or some of above standards professional roles.

It will be very important for all the standards professional to understand the purpose of standardization at first. That is, standardization is a business tool.

For each type of standards professional, relevant education or experience should be given.

5. Recommendations to Inspire Standards Professional Development

It will be important to persuade company executives to understand the importance of international standardization at first. But even if the top managements understand the importance of standards and encourage business groups to develop professionals, heads of business division or managers of section often degrade the priority of standards activity because of their daily operation. Therefore it will be very important for company executives to create and promote a kind of attitude or policy of the company to develop standards professionals in their companies.

ANNEX A.8 (APEC MEMBERS)

**YOSHIKAKI ICHIKAWA, SENIOR CHIEF ENGINEER,
HITACHI, JAPAN**

Standardization activities are more related with businesses than philanthropy. Standard professionals having competence in combining business plans with standardization strategy will be urgently needed particularly in Japan.

1. A Starting Point of Career Path to be a Standards Professional

As a senior manager of environmental affairs division, I have to be involved in the standards in the field of environmental issues. I became a chairman of IEC TC 111 in 2009 as a chairman which creates so called "harmonized standard" for regulations in EU as well as reference standards (based on WTO TBT) worldwide. My work significantly reduce compliance risks of our company's products as well as contributing to shaping regulations workable for our industry.

2. Important Event as Standards Professionals and Major Success Factors

Since 2000 I have been attending inter-governmental meetings representing my economy, where I learned lessons with respect to international negotiations. I learned skills for leading discussion and achieving consensus by finding the possibilities of compromise for all the stakeholders. After that I did a convinor for an international standard in IEC which provided real opportunities to lead the real standard development from scratch to final publication. This experience as a convenor seems to have build a basis for the competency needed to be a chairman of TC.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

- Standard Professional: communication capability, good to achieve and extend human connection, skilful for dealing with rules and regulations. Good for boiling a goal down to workable action plans
- Standard writers: good to quickly understand technical subjects, good to transform ideas into crisp languages.
- Strategic planner: a person in charge of real businesses but understands how to utilize standards to promote his/her own businesses.

4. Job Market and Future Prediction on Standards Professional

Standardization activities are more related with businesses than philanthropy. Standard professionals having competence in combining business plans with standardization strategy will be urgently needed particularly in Japan.

5. Recommendations to Inspire Standards Professional Development

Provide them appropriate training, real opportunities to participating in standardization activities, goals of contributing to businesses, and reasonable appraisals.

ANNEX A.9 (APEC MEMBERS)

HAKSUN KIM, VICE PRESIDENT,
SAMSUNG DISPLAY, KOREA

"I think that fairness and suggestions concerning the correct future technical direction are required to strengthen a business's competitive power through standards. To that end, in recognizing the importance of standards, the APEC should carry out diverse activities to positively improve the status of standards professionals."

1. A Starting Point of Career Path to be a Standards Professional

I majored in electric circuit and system field at the department of electronic engineering of the university, obtained a doctor's degree in the design of operational amplifiers in 1993, and worked as a professor at the department of electronic engineering at the university for 15 years and 6 months. During my years of teaching at the university, I took part in the establishment of standards and standardization activities at the IEEE 802 International Standard division, which is the communication area of the IEEE. Then, from 2008, while working as an executive for a company, I established the standardization department with an interest in international standards so as to lay the groundwork for systematic standardization activities. As a result, I led tasks to establish international standards at the international standardization departments for IEC TC110, SEMI FPD Metrology, ICDM, and so on.

2. Important Event as Standards Professionals and Major Success Factors

As I realized that leading industry with standards rather than technologies is much more important for industrial development, I became interested in standards. By this I mean that a standard should be established before the development of technologies, and I was able to confirm this while carrying out standardization activities for IMT2000. In the course of those activities, I gained an opportunity to broaden my appreciation of the direction of future technologies and developed the strong conviction that whoever rules standards controls the world. I am sure that much growth and many developments have been achieved on the basis of standards, as it is possible to predict future technology developments through standards as well as the technical skills achieved by recommending abundance of and systematic standardization activities.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

We require the recruitment of standards professionals in two main areas: The first type of position concerns standards technical staff who will plan international standards based on future technologies and establish the standard strategy. The other type of position is the standard technical expert who will deal directly with the standard document for each technical field. Engineers in vast technical areas who have experience of projects related to technical strategies or who have earned a Techno MBA would be preferred as standard technical staff, while experts in standardization who are capable of writing standard documents professionally would be preferred as standard technical experts. In addition, I think that it would be a good idea to foster experts through a standardization training program aimed at the company's experts in a given technical area, which would be selected by a company as and when a technology needs to be standardized in that company.

4. Job Market and Future Prediction on Standards Professional

I think that as technologies continue to develop rapidly, more and more standards professionals will be required in the future. A company might reach a limit in its competitive power if it relies solely on the development of a technology. In my opinion, a company might not survive if it can't lead both the technology and the standard at the same time. Because technology can be secured through various methods such as self-development or outsourcing, however, the relevant standard cannot be easily replaced if it is not included in the company's strategy. Also, I expect that both the profession of standards professional itself, and the number of personnel required, will be greatly expanded as technology develops.

5. Recommendations to Inspire Standards Professional Development

I think that fairness and suggestions concerning the correct future technical direction are required to strengthen a business's competitive power through standards. To that end, in recognizing the importance of standards, the APEC should carry out diverse activities to positively improve the status of standards professionals. I hope that the APEC will promote the achievements in various activities of the chairmen and members of the IEC, ISO, ITU, and other organizations, and implement other promotional activities so as to raise awareness that standards have an essential role to play in the growth of enterprises. Furthermore, I believe that providing support for training programs related to the economic value of standardization activities and the importance of standards, and fostering experts are necessary to stimulate companies' interest in standardization and help them to establish standards.

ANNEX A.10 (APEC MEMBERS)

YONGJIN KIM, VICE-PRESIDENT,
MODACOM, KOREA

The role of standard will increase substantially as part of increasing globall market and globall trade. The use of standard also increase as many organisations, as well as governments organisation, Therefore, I predict that the standard professional demand increase every year and in the future.

1. A Starting Point of Career Path to be a Standards Professional

Dr. Yongjin Kim has received the B.S. degree in Electronics Engineering from Yonsei University in 1983. He received the M.S. and the Ph.D. degrees in Electric and Electronics Engineering from KAIST(Korea Advanced Institute of Science and Technology) in 1989 and 1997, respectively. From 1983 to 2002, he has worked for ETRI(Electronics and Telecommunications Research Institute) for the development of a distributed operating system for Mini-computer, traffic management systems for ATM networks, and IPv4/IPv6 translators and many others as a team/project leader..

Since 2003, he has worked for Modacom as the CTO and executive Vice President. In Modacom he has developed several kinds of mobile Wimax/LTE terminal devices and M2M terminal device platforms including SDK, RDK and M2M communication modules. He has been a Rapporteur in ITU-T SG 13 for standardization on IP over ATM during 1997 ~ 2000 and he has been the Convenor of SGSN(Study Group on Sensor Networks) in ISO/IEC JTC 1 during 2008 ~ 2009. Also, he was an invited Professor at KAIST in 2002 and taught at Yonsei University during 2006 ~ 2008 as an invited professor. As the result of his research he has publishe d more than 150 papers and 40 patents for communications, computers, Internet, and sensor networks. He has been awarded a medal of honor of industry in 2011 from Korea government for his excellence in the field of standardization. Now, he is the Convenor of ISO/IEC JTC1/WG 7 for the standardization of sensor networks/M2M/IoT since 2010.

2. Important Event as Standards Professionals and Major Success Factors

The most important event in my standard professional was an appointment to the Rapporteut in ITU-T for leading international standards for 4 years since 1997. During the period, I contacted many people to discuss and learned how to manage standardization meetings.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

In recruiting the new employee, the important aspects to be considered are the knowledge and skills and experiences. English and conversation skilsl are important too. But the most important aspects is positive and active attittude.

4. Job Market and Future Prediction on Standards Professional

The role of standard will increase substantially as part of increasing globall market and globall trade. The use of standard also increase as many organisations, as well as governments organisation, Therefore, I predict that the standard professional demand increase every year and in the future.

5. Recommendations to Inspire Standards Professional Development

I recommend to participate in Standard Related Meeting and Seminar to get the information. If you have a chance to get a leadership in standardization bodies like ISO, IEC or ITU, it will make you a real standards professional.

ANNEX A.11 (APEC MEMBERS)

LAWRENCE LEE, CHIEF DIRECTOR,
LAYANG LAYANG, MALAYSIA

"To propose to the government to sponsor individuals for further training to enable them to be a better standards professional so we become more define and strategic in our roles as professional standards."

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1. A Starting Point of Career Path to be a Standards Professional

- Started working in 1982
- Got involve in scuba diving in 1985
- Took up leadership/traning programs in 1991
- Became an Instructor since then and thereafter a Course Director in 1996
- Have trained more then 600 divers.
- Decided to specialize in marine tourism in 1992
- Worked for Layang Layang Island Resort a dive resort as a Sales & Marketing Manager in 1997
- Got involved with National Occupational Skills Standards(NOSS) in 1998
- Then went on to facilitating ISO for scuba standards and develop/adopted Malaysian Standards
- Currently General Manager of Layang Layang focusing on business development, strategic matters and overseeing the resort operation.

2. Important Event as Standards Professionals and Major Success Factors

Participating with other dive professionals and sharing experiences

It has made me to be more detailed in my thinking and analyzing process

Enable me to guide and teach staffs in my company to adopt a systematic approach to addressing and solving problems.

To address and resolved management crisis.

To be able to anticipate issues and pro-act to prevent further problems.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

I will hire sufficient/relevant work knowledge and possess the right qualification

With very strong and positive attitude

A person who is passionate about the job/ work.

4. Job Market and Future Prediction on Standards Professional

Yes there is a need and potential to develop human assets in standards professional

To hire professional with lots of experience to be involved with standards thus able to guide and lead new professionals to perform effectively.

5. Recommendations to Inspire Standards Professional Development

Conduct special programs for standards professional to enable them enhance their skills/ knowledge

To propose to the government to sponsor individuals for further training to enable them to be a better standards professional so we become more define and strategic in our roles as professional standards.

ANNEX A.12 (APEC MEMBERS)

NG KIM KEAT, CHAIRMAN,
FOOD MANUFACTURING GROUP, MALAYSIA

"It is important that a standards professional to continuously update own self the latest scientific information, public interests, global standards trend, and global trade & health policies. As such I have read (lots!), learn from others' experience, and always keep an open mind."

1. A Starting Point of Career Path to be a Standards Professional

I am now the Chairman of Technical Committee of the Food Industry Group of Federation of Malaysia Manufacturer and Head of Regulatory Affairs of a multinational company. One of my roles is to lead the industry to work with regulators and standard setting bodies to set food standards. I started to involve in standard setting end of 90s, and have since developed my career interest in regulatory & scientific affairs.

2. Important Event as Standards Professionals and Major Success Factors

It is important that a standards professional to continuously update own self the latest scientific information, public interests, global standards trend, and global trade & health policies. As such I have read (lots!), learn from others' experience, and always keep an open mind. The abilities to connect all the knots, and come up with a solution to benefits most are key success factor. I have seen some standard professionals are taking very extreme views with an aim to win all. I think to be a successful standard professional, one must always base on data and facts for the benefit of all. I feel satisfy and take pride when I have contributed to a good standard which will benefit all parties.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

I will look for open minded, technical people who are able to connect data/facts.

4. Job Market and Future Prediction on Standards Professional

Standard setting will become more regional and global. It will go beyond local, and be a specialist in its own field globally.

5. Recommendations to Inspire Standards Professional Development

A good standard can benefit mankind. A bad standard can destroy what we have achieved for years. We need ethical standard professionals as their works will help us to live in a better world, globally. Standard professional is a specialist who should be rewarded and recognized as par with the contribution.

ANNEX A.13 (APEC MEMBERS)

ROSARIO URIA, CHIEF,
INCEOPI, PERU

"An important aspect is also the demand for these professionals is increased to the extent that the company become more competitive and need to apply standards in its processes and introduce innovation."

1. A Starting Point of Career Path to be a Standards Professional

My experience in standardization is of about 24 years, I started in microbiology laboratory using technical standard in microbiological methods, and then I continued working in quality management system in the industry, principally ISO 9001. Then I introduce my professional activities in environmental standards like ISO 14001 and food safety with HACCP system. In 2005 I started to work in Peruvian Standard Body, in regards our activities in the NSB, I should mention that in the beginning we did not have a significant participation in the regional nor non-regional standardization. Currently, we have strengthened our international work, which is shown in the increasing number of ISO mirror committee, as well as our participation in the international balloting.

2. Important Event as Standards Professionals and Major Success Factors

I had the opportunity to advice the Head of INDECOPI in to change its status as a P member in ISO, so since 2007 Peru started to work in ISO as a P member; another event was our participation in APEC 2008. In this opportunity, Peru was host of this important international forum. The participation in the forums, in projects and technical meetings with the different economies and NSB of the region has amplified our vision of the international participation, being Peru a economy with a small international presence, we find in APEC an opportunity to interchange experiences

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

- Planning: International cooperation and relation with stakeholders:2 Economists, with experience in international and national partnerships.

- Projects Management: Engineer, Economists, with experience in project management

- Development standards: Professional in standardization: Engineer in Food, Industrial, Civil, System, Electric related, Chemistry, Science professional (Biologist, Chemistry). Experience in quality management system, Knowledge

in WTO TBT agreement and international standards process. Good skills in negotiation, and attitude proactive and researcher.

- Dissemination: Marketing and sales promotion: Marketing Professionals, Graphic Design, Communication Science professionals.

- Education: Professional to develop education programs

All the professionals should have an advanced knowledge of English, good writing skills, negotiation attitudes, skills to work in group and emotional management.

4. Job Market and Future Prediction on Standards Professional

At the time is still limited, yet it is not very competitive, because there is no proper training for this kind of professional, usually the experience in gained in the work, so it is important training programs for professionals in standardization. An important aspect is also the demand for these professionals is increased to the extent that the company become more competitive and need to apply standards in its processes and introduce innovation.

5. Recommendations to Inspire Standards Professional Development

- Share experience of economies to have a formal program for education young professional.

- At regional level created a virtual course for a formal program (Training to trainers)

- Diffusion of educational workshops.

- Networking of professors to share materials

- Technical assistance in education programs

ANNEX A.14 (APEC MEMBERS)

RENATO V. NAVARRETE, MANAGING DIRECTOR,
CERTIFICATION INTERNATIONAL PHILIPPINES(CIP), INC., PHILIPPINES

"Given the trend in globalization and regional market integration, as well as continued economic expansion in the Philippines, there is a growing market for standards professionals. This market is not confined to jobs in the government. Business and investment opportunities are multiplying."

1. A Starting Point of Career Path to be a Standards Professional

My career started in materials management with a major food and beverage company in the Philippines. Subsequently I entered government service, where for nearly 21 years, various assignments had involved me in industrial development planning and then national standardization.

I started work in the standards community when I was appointed Deputy Director and later Director of the Philippine national standards body, the Bureau of Product Standards. My prime responsibilities centered on policy and program formulation on national standardization, encompassing standards development, conformity assessment and standards promotion, as well as overall administration of the Bureau. As Director, my functions included international involvement in ISO's technical cooperation programs for developing country-members in my capacity as Chairman of the ISO Development Committee and in ISO council affairs. I had participated too in establishing mutual recognition arrangements in conformity assessment schemes within ASEAN and APEC. After leaving BPS, I was engaged in a UN standardization project for LDCs in Southeast and South Asia. In 1996, I joined Certification International Philippines, a Philippine-accredited certification body with international affiliation, as Managing Director. My main responsibilities span corporate strategic planning, technical and financial administration. Work activities included management system audits of major clients.

I pursued my career with hard work, determination, diligence and integrity. I developed my professional capabilities through academic and practical studies in varied areas such as: standardization, business, international trade, communications, negotiations, organizational management. My successful experiences through the years had been seen in how stakeholders of national standardization work had appreciated its beneficial impacts on their industrial competitiveness and productivity and how consumers had begun to improve their ability to exercise their rights to protection. I am personally satisfied that this has developed the beginnings of an increasingly balanced market environment in the Philippines.

I believe that a key strategy in fulfilling my professional aspirations was, and will continue to be, keeping national standardization stakeholders, particularly their needs and expectations, in constant focus – how to meet these in the most effective way within existing resources. It is consistent with my service orientation as an individual. Self-fulfillment arises from being able to serve others, fellow nationals and foreigners alike.

2. Important Event as Standards Professionals and Major Success Factors

Obtaining national recognition of the impacts of standardization work, particularly on industrial competitiveness and consumer protection. This was my experience in the national standards body of the Philippines. Subsequently, in the private sector, seeing our company become the leading and major certification body in the Philippines is another significant highlight in my career. Serving customers faithfully and diligently indeed brings an organization forward.

A high degree of participation of business and consumer sectors in national standardization work confirmed the validity of my contributions to influence the direction of national standardization towards meeting stakeholders' expectations. This required translation of highly technical aspects of standardization into more easily understandable messages and readily recognizable benefits to consumer welfare and trade and industrial competitiveness. These have helped draw out stakeholders' interests in national standardization in their voicing out their needs and expectations and in initiating market-driven quality improvement programs.

My personal success factors include undertaking continuing business and economic studies, development of my management and communication skills to be able to function within social and economic groups with divergent views, keeping an open mind and also being results-oriented. In addition, reaching out to stakeholders to identify and then to work to satisfy their needs and expectations, working jointly with them through committees, workshops, public discussions was often done. This is why, time permitting, I still do audits at our client sites. This is one way I keep in touch with our clients. Developing and strengthening team work among my staff, previously in a public agency and currently in the private sector, has helped to keep them always motivated and dedicated; staff relationship is of prime importance at all times - this is also a significant element in our organizational effectiveness.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

Important personal attributes of our staff, and those required of future recruits, are honesty, diligence, open-mindedness, initiative and willingness to learn. Competencies in team work, public communication, customer relations and systems thinking are basic job requirements. Technical competencies, breadth of technical knowledge and experience in conformity assessment are expected but these competencies alone are not enough. The foregoing personal attributes and competencies are prerequisites.

4. Job Market and Future Prediction on Standards Professional

Given the trend in globalization and regional market integration, as well as continued economic expansion in the Philippines, there is a growing market for standards professionals. This market is not confined to jobs in the government. Business and investment opportunities are multiplying.

Professionals should be educated and prepared for standards development in a manner that balances their technical expertise in various fields of standardization (standards development, inspection, testing, certification, metrology) with the expectations of their stakeholders. Therefore, communication and managerial abilities are important. Customer focus is imperative among standards professionals. This should be one aim of their career development process.

As for the young people in the job market, they should be attracted to the standardization field by standardization organizations, public and private, by portraying this as an equally exciting and rewarding area that can challenge their abilities. As a technical or scientific pursuit or as an entrepreneurial business venture, there is plenty of room for standards professionals of the future. They can engage in research. Some may decide to invest in training, inspection, testing or certification as a commercial enterprise. But wherever their interests bring them, they should not lose their customer-sense. It is the job of current standards professionals to bring this message to an emerging crop of professionals, in order that a good number of them can be attracted to the standardization sector where these young people can decide to build their careers

If standards professionals are too cooped up in their technical specialization, there is a possibility they might lose a sense of purpose as to who they should be serving. They have real customers outside their institutions. Standards professionals should exert the initiative to create this match between themselves and their resources on the one hand, and, on the other, an expanding world of customers pursuing their objectives whether in trade globalization, technology exchanges or consumer protection. In these fields, standardization is an essential element.

Standardization is a critical and vital infrastructure in any economy. A new generation of professionals should be attracted to man and expand this infrastructure. 4

5. Recommendations to Inspire Standards Professional Development

For regional and international cooperation to flourish in the field of standardization, standards professionals should be exposed to the realities of globalization. Along with this development arises trade and investments expansion, cross-national transfers of technology and of human resources.

It is vital to sharpen the technical expertise of standards professionals and also their abilities to function in a multicultural environment. Interdisciplinary studies are necessary. These can mold them to be more understanding of globalization being an unstoppable wave that can widen the borders of any economy for more trade and social exchanges, and hopefully better standards of living and inclusiveness in more economies. Hence, the importance of broad and open mindedness on the part of standards and many other professionals. They will be functioning in a more demanding and much wider field where

their expertise and abilities will be challenged. It will no longer be enough to be competent against national expectations. International levels of performance will be expected; this requires a new mindset among the rising professionals of today, not only in standardization but also in many other professional pursuits.

It is important to train young professionals under a new paradigm that prepares them for a wider range of career and achievement opportunities beyond their national borders. Both in the classroom and in day-to-day life, through examples of standards professionals in the way they live and conduct themselves, this should be inculcated among the youth of today to counteract a generally observed tendency on their part towards greater materialism, more comforts and short-term vision. Education is indispensable.

ANNEX A. 15 (APEC MEMBERS)

GEORGE ARNOLD, CEO AT TERCIO SOLUTIONS LLC, USA (FORMER DIRECTOR, STANDARDS COORDINATION OFFICE, NIST, USA)

"So my advice to people early in their career is to think of standards as an important part of an engineering professional's job. The main job is to do the research or development or engineering or management of a new product or process or innovation, and dealing with the standards aspects is as important as dealing with the financial, legal, or other aspects needed to be successful in the marketplace."

1. A Starting Point of Career Path to be a Standards Professional

I started working on standards early in my career, in the early 1980s, when I was leading the development of protocols for computer networking for automated operations in the nationwide AT&T telephone network. We had some requirements that the existing standards didn't quite meet, so my group became involved in the development of standards at CCITT (now ITU-T) so that we could use them. About 15 years later, when Lucent Technologies became independent of AT&T, I was asked to lead the company's global standards function. I became involved in governance of the standards system through ANSI (I had volunteer leadership positions of increasing responsibility, eventually becoming Chairman of the Board), IEEE (I was elected to the IEEE Standards Association Board of Governors and later President) and ISO (where I was elected Vice President – Policy, responsible for ISO's strategic plan). Most recently, I joined the National Institute of Standards and Technology, a government agency, and have responsibility for coordinating standards activities across the entire U.S. federal government. During my tenure at NIST I was also responsible for leading a national program to develop a standards framework for the smart grid.

2. Important Event as Standards Professionals and Major Success Factors

Early in my career, I gained experience making technical contributions to the development of standards. I later learned that many other skills are required to become an effective leader in the standards community. Learning how to lead an organization of volunteers and reconcile differing perspectives to forge a consensus was the most important experience in my career. You have to sell others on a proposed solution and show how supporting it is in their organization's self-interest. Ironically, I initially developed these skills during a period in which I was not involved in standardization – I had a number of assignments at Bell Labs where I was responsible for matrix-management of cross-organization teams of people involved in process engineering. I later discovered that the leadership skills I developed in these assignments were transferrable to standardization work. (And I believe the converse is true, that leadership skills developed in standardization prepare one for other cross-functional or cross-organization leadership assignments in large organizations and hence are beneficial for career development.)

Another important skill I learned is how to ensure that standards work is effectively communicated to the senior leadership of an organization. You have to communicate the essence rather than the details in a way that makes the connection to their strategy or vision easy to comprehend. You have to learn how to converse in a different language. The language of standardization is too far "in the weeds" to be of concern to most senior leaders of organizations or agencies. You have to translate it into higher-level concepts and terms used in their frame of reference.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

It takes a special combinations of skills to succeed as a standards professional. One has to be technically knowledgeable, of course, but that is far from sufficient. Excellent interpersonal and negotiation skills, ability to work with others across internal organization boundaries, with other companies, and with people from different cultures is very important. You need the ability to communicate persuasively both orally and in writing, be regarded as objective and trustworthy, have good project management skills, and the fortitude to endure extensive travel.

4. Job Market and Future Prediction on Standards Professional

I would encourage young professionals who are interested in standards to start out in another business function as a first step in their career, and then move into standardization next. There are relatively few people engaged in standards who do that as their full-time job, so if that is your focus the career opportunities are exciting and interesting but somewhat limited in number. The large majority of people from industry who participate in the standards process also have responsibilities in product or service development or product management, and participate in standards to help align standards under development with their company's needs. So my advice to people early in their career is to think of standards as an important part of an engineering professional's job. The main job is to do the research or development or engineering or management of a new product or process or innovation, and dealing with the standards aspects is as important as dealing with the financial, legal, or other aspects needed to be successful in the marketplace. Influencing and participating in the standards work as part of that job requires that you develop special skills, such as those mentioned previously, and these skills are very valuable in your career development towards higher levels of management where you are primarily influencing people rather than writing code or designing hardware.

5. Recommendations to Inspire Standards Professional Development

Standardization is one of the most rewarding occupations I can imagine. It interweaves technical, political, cultural and social aspects in a way that no other profession does. You have to deal with all of these dimensions. It gives you the satisfaction of working on things that have big impact. Standards are a powerful means of technology transfer, and so you can see your efforts in developing a standard have big impact – across a whole industry or even society.

ANNEX A.16 (APEC MEMBERS)

NGUYEN MINH BANG, DIRECTOR – STANDARDS DEPARTMENT, STAMEQ, VIET NAM

Standardization including conformity assessment should be considered as an official profession. So, it should be included in education programmed as a permanent subject (from schools to universities and academics of higher education).

1. A Starting Point of Career Path to be a Standards Professional

Personally, I have worked in the structure of Director of the Standards Department under the Directorate for Standards, Metrology and Quality (STAMEQ - National Standards Body of Viet Nam) for more than 30 years. Before being appointed as Director of the Standards Department under STAMEQ in 2011, I used to hold the positions of Deputy Director of SMQ Information Centre of STAMEQ, Deputy Head of General affairs, Legislation and Planning Division, and Head-in-charge of the Methodological affairs Division of the Viet Nam Standards and Quality Institute (VSQI).

My colleagues and I (Director) in Standards Department of the Directorate for Standards, Metrology and Quality (STAMEQ – National Standards Body of Viet Nam) are responsible for implementing the following tasks:

- To develop, issue or submit to the competent State agency, person authorized to issue, and organize the implementation of policies, strategies related to standardization and technical regulating; organize the setting up and approval of master plans, work programs for national standards and technical regulations preparation in the fields assigned for management;

- To develop, issue or submit to the competent State agency, person authorized to issue the legal documents on standardization and technical regulating and organize the implementation of those documents;

- To carry out the appraisal and publicize the national standards; organize the preparation and adoption of national standards in the fields assigned for management; issue the organizational and operational rules/regulations for technical committees of national standards; provide guidelines for preparation and adoption of national standards, provide guidelines for preparation, publication of organization's standards; provide guidelines for application of international, regional and foreign standards;

- To carry out the appraisal of national technical regulations; provide guidelines for preparation of technical regulations; organize the preparation and approval of national technical regulations in the fields assigned for management;

- To build up and develop human resource for standardization and technical regulating activities; to organize scientific research and technology preparation on standards and technical regulations;

And some others. For implementing the above-mentioned tasks, we should cooperate closely with other relevant departments/units of STAMEQ like: Conformity Assesssment Department, Metrology Department, Viet Nam Standards and Quality Institute (VSQI), etc. as well as focus on the following things/matters:

- To promote and develop national standardization activities on the basis of harmonizing with or aligning to regional and international ones in various aspects of rules/principles, approaches and practices, etc.;

- To catch up with development strategies and trends of national economy and specific industries in order to ensure the "relevance" of standards developed and implemented;

- To be educated and self-educated continuously for having appropriate knowledges and information;

- To coperate with SDOs as well as other organizations in standardization issues (e.g. promulgation, dissemination, guidance…)

2. Important Event as Standards Professionals and Major Success Factors

For my colleagues and I, the most important events that impact on our career and professional activities are as follows:

- The deeper integration of Viet Nam economic activities into global, regional ones as well as bilateral and multilateral economic cooperation with other economies;

- The participation of Viet Nam in international/regional standards organizations (ISO, IEC, CAC, APEC/SCSC, PASC,… as a member (This open and ensure our possibility of participating in policy-making and technical activities of these organizations);

So, for us, the most important success factors are:

- People (Staff);

- (Clear) function;

- Process;

- Resources;

- Cooperation.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

Among our main tasks (mentioned in Answer 1 above) there is the task of doing appraisal of draft national standards (TCVNs) prepared by ministerial SDOs and draft national technical regulations (QCVNs) prepared by ministerial regulatory agencies. So, I used to and will recruit new technical persons for doing this.

This kind of staffs shall have appropriate competence meeting the following requirements:

Having upgraded knowledge and skills on standardization and technical regulation;

Having deep knowledge on specialised industrial subjects aiming to which standards and technical regulations being developed;

Having required degrees on foreign languages (English is preferable); And some other professional competence requirements/criteria.

4. Job Market and Future Prediction on Standards Professional

Today and in the future, in Viet Nam, more relevant organizations (stakeholders) are required/promoted to participate in national standardization (in wider and deeper manner) and international standardization (in the extend determined). So, standards professionals are needed to be hired/recruited not only for STAMEQ but also for ministerial SDOs, and business organizations. For some young people or experts involving or working in standards-related tasks, standardization is regarded as a practical job, and for some others it is regarded as a priority (main) profession. Based on this, we should identify/determine an appropriate approach on professional development to have enough human resources for the economy's standardization.

5. Recommendations to Inspire Standards Professional Development

Our suggestions and recommendations:

- Standardization including conformity assessment should be considered as an official proffesion. So, it should be included in education programme as a permanent subject (from schools to universities and academics of higher education).

- International standards organizations like ISO, IEC in cooperation with other international and regional organizations, should focus more on standards education by setting up and implementing pilot programmes in some selected economies and duplicate them in other economies later on.

- To promote "twinning" approach on standards education.

ANNEX A.17 (INTERNATIONAL FEATURES)

ROBERT STEELE, SECRETARY-GENERAL, ISO

So my perhaps simplistic message here is that standardization needs to be seen as an essential part of an organizations strategic direction and plan. It is not something esoteric to be debated in academia.

1. A Starting Point of Career Path to be a Standards Professional

ISO Secretary-General since 1 January 2009, Rob Steele has been reappointed for a second term of office (2014-2018). He was previously the Chief Executive Officer of Standards New Zealand (SNZ) and is a Chartered Accountant, a member of the New Zealand Institute of Directors, and a Fellow of the New Zealand Institute of Management. During his tenure as CEO of the New Zealand standards body, he represented SNZ on the ISO Council and Council Standing Committee on Strategy, and the ISO Technical Management Board. He was also Secretary of the Pacific Area Standards Congress (PASC) from 2002 to April 2007.

In his career Rob has worked in the private sector in New Zealand and Canada in many roles. He was Chief Executive of an electricity distribution company and prior to that in providing senior management advice to clients of Deloitte on financial audit and organizational finance. He has served on several Boards as a director of companies in the manufacturing and service sectors. Rob holds New Zealand and Canadian citizenship.

2. Important Event as Standards Professionals and Major Success Factors

Experience working for many years for industry and exposure to many different businesses in three economies really helped me understand what industry wants. I worked as a financial advisor and auditor which gave me access to senior management and the board of directors. These insights have helped me run standards organizations at national, regional and international levels.

Working in this way also made me appreciate that trade depends on common standards between buyer and seller. If these standards are also developed by industry it gives those at the table a competitive advantage over those that are not. But this is not widely appreciated and it is interesting to see a correlation between business that actively participates in standardization and higher financial returns.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

It is very important to have the following skills / experience

- A broad understanding of people management and leadership skills
- Experience in working where people are actually using standards. An understanding of what the customer really wants is critical
- A high level of curiosity
- Experience to see the "big picture". There is a real need to look outwards, not inwards

4. Job Market and Future Prediction on Standards Professional

I think the idea of a standards professional, as a standalone skill, is completely the wrong way to go. It suggests that people with this skill will stand apart from those who use the standards developed and this would be disastrous in that It would imply that standardization is a separate and possibly mysterious "art" practiced by a few acolytes in a theoretical world. Standardization isn't like that. It is an open, transparent inclusive process where all with an interest can and should be encouraged to participate.

Instead I think standardization should be a strategic subject within other degrees or skills learned, not just at a technical level, but an organizational and strategic level.

5. Recommendations to Inspire Standards Professional Development

So my perhaps simplistic message here is that standardization needs to be seen as an essential part of an organizations strategic direction and plan. It is not something esoteric to be debated in academia.

Stakeholders in the APEC region, especially industry in both manufacturing and services, need to understand this and demand that standardization be included in all undergraduate courses associated with business leadership. At a post-graduate level the subject needs to be included in strategic thinking and leadership.

Finally, standardization needs to be taught in ways that are interesting. It's not a boring subject that needs 2000 slides to explain. It's a vibrant story of organization excellence and setting platforms for launching exciting innovation into technologies and thinking we have not yet even dreamed of.

ANNEX A.18 (INTERNATIONAL FEATURES)

HITOMICHI FUJISAWA,
VICE-PRESIDENT, IEC
(CORPORATE CHIEF SCIENTIST, HITACHI, JAPAN)

It is simply to say "participate." Then the new world comes into their sights and it would become clear what are necessary for their next steps.

1. A Starting Point of Career Path to be a Standards Professional

I spent over 30 years in R&D in a private corporation, and after that career, I became and have been responsible for the corporation's international standardization activities for these 10 years. The previous career in R&D gave me a lot of opportunities to work in an international environment, which included international academic and technical/engineering societies such as IEEE and IAPR, by publishing/presenting technical papers, organizing international conferences, chairing technical sessions in such conferences, and so on. In 2002, I received IEEE Fellowship, and in 2003, I became responsible for technology development in R&D as a Corporate Chief Scientist. This kind of career is the basis of my current position at the IEC – I have been a Vice President of the IEC since 2009.

2. Important Event as Standards Professionals and Major Success Factors

This was not intended but as mentioned above, every experience in the international academic societies is the basis of my current skill and capability, which includes capability for communicating with international colleagues, presiding meetings, preparing documents for meetings, and so on.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

I do not have any experience in recruiting. But I like to have a kind of ″well balanced″ engineer. I want them to have language skill in English, communication skill, sufficient engineering/technological knowledge in the relevant domains, etc. Actually before talking about ″skill,″ he/she needs to be attractive (or friendly) as a person. Preferably it is nice if he/she is recognized by peers.

4. Job Market and Future Prediction on Standards Professional

I am not sure if we want "standards professionals." I personally think that they could start with engineers or managers in the field of engineering who can learn to become a "professional" for the work of standardization.

5. Recommendations to Inspire Standards Professional Development

It is simply to say "participate." Then the new world comes into their sights and it would become clear what are necessary for their next steps.

ANNEX A.19 (INTERNATIONAL FEATURES)

TERESA J. CENDROWSKA,
VICE PRESIDENT – GLOBAL COOPERATION, ASTM INTERNATIONAL

Recognizing that standards development is increasingly only one aspect of many components of an individual's job responsibilities, or perhaps even an extracurricular activity, the efficiency and effectiveness of the professional's participation in standards development will grow in importance.

1. A Starting Point of Career Path to be a Standards Professional

Prior to joining ASTM International I worked in two very different companies, a natural gas utility and the manufacturer of cable television converters. In addition to providing me an opportunity to apply my industrial engineering degree, I also gained a broad view of issues such as competition, market access, testing and certification, addressing consumer interests and the impact of regulation.

I engaged in the standards development community through my third job, beginning with ASTM International as a manager within the Technical Committee Operations Division. This work provided an excellent platform for learning about fundamental aspects of standards development, including: observing and understanding different approaches to consensus development, the value of engaging relevant stakeholders, negotiating consensus from divergent points of view, the benefits of cooperation between the public and private sectors, incorporating technological changes and market realities in standards as effectively and efficiently as possible, and communication.

I was pleased to have the opportunity to transition into a different aspect of standards development which focused on outreach to developing nations. My current role has afforded me the opportunity to see the global impact of standards. Even as I enter my 25th year of work in the standards development community, I continue to learn a great deal. The fundamental knowledge I gained in my earlier roles in ASTM continues to be unquestionably important. At the same time, I've gained a deeper appreciation and awareness of the different approaches to standardization and the challenges faced by developing nations.

2. Important Event as Standards Professionals and Major Success Factors

Generally speaking, key events or experiences in my professional career include:

- Receiving a sound foundation of information regarding procedures, company mission and objectives

- Direct engagement with a broad range of stakeholders which formed an awareness of key issues and a deep appreciation of the volunteer members' technical expertise, as well as their personal and professional commitment to standards development

- Being offered new assignments which provided opportunities to learn and collaborate with diverse interests, and being invited to contribute ideas to, as well as working on, new initiatives.

- Finally, my learned experiences and characteristics such as creativity, flexibility, and persistence are important to success.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

From my perspective within a standards development organization, potential employees demonstrate the following experiences, capabilities and characteristics:

- Strong organizational skills and the ability to multitask, managing several priorities at one time.

- Proficiency in written and oral communication including public speaking and interpersonal communication skills reflected in an ability to motivate and collaborate.

- Cultural awareness

- An ability to use and apply technology tools

- An ability to operate in situations with high degrees of ambiguity

- Optimism and a positive outlook

- Demonstrated entrepreneurial mindset that includes adaptability, flexibility and creativity

- Curiosity

- Commitment to long-term objectives

Based on my observation of individuals who work as experts within standards development committees, I believe the following experiences, capabilities and characteristics are important:

- Technical background or strong technical knowledge of the interests and topics he or she represents

- Clear understanding of the desired objective or end result for the standard being developed or discussed
- Awareness of the market place, including the impacts of technology, regulation and trade factors.
- Strong oral and written communication skills, including an ability to describe abstract ideas and provide a rationale for a stated position
- Strong organizational skills, including time management
- Interpersonal skills that include the ability to collaborate, network and negotiate
- Ability to use and apply technology tools
- Commitment to the task at hand

4. Job Market and Future Prediction on Standards Professional

I offer the following regarding future opportunities for standards-related tasks.

Standards will continue to serve as valuable tools that offer current technical information and facilitate market access. Companies that engage in the development of standards will benefit from a strengthened position to influence and understand the content of the standards. These capabilities will advantage the participating companies' positions in the marketplace.

Recognizing that standards development is increasingly only one aspect of many components of an individual's job responsibilities, or perhaps even an extracurricular activity, the efficiency and effectiveness of the professional's participation in standards development will grow in importance. The professional will be required to be knowledgeable about the use of the technology tools that are available for developing and implementing standards. Equally important will be a robust understanding of the development process. These two factors will enable the participant to be as effective as possible for the time invested in standards development.

Individuals participating in the standards development process will continue to benefit from the opportunity to network with colleagues from like-minded and competitor companies. Engaging in standards development will also offer an avenue for personal and professional development by cultivating leadership skills and a network.

5. Recommendations to Inspire Standards Professional Development

My recommendations for individuals engaging in standards development and the organizations or companies from APEC Member Economies in terms of regional or international cooperation include:

- Be prepared and participate actively and consistently to build knowledge and a reputation

- Engage with an open mind and appreciate the diversity of inputs; listen to the options and solutions others present,

- Strive to deliver the the best solution that is possible for the circumstances; then revisit that solution periodically to determine if there is any need for change

- Avoid duplication and the development of unique national or regional solution by embracing the rich resource of solutions available from multiple sources of standards

ANNEX A.20 (INTERNATIONAL FEATURES)

ERIK PUSKAR, ICES CHAIR IN 2014 (PROGRAM MANAGER, NIST, USA)

"Most of the efforts on education that I am aware of both in the U.S. and internationally focus on the supply side of preparing students. What is now needed is more focus on the demand side to see what industry needs and to encourage them to be more vocal about standardization qualifications during recruiting."

1. A Starting Point of Career Path to be a Standards Professional

Although my career has spanned over thirty years, I have been a standards professional for only the past ten years. I changed my professional focus from public finances to technology and standardization in mid-career. Like many of my contemporaries, I did not start out with the objective of becoming a standards professional but happened to fall into it. My university education in the 1970s and 1980s which was in the field of economics and public administration and did not cover standardization . Working at the U.S. National Institute of Standards and Technology (NIST) obviously increased the possibility of this happening, and when I was offered the opportunity of joining the Standards Services Division of NISTI quickly accepted and took advantage of the possibility. This turned out to be a fortuitous decision as the strategic importance of standardization is becoming more apparent to governments and industry. Most of my knowledge has come from on-the-job training supplemented by professional education courses.

2. Important Event as Standards Professionals and Major Success Factors

As my career took me into the standards realm, there was no single event or experience that influenced me. Rather it was a steady progression of learning opportunities and challenges that built upon themselves to establish a strong foundation in standardization. These include training courses, writing research reports, serving on standards committees and helping design standards or conformity assessment programs. Each time I would take away some additional knowledge from the task. One event stands out is the standards simulation exercise offered by United Knowledge which I participated in for the first time during the ICES meeting in Tokyo. This was truly an experience that builds enthusiasm for standards development as you are reminded of all of the soft skills such as negotiation which are necessary to be effective in standards development. I enjoyed this so much that after NIST colleagues experienced it, we decided to make this training available to NIST staff several times a year. Another experience that stands out was my first ICES meeting which I was responsible for organizing at NIST in 2008. It was fascinating to meet individuals from around the world working on educating students on standardization and learning about the different approaches and methods used to meet the goal of increasing

knowledge and awareness of standardization in different economies and regions of the world. As for a most important success factor, I believe it was when I realized that the learning process never ends and to always be open to new ideas and suggestions. Also, network, network, and network!

Regarding my daily tasks, my workday can be very *diverse*

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

Today, the lack of knowledge related to standardization is the biggest hurdle I face when hiring new employees (please note that for the most part I do not hire engineers where you would expect at least a rudimentary understanding). The majority of recent college graduates have basic computer skills, good time management skills, and possess the willingness to learn,. Their degrees, however, have not prepared them for a career in the world of standards, forcing me to take chances on their skills and trust my instincts during the hiring process. Recently, I was awarded the opportunity to hire interns, which enables me to test a future employee while he or she is still a student. I see this as a great advantage, both for me and for the student. In terms of hiring experienced staff we will look for previous standards or conformity assessment knowledge and experience either in the government or industry sectors. Conformity assessment (CA)experience is now very in high demand. But as stated in the answer above, regardless of how much direct standards or CA experience a job candidate has, we look for individuals who have a willingness to learn and an interest in growing their skillset.

4. Job Market and Future Prediction on Standards Professional

The lack of aspiration to become a standards professional is due to the lack of information. Students do not know that careers in the world of standards exist. The job market for standards professionals will remain fairly constant, as there will always be a need for standards professionals. But there is also a need for increased public awareness about the value of standardization. I hope that, overtime, the importance of standards becomes more apparent for all industry and business leaders, and is not limited solely to the individuals that work with standards on a daily basis. Most of the efforts on education that I am aware of both in the U.S. and internationally focus on the supply side of preparing students. What is now needed is more focus on the demand side to see what industry needs and to encourage them to be more vocal about standardization qualifications during recruiting.

5. Recommendations to Inspire Standards Professional Development

We need to improve our tactics at starting standards education early. Many young professionals come into the workplace without a solid foundation of knowledge regarding standards. The mission of ICES is to promote education, not only for students, but for researchers, professors, and other authorities. Over the years, it has come to my attention that people either know about standards, but fail to admit that it affects their lives, or that they do not know anything about standards.

To inspire standards professional development, conferences or lectures are great ideas, but they need to be with students, not other standards professionals. We need to visit schools, both private and public, large and small. This isn't a one-sided campaign. Schools need to want us to come into their institutions and educate their students about standards. I see it as a small grassroots movement which will be started by current standards professionals and gain momentum as college students become standards professionals themselves.

Overall, it's about informing and mentoring. Current standards professionals, like myself, need to guide the 20-somethings into standards careers. I'm confident that this can and will happen.

ANNEX A.21 (INTERNATIONAL FEATURES)

HENK DE VRIES, ICES CHAIR IN 2013
(PRESIDENT, EURAS; ASSOCIATE PROFESSOR, RSM ERASMUS UNIVERSITY)

"Standardization knowledge is increasingly important for many reasons, in particular because products and services are more and more integrated into complex systems and then standards are needed for managing the interfaces."

1. Describe your career path and its development.

Current Position	Position: Associate Professor of Standardization Division/Department: Department of Technology and Operations Management Organization/Company: Rotterdam School of Management, Erasmus University
Major Experiences	*Position, Division, Organization, (Year-Year) 1) Uitermark Consultancy, Deventer, the Netherlands, 1982-1983 2) International Christian Study centre (ICS), Amsterdam, the Netherlands, 1983-1984 3) Netherlands Standardization Institute (NEN), Delft, the Netherlands, 1994-2003 4) Rotytedram School of Management, Erasmus University, Rotterdam, the Netherlands, 1994-now
Education	Bachelor : Technical University Delft, the Netherlands, Geodesy Master : Technical University Delft, the Netherlands, Geodesy Ph.D : Rotterdam School of management, Erasmus University, Rotterdam, the Netherlands

2. Important Event as Standards Professionals and Major Success Factors

I got involved because an uncle of mine, member of the Dutch standardization committee on banking (mirror committee of ISO TC 68) informed me on a vacancy at the Netherlands Standardization Institute, and I applied. Being educated at academic level, I was assumed to be able to do the job. In fact, this is strange. I learned from an inspiring colleague of mine, Wubbo Winter: "standardization should be seen as a discipline for which specialized knowledge is needed, underpinned by research. "

This triggered me to start thinking about research in this field and together with him we developed methods about systematic standardization as well as courses for

standardization professionals. He also made companies aware of the need for better education. This lead to an advice by these companies to the Board of the standards body that education in the field is needed. This resulted in the decision to establish an endowed chair. I had and have the pleasure of being the one who supports the (part-time) professor (currently Knut Blind).

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

We recruit PhD students. They have to meet the regular high-level criteria of our university. Additionally, we have some PhD students who combine a job in industry with a PhD trajectory. Most of them are former students, already familiar with standardization.

4. Job Market and Future Prediction on Standards Professional

Standardization knowledge is increasingly important for many reasons, in particular because products and services are more and more integrated into complex systems and then standards are needed for managing the interfaces. Our courses are in the Masters programs Innovation Management and Supply Chain Management, and in both fields this is very relevant. They use our knowledge in their jobs. Only a few of them get a full-time position in standardization – so far one in industry and five in the national standardization organization.

5. Recommendations to Inspire Standards Professional Development

The challenge is to see standardization as a discipline for which research is needed to develop the field, and education to prepare people for their jobs. I hope many economies will follow the Dutch example of creating an endowed chair on standardization. The return on investment is enormous – NEN pays less than € 100,000 per year and its annual extra income thanks to my advice is structurally more than € 3,000,000. Impact on business and society is probably even more but here I have no quantitative figures. You may learn from my publications what to do in your economy to bring standardization at a higher level.

ANNEX A.22 (INTERNATIONAL FEATURES)

MINGSHUN SONG, ICES CHAIR IN 2012
(VICE PRESIDENT, CHINA JILIANG UNIVERSITY, CHINA)

I recommend that a specialized agency be established under APEC to set aside special funds and projects to promote the cultivation and exchanges of standardization talents among the APEC economies and regions..

1. A Starting Point of Career Path to be a Standards Professional

I'm a professor specialized in the teaching and research of standardization, quality management and metrology at China Jiliang University. My work in the field of metrology started in 1990. In 1994 I started my work in the filed of standardization and quality management. I have participated in the formulation and revision of international standards and have been in charge of the formation and revision of China's national standards in all the above three fields. I was once a member of ISO/CASCO's WG 33 and WG 37 and is now a member of the joint work team of ISO/TC 207 and CASCO. I'm a member of TC 151, TC 261, TC 286 and TC 443 of the Standardization Administration of P.R. China. I'm also a member of the Zhejiang Quality Association and am now the chairman of the International Cooperation about Standardization (ICES). I was awarded the title as a distinguished individual in the field of China's standardization and once won ISO's inaugural Award for Higher Education in Standardization.

2. Important Event as Standards Professionals and Major Success Factors

In 1999 I took part in the formulation of the State Scientific Development Plan of Metrology, Standardization and Quality of China, which won me fame in this field. In 2001 I participated in the revision of the international uncertainty standards at BIPM in Paris and thus started my experience in the field of international standardization. In 2003 I participated in the EU-Asia Link project entitled "Standards in Companies and Markets", thus starting my internationalization journey of standardization teaching and research. In 2004 I took part in the work of TC261 and was in charge of the formulation of China's certification and accreditation standards, thus starting my work in the formulation and revision of China's national standards. In 2007 I won the inaugural ISO Award for Higher Education in Standardization, which marked a new level of my standardization work.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

Since China Jiliang University is specialized in the teaching and research of standardization, quality management and metrological management, we hire talents who hold PhD titles and who have experience in the fields of standardization, quality management and metrological management. We mainly hire faculty from the engineering and management disciplines.

4. Job Market and Future Prediction on Standards Professional

Standardization talents are needed in all sectors and its demand is increasing. Standardization talents are of two types:

- one with engineering background and standardization knowledge, and
- the other with economic management background and standardization knowledge.

5. Recommendations to Inspire Standards Professional Development

A specialized agency is established under APEC to set aside special funds and projects to promote the cultivation and exchanges of standardization talents among the APEC economies and regions.

ANNEX A.23 (KOREAN YOUNG PROFESSIONALS)

JINJAE PARK, RESEARCHER, KTR, KOREA

"These days, those who understand standards can occupy the market, so standards professionals are in demand. This is also why many economies want to foster standards professionals. As such, I believe a training program for standards professionals should be developed, but such a program needs funds. However, a program of this kind will deliver benefits that greatly outweigh the costs."

1. A Starting Point of Career Path to be a Standards Professional

I aim to develop a career in certification as I would like to contribute the safety of consumers and society.

Section	Contents
Major tasks in the organization	Product certification in a testing laboratory company
Positions	Assistant manager
Working Years (Career)	I have worked for four years in the field of certification, and for one in the quality area of heavy industry.
Tasks	Electrical Machinery Certification (CE-Machinery Directive) IEC 60204-1

My Vision: To become a standards expert and contribute to the safety of consumers and society.

I want to play a leading role in many fields of science and technology. Therefore, I need to acquire an integrated perspective in order to formulate and implement policy with industry, and technology expertise and experience

While working, I have had many opportunities to meet manufacturers. I want to contribute to spreading the trends of IEC to manufacturers as I believe manufacturers should be aware of them because standards are connected with products and are related to certification, sales, and quality. Whenever I get the chance to meet a manufacturer, I try to transmit everything I know

2. Important Event as Standards Professionals and Major Success Factors

The IEC Young Professionals workshop presented me with a good opportunity to develop myself

Before Participating in the IEC Young Professional Program	After Participating in the IEC Young Professional Program
Did not know about the Standardization process.	Have learned about the standardization process.
Did not know about many Sectors of Technical Committees	Have learned about many Sectors of Technical Committees. It can access standard more easily.
Did not have any connections worldwide.	I have connections worldwide. I have made many friends in other economies, from whom I can learn many things.

I tested dental CT according to the IEC 60601 Series. At that time I needed a lot of time to interpret the meaning of every clause. When standards are applied to products, this experience is highly important.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

I think that 'attitude' is most important factor in developing a career: For example, having an open attitude towards people from other economies and an appreciative attitude towards standardization.

The following qualities are helpful:

Quality	Contents
Knowledge:	Technical knowledge.
Skills	English language proficiency + other linguistic skills
Experience	Ability to use and interpret standards

4. Job Market and Future Prediction on Standards Professional

Manufacturers should know about the trends of IEC because standards are connected with products and are related to certification, sales, and quality. Thus, I believe that experts working in standards-related tasks should be able to get a job relatively easily, as manufacturers also need standards experts. It can affect both the quality of a product and market access.

5. Recommendations to Inspire Standards Professional Development

These days, those who understand standards can occupy the market, so standards professionals are in demand. This is also why many economies want to foster standards professionals. As such, I believe a training program for standards professionals should be developed, but such a program needs funds. However, a program of this kind will deliver benefits that greatly outweigh the costs.

I did not know anything about the IEC systems or the standardization process, so I had difficulty working because of a lack of information about certification trends. After I participated in the IEC YP program, I was able to obtain information on IEC trends and knew about the standardization process. It was a good experience. Now, I am more efficient at work than I was before, and can inform manufacturers about new trends of standards.

ANNEX A.24 (KOREAN YOUNG PROFESSIONALS)

KYONGHO PARK, LSIS CO., LTD, KOREA

"I reckon that this questionnaire conducted by APEC is intended to contribute to standardization and economic revitalization in the Asia-Pacific nations. I hope that a standard council will be established to help standards professionals understand the surrounding environment and the application of their products, and to share and exchange professionals' abundant work experience and technologies among other professionals."

1. A Starting Point of Career Path to be a Standards Professional

At present (as of 2014), I have been working for four years as a product manager for photovoltaic systems at the marketing department of the LS IS Convergence Business Headquarters for four years, which is responsible for international standards, overseas exhibitions, marketing strategy, and product planning.

Regarding international standards-related tasks, I worked for the company's international standard and its relevant support works in 2012 when I performed the standard-related task first by carrying out the work, which was led by the Korean representative of the IEC's ACTAD (Advisory Committee on Electricity Transmission and Distribution; President: Choi Joong-woong). During the same year, I volunteered and was selected as an IEC Young Professional, thereby becoming a member of the international standards field in earnest.

I think that, in my work as a standards professional, I have been able to acquire the relevant national and international professional knowledge and improve my personal capacities. Also, as the company recognizes and applies internal standards faster than other companies, we were able to take the lead in standardization.

Regarding my projects as a standards professional, I would like to become an expert in products and solutions, an area in which I am currently in charge, along with knowledge of standards. Although the IEC covers a broad spectrum of products in the electric and electronic areas, I would like to deepen my knowledge as a product planner and marketer, especially in the photovoltaic and smart grid areas, in order to be in a position to reflect international standards, which change quickly, in our products, and suggest a new standard related to future technologies.

2. Important Event as Standards Professionals and Major Success Factors

I think that the most important qualities are an individual's determination, planning ability, and execution. Although it isn't easy to carry out both regular tasks and standards-related tasks simultaneously while working for a private company, I've striven to find

connections between the projects I am in charge of and international standards. Since becoming an IEC Young Professional, I have attended the TC82 on photovoltaics at the IEC General Assembly while working on photovoltaic system projects, and continued to communicate with the relevant chairperson and standards professionals on a regular basis.

Additionally, I have established various networks from international standards workshops on photovoltaics, the Korean Agency for Technology and Standards, and the photovoltaic industry in Korea, and gathered the information required for standards-related tasks in floating photovoltaic and photovoltaic for special environments. I am sure that these two types of activities are helpful for both main tasks and standards-related tasks.

Many people in the industry say that the basic element for standards-related tasks is foreign language proficiency for smooth communication, something with which I agree, although I believe that the acquisition of professional knowledge in the applicable area is more important. To that end, I think that acquiring knowledge through continuous training and learning, communication with the relevant experts, the suggestion of ideas through new standards, and time and experience are also very important elements.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

My answer would be similar to the one I gave for question number 2. In my opinion, we should ponder the following question first of all: "Why is standardization necessary?" I think that the most effective way of operating various organizations and numerous products and systems is standardization.

The things one must develop in a career in a standards-related occupation might include knowledge of the basic theories and professional technologies, understanding of global trends in the relevant technologies, work experience, active participation in international standard meetings, and one's determination to become an expert in standards. Besides these qualities, an understanding of multiple cultures would be desirable as certain tasks can only be achieved by exchanging and communicating with standards professionals around the world.

4. Job Market and Future Prediction on Standards Professional

Actually, there are limited opportunities to develop a career as a standards professional in Korea; however, standards professionals could develop their careers by participating in conferences of the academic community, working with the Korean Agency of Technology and Standards (KATS) and the Korean Standards Association and its related organizations, and getting involved with the projects of the R&D departments of their companies. In my case, as I am a marketer and planner rather than a developer, it will not be easy to develop a career as a standards professional unless I get involved with a relevant team such as one that deals with 'standard patents.'

In my opinion, in order to broaden the horizon of standardization, it is essential to prepare venues in which to communicate the necessity of participation in standardization by both the government and companies, to foster exchanges between standards professionals with years of experience and young professionals like me, and to carry out learning and training programs on policies and regulations related to international standardization.

5. Recommendations to Inspire Standards Professional Development

I reckon that this questionnaire conducted by APEC is intended to contribute to standardization and economic revitalization in the Asia-Pacific nations. I hope that a standard council will be established to help standards professionals understand the surrounding environment and the application of their products, and to share and exchange professionals' abundant work experience and technologies among other professionals.

ANNEX A.25 (KOREAN YOUNG PROFESSIONALS)

WOOJUNG YOO, KTL, RESEARCHER, KOREA

"Technical standards are made by industry for their needs. But small companies without the time or money to invest in standardization usually hesitate to participate because it neither brings them money nor increases their income in the short term,"

1. A Starting Point of Career Path to be a Standards Professional

I am a testing engineer at the Korea Testing Laboratory (KTL), and have been testing electronic appliances for more than three years. I didn't know in detail what I would be doing when I started out on my career as a testing engineer. But, as time passed by, I realized that I could help manufacturers reduce their mistakes when designing and making products that comply with the prevailing standards. Moreover, sometimes I can encourage them to get involved in standardization by giving information and advice, although my main job consists largely in implementing existing standards and is not directly related to developing new standards.

At present, standardization is very active in Korea in certain fields but not in others. Standardization related to my job field is not that active compared to other fields, and there are not enough standard professionals in this field. As such, there are some opportunities for myself and other testing engineers to get involved in developing national regulations that are based on international standards. Personally, I think that this is a very good situation for me because I can both join meetings on the development of national standards and use them. This is how I experience standardization activities.

Ultimately, however, manufacturers need to get involved in standardization either at the national or international level for the good of industry, because testing engineers like me don't know exactly what is needed for industry. Thus, I think that what I should do in the long run is not just to be involved in standardization but to help manufacturers attend standardization meetings or activities. Recently, the question I have asked myself if how can I encourage them to take part in standardization when they don't have enough time or money to do so?

2. Important Event as Standards Professionals and Major Success Factors

I test various kinds of products using just a few types of standards, so I have many opportunities to think about various applications of the standards from different points of view. I think these opportunities have deepened my understanding about them. As I have accumulated experiences at my workplace, sometimes parts and errors in standards that require revision are discovered. Then, it feels like I am in the process of becoming qualified to be a 'standards professional'.

In my case, I cannot come up with 'the most important event' related to standards, because I always work using standards, and working as a testing engineer is itself the most valuable experience in becoming a standards professional. No matter what field a person is working in, I think that the accumulation of experience over a sufficient period of time is the most important and crucial factor to becoming a professional.

When I first attended the IEC TC meeting, I was surprised at the age of the members. Almost all of them were middle-aged, and they were leading the meeting. Once one of my colleagues told me the members from developed economies were experienced enough to know the entire history of standards and to have all the necessary background knowledge. At that time, I thought that they were the real professionals.

3. Competency Requirements for Knowledge, Skills, Experiences, or Attitudes

A standard is developed in order to be used universally, and shows the various needs and demands from various sectors of society, rather than simply reflecting the interests of just one side. For example, there are many safety standards which exist for consumers' safety during use. However, they are usually developed by manufacturers. If a standard only reflects the manufacturers' interest, then safety problems could arise. On the other hand, if it did not reflect the manufacturers' situation, it would be very difficult for industry to function efficiently. Therefore, one should be very careful to maintain the proper balance of the interests between the various parts of society when developing and applying standards. This is not about just safety standards. Other kinds of standards must be also balanced between different regions, economies or companies. Therefore, I think an unbiased attitude is most important for the developers of standards.

In order to achieve the best output when developing standards, many representatives from different backgrounds cannot help cooperating together. A standard is not made by one person acting alone. So you must have the appropriate communication skills and a cooperative attitude. Even for conformity assessment professionals, it is necessary because sometimes they have to draw only one conclusion in a situation where opinions about interpreting and applying standards might be very different. Furthermore, you can deepen your professional ability while working with other professionals by sharing each other's thoughts and experiences. During meetings on standards or regulations, I meet people from other companies and laboratories and talk casually with them about anything during breaks. And every time, I obtain useful information unexpectedly. It is very true that your human connection with other professionals can be a most valuable asset.

4. Job Market and Future Prediction on Standards Professional

Recently, the development of standards has become a very important matter because it can directly affect companies' success. Whether a certain technology of a company is chosen as an official standard could affect the future of that company. Thus, it is not uncommon for companies to strategically train standards professionals in order to lead the standardization of the technologies they are interested in. Since these professionals' vision affects the future of the industry and the market, I personally believe that more and more competent people will be needed as standards professionals to ensure that companies do not fall behind their competitors. As such, I think opportunities for intelligent researchers and engineers to get involved into standard-related work will certainly increase.

The work of standards professionals is not just limited to the standardization of technology. Their abilities are also needed when drawing up regulations for markets. In many cases, regulations for markets are based on international or national standards, so standards can sometimes affect legislation. I also have experience of attending meetings for revising the national regulation of electronic appliances, and suggesting my opinion. Also, standards may sometimes be used as a trade barrier when regulations are based on technical standards. When these kinds of regulations are made, suggestions and opinions from many professionals are necessary to avoid the side effects that could arise if only a few opinions were heard. There are many tasks for standards professionals to do other than standardization, especially in the current era in which new technologies are developed every day.

5. Recommendations to Inspire Standards Professional Development

Technical standards are made by industry for their needs. But small companies without the time or money to invest in standardization usually hesitate to participate because it neither brings them money nor increases their income in the short term, although some of them acknowledge that it is beneficial in the long run. When I attended the general meeting of the IEC last year and talked with people from other economies, I found that this situation was the same all over the world. Large companies have no difficulties, so it is likely that meetings for standardization are attended mainly by the executives of rich companies and developed economies. In order for a standard to become a "real" standard, I think that efforts to include various types of members are very necessary, regardless of their influence on industries or markets. So we need to support them systematically, be it with financial or other kinds of support.

As standardization at the national level is relatively burden-free to everyone, I think that boosting national mirror committees would be a good option for supporting small companies. If the results of national committee meetings were delivered to international committees efficiently, then small companies would not have to invest their time and energy. Moreover, it would be easier to support them with fewer resources.

Inspiring the Next Generation
of Standards Professionals

Annex B.

Project Workshop Program

9-10 August 2014
Beijing Hotel, China

Korean Standards Association
Korean Agency for Technology and Standards
For APEC Sub Committee on Standards and Conformance (SCSC)

FINAL DRAFT AGENDA

APEC Conference on
Standards Professional Development for Next Generation

Beijing Hotel, Beijing, China (Address: No.33 East Chang'an Avenue)
August 9th, 2014 (Day 1)

CONFERENCE THEME:

- Who and what are standards professionals?
- What are their jobs, competencies, and career models?
- What strategies/actions are needed to develop standards professionals?

KEY TOPICs for CONFERENCE SPEAKERS To ADDRESS :

This conference is designed to focus on defining the roles, jobs, and competency of standards professionals, based on real jobs in commercial and non-commercial organizations, which will include the following issues (but not limited to):

1) **Defining** who and what are 'standards professionals'
2) **Reviewing and Analyzing** practical tasks and roles of standards professionals in real jobs in companies and standards-related organizations
3) **Discussing** competency requirements, education programs, and qualification framework for standards professionals
4) **Browsing** career paths/models or best practices for standards professionals – do they have future of being an executive or a leader?
5) **Presenting** recommendations and priorities to APEC Members to inspire next generation of standards professionals in the region

8:30am - 9:00am	**REGISTRATION**
9:00am - 9:10am	**WELCOME FROM the SCSC CHAIR** Mr. Jianping HAN Deputy Director General, Department of International Cooperation, AQSIQ, China

9:10am - 9:30am ***INTRODUCTION with CONFERENCE CO-CHAIRS***

Mr. Donggeun CHOI

Project Editor, APEC SCSC Standards Professional Development
Chief Researcher, Korean Standards Association, Republic of Korea

Ms. Chunjing DU

Director for International Cooperation, Certification and Accreditation Administration of China (CNCA), China

9:30am – 10:50am ***PANEL 1: VIEWS of EDUCATIONS INSTUTINOS and SCSC MEMBERs***

MODERATOR

Mrs. Metrawinda TUNUS, Head of Center for education and promotion of standardization, BSN, Indonesia

SPEAKERS

1-1 <Education Institutions>

Prof. Byung-Goo KANG, Dean and Professor, Korea University, Korea

Prof. Mingshun SONG, Vice President and Professor, China Jiliang University, China

1-2 <SCSC Members>

Mrs. NURLATHIFAH, Head of Sub Division for Profession Development of Standardization, BSN, Indonesia

Mr. Donggeun CHOI, Chief Researcher, Standards Policy Research Center, KSA, Korea

Ms. Atty. ANN CLAIRE CREDO-CABOCHAN, Director-in-Charge, Bureau of Philippine Standards (BPS), Philippines

- In Panel 1, two speakers from education institutions will discuss the need for definition/classification and career paths of standards professional, and education challenges from teachers' perspective. And, three SCSC representatives may summarize their survey result and provide recommendations on standards professional development (10 minute presentation each)

10:50am-11:20pm **COFFEE BREAK**

11:20am - 1:00pm ***PANEL 2: STANDARDS-PROFESSIONALS IN COMPANIES***

MODERATOR

Mr. Steven TAN, Group Director of Quality & Standards, SPRING, Singapore

SPEAKERS

Dr. Jinming SHA, Director for International Standards, Haier Group, China (ICT/EE industry)

Mr. Toshiyuki KAJIYA, Senior Counselor to International Standardization, Product Safety and Quality Administration Center, Panasonic Corporation, as well as a Japanese member of IEC/CAB member (ICT/EE industry)

Ms. Jiseon PARK, Director of Standards Team, Samsung Research Center in Beijing, Samsung Electronics, Korea (ICT/EE industry)

Mr. Sila Agung WIDYANTORO, Business Development Manager, Wijaya Karya Beton Plc, Indonesia (construction/chemical Industry)

Ms. Jinfeng GENG, Senior Engineer and also Senior Business Manager, Aviation Industry Corporation of China (AVIC), China (aviation/defense industry)

- In Panel 2, five industry speakers are invited to present 1) real tasks of standards-related professionals in their companies, 2) personal history of career development, and 3) their personal suggestions for standards professional development (10 minute presentation each)

1:00pm- 2:30pm **LUNCH BREAK**

2:30pm-4:00pm ***PANEL 3: STANDARDS PROFESSIONALS IN STANDARDS SPECIALTY ORGANIZATIONS***

MODERATOR

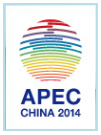
Mrs. Patrica HARRIS, International Standards Specialist, NIST, USA

SPEAKERS

Mr. Damian FISHER, Senior International Development Manager, Standards Australia, Australia (Standards Development Organization)

Mr. Fei LIU, Chief Representative, ASTM International China Office (Standards Development Organization)

Mr. Dennis CHEW, Regional Director, IEC Asia-Pacific Regional Centre
(Standards Development Organization)



Ms. Eve O'Neill, Program Manager, Asia Pacific and Emerging Markets

Certification Programs Office, UL (Conformity Organization)

Dr. Takayoshi KUROIWA, Manager, Reference Materials Office/Metrology Management, National Metrology Institute of Japan (NMIJ), AIST, Japan (Metrology Organization)

Mr. Wan Abdul Malik WAN MOHAMED, Operations Manager, Technical Department, SIRIM Standards Technology Sdn Bhd, Malaysia (Metrology Organization)

- In Panel 3, six speakers are invited from various standards-specialty organizations -- standards development organizations (SDOs), testing conformity laboratories/bodies, and metrology Institutes
- Each speaker may present 1) real jobs of standards professionals in their organizations, 2) personal history of career development, and 3) their suggestions (10 minute presentation and Q&A)

4:00pm-4:20pm ***COFFEE BREAK***

4:20pm-5:20pm ***PANEL 4: FEEDBACK AND DISCUSSION***

MODERATOR 4

Conference Co-Chairs (Ms. Chunjing DU & Mr. Donggeun CHOI)

COOMMENTERS (invited)

- Three Panel Moderators
  (Mr. Steven TAN, Mrs. Metrawinda TUNUS, Mrs. Patrica HARRIS)
- The SRB Forum Chair (Mr. Michael FRASER)
- The SCSC Chair (Mr. Jianping HAN)

COMMENTERS (voluntary basis from the floor)

- Three to Five conference participants, both from public and private sectors, will be invited on-site for comments and ideas

5:20pm-5:30pm ***CLOSING REMARKS***

Conference Co-Chairs

Draft Agenda

APEC SCSC Conference on Standards Professional Development: for Next Generation

Beijing, China

August 10th, 2014

(Day 2 – Close Door session for **Moderators/Speakers only**)

The second day conference is closed roundtable inviting the moderators and speakers of the conference day 1, to have more interactive discussion. Participants of day 2 conference will have intensive time to have more interactive discussion with other speakers and develop summary conclusions of the conference.

Specifically, they will review major issues and identify follow-up actions items of the conference with a view to submitting them to the APEC SCSC 2 for consideration.

The conference summary report will be presented by the Conference Co-Chairs, Mr. Donggeun CHOI and Ms. Chunjing DU at the SCSC 2 plenary meeting, 11 August in Bejing, China. Also, the report will be sub-summed in the final report of the APEC project CTI 07 2013T which will be published at the end of 2014.

9:00am - 9:10am **OPENING**

9:10am - 13:00am **REVIEWING THE DISCUSSION OF FIVE MAIN ISSUES**

1) Definition and classification of 'standards professionals'
2) Practical tasks and roles of standards professionals in companies and organizations
3) Competency requirements, education programs, and qualification framework for standards professionals
4) Career paths/models or best practices for standards
5) Recommendations and priorities to APEC Members

13:00am - 14:00pm **LUNCH**

Asia-Pacific Economic Cooperation

APEC CHINA 2014

Bio of Speakers and Moderators

APEC Conference on Standards Professional Development
9-10 August 2014
Beijing Hotel, Beijing, China

 Dr. Donggeun CHOI, Chief Manager, KSA, Korea (Conference Co-Chair)	**Dr. Dong Geun CHOI** is Chief Manager of the Korean Standards Association (KSA). In KSA, Dr. Choi has initiated several projects in APEC Transportation Working Group (TPTWG) in 2003-2008 and APEC Sub-Committee on Standards and Conformance in 2004-present. Dr. Choi the project proponent and editor of the APEC project, Inspiring Next Generation of Standards Professional Development in 2014-2015 and also the APEC Strategic Standards Education Initiative in 2006-2011. He serves as the Board Member of International Cooperation for Education about Standardization (ICES) in 2012-2015. During his service in KSA, Dr. Choi also visited Standards Coordination Office (SCO), National Institute of Standards and Technology (NIST) in USA in 2012-2013. Before joining KSA, he worked in international cooperation division of Korea Development Institute (KDI) in 1999-2000. He holds a Master's degree in Transportation Management from Seoul National University, and a PhD degree in the Management of Technology at Sungkyunkwan University. His publications have been published *Technovation, Total Quality Management & Business Excellence, Scientometrics, and International Journal of Technology and Design Education.*
 Ms Chunjing DU, Director, CNCA, China (Conference Co-Chair)	Ms. Chunjing DU is Director for International Cooperation, Certification and Accreditation Administration of the People's Republic of China (CNCA). In this role she is responsible for overall coordination of China's involvement in international and regional organizations related to conformity assessment Ms. Du has participated APEC since 2003, as a delegate/head of delegation of China to APEC/SCSC, a member of the Chinese delegation to the IEC General Meeting, IEC/CAB alternate; member of IEC/CAB WG10, and member of IECEE Policy and Strategy Forum; member of the Chinese delegation to IECEE CMC

 Mrs. Metrawinda TUNUS, Head of Center for Education and Promotion of Standardization, BSN, Indonesia (Panel 1 Moderator)	**Mrs. Metrawinda TUNUS** became a part of the National Standardization Agency of Indonesia (BSN) since January 2012. She has served as the Head of Center for Education and Promotion of Standardization at BSN since January 2013. Her primary role has been to promote standardization education, both formal and non formal, at the university and vocational high school levels. She is also responsible for conducting training on Standards and Conformity Assessments for stakeholders, industry, conformity assessment body, and academia. She spent most of her carrier in the Ministry of Agriculture, in Bureau of Planning, International Cooperation and Agriculture Quarantine Agency. During 2003-2007 period, she served as Indonesia's Aggriculture Attache in Washington D.C., U.S.A
 Mrs. NURLATHIFAH, Head of Sub Division for Standards Professional Development, BSN, Indonesia	**Mrs. NURLATHIFAH** is the Head of Sub Division for Standards Professional Development of the National Standardization Agency of Indonesia (BSN). She holds a Bachelor's degree in Physics Science from Diponegoro University, Semarang. With twelve years of experience working in BSN, she has been involved in Standard Development and Accreditation. Currently she is Lead Assessor for Product Certification Body and Timber Legality Verification Body, also Assessor for Quality Management Certification Body and Personnel Certification Body of National Accreditation Body of Indonesia (KAN).
 Mrs. Atty. Ann Claire CREDO-CABOCHAN, Director-in-Charge, Bureau of Philippine Standards (BPS), Philippines SCSC Vice Chair	**Mrs. Atty. Ann Claire CREDO-CABOCHAN** was recently designated as Director-in-Charge of the Department of Trade's Bureau of Philippine Standards (formerly known as Bureau of Product Standards), the National Standards Body of the Philippines. She holds this new assignment while concurrently heading the Philippine Contractors Accreditation Board (PCAB). Before that, she was Director of the Bureau of International Trade Relations (BITR). Her experience in international trade law rules at BITR and licensing and regulation in PCAB will be definitely be put to good use in BPS. As BPS head, she will Chair the APEC Sub-committee on Standards and Conformance during the Philippine hosting of APEC in 2015. A lawyer and certified public accountant by profession, Atty. Cabochan is also a part-time law professor at the Arellano University School of Law. She is married to a former classmate at the San Beda College School of Law, Atty. Jonas Cabochan, and is mother of one.

 Prof. Mingshun SONG, Vice President & Professor, China Jiliang University, China	**Prof. Mingshun SONG** has a Ph.D in Management Sciences from Zhejiang University, China. Currently, he holds a post as Professor & Vice President of China Jiliang University. His current research focuses on quality management and standardization. He has participated in different national and international congresses (the China National Technical Committee for Quality Management Standardization, ISO/CASCO/ WG33, the International Cooperation for Education about Standardization, and others). He has published different articles in journals in his field of research, including *ISO Focus, the Journal of Asian Quality,* and *China Standardization*
 Prof. Byung-Goo KANG, Dean & Professor, Korea University, Korea	**Prof. Byung-Goo KANG** received the Ph.D. in Decision Sciences from the Georgia State University, USA. He is now a Professor in the Department of Business Administration in Korea University, the Sejong Campus. His research interests focus on business strategies employing IT and standards. Prof. Kang has participated in many research projects regarding mutual recognition agreements, conformity assessments, standards education, etc. He has published many research articles in journals, including the *Journal of Global Business and Technology, the Journal of MIS research, and Information Systems Review* as well as numerous research reports. As a remarkable contribution to the national standardization and conformity assessment, Prof. Kang was awarded a Silver Tower, known as an Order of Industrial Service Merit by the President in 2012.
 Mr. Steven TAN, Group Director, SPRING, Singapore (Panel 2 Moderator)	**Mr. Steven TAN** is the Group Director in the Quality and Excellence Group (QEG) in SPRING. He currently oversees the Standards, Accreditation, Consumer Product Safety and Weights & Measures Programmes. Mr. Tan has been involved in developing and managing a robust and internationally-recognized standards and conformance infrastructure that contributed to Singapore's economic growth for over 25 years. During 2000-2003, he also headed the Productivity and Innovation Division in SPRING. He started his professional career in the area of metrology. He was an assessor for the Singapore Laboratory Accreditation Scheme (SAC-SINGLAS) in the area of electrical metrology and chaired the SINGLAS Technical Committee on Calibration and Measurement in the 1990's. Mr. Tan was instrumental in Singapore attaining the Mutual Recognition Arrangement (MRA) on Measurement in 2005. Mr. Tan has participated in many international and regional Standards & Conformance fora and is currently involved in the ASEAN Consultative Committee on Standards & Conformance (ACCSQ).

Dr. Jinming SHA, Director for International Standards, Haier Group, China

Dr. Jinming SHA had his master degree in University of Science and Technology, Beijing 1992 and his Ph.D from Technical University of Denmark in 2002. He has been working in various industries for many years, including material processing, electrical engineering. He is also working in different functions, such academic research, development, design, project management, quality management, standardization management, etc.

Previously he was working in Nokia, Vestas in Denmark. He returned China in 2012. Now he is international standards director of Haier Group, he is in charge of several international standards and national standards. He has rich experiences of Standardization Management as well as standardized revision of international standards.

Dr. SHA currently works in WPC (wireless power consortium) as co-Chair of Kitchen Working Group, Chair of GC PWG (Great China Promotion Working Group). Sha is committee members of IEC TC100, TC59, TC61 and he is also the secretary of TC46/SC16 in China.

Mr. Toshiyuki KAJIYA, Senior Counselor, Panasonic Corporation, Japan

Mr. Toshiyuki KAJIYA was born in 1951. After a graduation of the Master Course of Mechanical Engineering in Kyoto Institute of Technology, he joined Matsushita Electric Industry Co. Ltd., currently Panasonic Corporation, as a design engineer of motor appliances. In 1981, he was transferred to Corporate Engineering Division to take care of European Technical Regulations, and in 1985, he was again transferred to Germany as a Panasonic Representative of European Technical Regulations until the end of 1993.

After he returned home in Japan, he was assigned as a group manager of overall International Technical Regulations, and at the same time he started to take leadership in the industry association, currently Japan Electronics & Information Technology Industries Association (JEITA), and to be a liaison with METI.

In 2005, he was assigned as a chair of Japan National Committee on IECEE, and in addition, he was approved as a Japanese Representative of IEC Conformity Assessment Board (CAB) in 2009.

As a remarkable contribution to the international standardization in the field of conformity assessment representing the industry sector, he was awarded by the Minister of METI in 2008.

 Ms. Jiseon PARK, Head of Standards Team, Samsung Research Center in Beijing, Samsung Electronics, Korea	**Ms. Jiseon PARK** has taken in charge of China standard team of Samsung Research Center since 2012. In this role she has extensive knowledge and experience on regulations and technical/products standards in China. Before joining China standard team, she was actively involved in industry alliance as the strategist including BoD member of HDMI Forum and Founder of MHL forum. She has various experiences on technical Planning, outsourcing/Alliance and strategic stadnardization for 20 years in Samsung electronics.
 Mr. Sila Agung WIDYANTORO, Business Development Manager, Wijaya Karya Beton Plc, Indonesia	**Mr. Sila Agung WIDYANTORO** is a Business Development Manager at Wijaya Karya Beton Plc., a Pre-stress Concrete Product Manufacturer. The holding group of this company has awarded SNI (Indonesia National Standard) Award in 2008 and elected as pilot implementation of ISO Methodology in Assessing Economic Benefit of Standards in 2010 to 2011. In the previous task (1999 to 2010) as the Branch Manager one of his duties was the ISO 9001 Project Representative. He graduated as Civil Engineer from Institute Technology of Sepuluh November Surabaya in 1987 and also has a master's degree (MBA) from Institut Management of Business & Administration in 1991. In the field of organization, he has an experience as a Chairman of Indonesia Pre-stress Concrete Pole Manufacturer Association.
 Ms. Jinfeng GENG, Senior Engineer/Manager, AVIC, China	**Ms. Jingfeng GENG** is holding a Master degree for quality management direction. She is Senior Engineer and also Senior Business Manager in quality and safety management department of Aviation Industry Corporation of China (AVIC). She has been mainly engaged in the construction of quality management standard and system of AVIC, quality information management, CAQG (China Aviation Quality Group), Published more than 10 papers.

 Mrs. Patrica HARRIS, International Standards Specialist, NIST, USA (Panel 3 Moderator)	**Mrs. Pat HARRIS** is an International Standards Specialist at NIST, managing the Standards In Trade Program. She has extensive experience in the standards development arena at the national and international levels. For twenty years Pat managed an ANSI-accredited standards setting organization and was directly involved in international standards development through the ISO. As secretariat for an ISO Subcommittee and the U.S. Technical Advisory Group to an ISO Technical Committee she learned first-hand about standards development processes and systems. In her career, Pat has engaged in a number of standards activities that have demonstrated the value of standardization to enabling innovations in information technology, including standardization of the file structures for the CD-ROM and e-books. She is a graduate of the Randolph Macon Woman's College, holds an M.S. from the University of North Carolina-Chapel Hill, and currently serves on the Board of Visitors to the UNC-Chapel Hill School of Information and Library Science.
 Mr. Damian FISHER, Senior International Development Manager, Standards Australia (SA), Australia	**Mr. Damian FISHER** is a senior member of Australia's National Standards Body, Standards Australia. He is responsible for coordinating and managing international standards work and leads the organisation's capacity building and institutional strengthening program. Damian has also led a number of APEC SCSC sponsored projects. He is a member of ISO's Developing Countries (DEVCO) Chairs Advisory Group and the past Chair of the SRB Forum. Damian has extensive experience in international business, project management and business consulting. He has more than 28 years' experience in international business and is a former senior Australian trade diplomat. His postings included appointment as Consul General and Senior Trade Commissioner based in Turkey. Damian also served with the Australian Embassy in Riyadh, Kingdom of Saudi Arabia where he was accredited as Counsellor (Commercial) and Senior Trade Commissioner for Saudi Arabia, Kuwait and Bahrain. He is also a co-author of a number of publications including a book, Export Best Practice: Commercial and Legal Aspects, The Federation Press, Sydney. Damian is based in Sydney, married and has three daughters.
 Mr. Fei LIU, Chief Representative, ASTM International	**Mr. Fei LIU** is the chief representative of ASTM international. Prior to joining ASTM in 2006, Liu Fei was the director of operations for the China Consortium on Standards and Conformity Assessment, of which ASTM International was a member. His responsibilities are to work with ASTM staff and technical committees to work with Chinese and surrounding Asian governments, business and industry in the application of ASTM standards and the development system. Established in 2005, the Standards Expert Program (SEP) is a key benefit offered to MOU signatories. Each year, through the SEP, ASTM offers to host up to three standards experts for a one-month period at ASTM headquarters. Experts participating in the Program from China included He Ting in 2005 and Pan Beichen in 2009.

 Mr. Dennis CHEW, Regional Director, IEC APRC	**Mr. Dennis CHEW** has been actively involved in international and regional standardization and related activities for more than 15 years. He also regularly and actively participates in the meetings of regional regulatory authorities and organizes seminars with IEC National Committees in the region. Dennis has extensive knowledge and experience on technical regulations, standards and conformance infrastructure and developments in APEC and ASEAN, having been involved in the development and implementation of the ASEAN Harmonized Regulatory Regime for Electrical and Electronic Equipment, regional Mutual Recognition Arrangements and the regional harmonization of standards and regulatory requirements. Dennis graduated from the University of Aberdeen with a Bachelor of Engineering (Electrical) Honors degree.
 Ms. Eve O'NEILL, Program Manager, UL	**Ms. Eve O'NEILL** is a dedicated quality and conformity assessment professional with more than 18 years of experience. As Program Manager for Asia Pacific and Emerging Markets at UL, she oversees the development of conformity assessment programs, and is responsible for managing programs that provide market access to Asia Pacific and Emerging Markets. Her experience includes market research, strategic planning, business/program development, contract negotiation, project/program management and government affairs. Eve was a key player in establishing UL's joint venture in China while on assignment in Shanghai from 2001 to 2004. She also worked in UL's Beijing Office serving as Acting Manager for China Government Affairs. Eve worked for the American Society for Quality (ASQ) prior to joining UL in 1998. She received her Master of Business Administration (MBA) degree from Marquette University in Milwaukee, Wisconsin.
 Dr. Wan Abd Malik WAN MOHAMED, Operations Manager, SIRIM Standards Technology, Malaysia	**Dr. Wan Abd Malik WAN MOHAMED** is currently serves as an Operations Manager of SIRIM Standards Technology Sdn. Bhd. He received his BSc degree in Electrical Engineering from Seoul National University, South Korea in 1990 and PhD degree in Pressure Metrology from Loughborough University, UK in 2006. With more than 23 years of experience in metrology field, he managed to get himself involved in various fields of metrology such as scientific, industrial and legal metrology. His area of specializations includes pressure metrology, mass metrology and legal metrology (weighing instrument and pre-packaged products). Since 2006, Dr. Wan Abd Malik has participated as one of the Malaysian delegates in international fora such as Asia-Pacific Metrology Programme (APMP) in the field of Mass and its Related Quantities. From 2009, he was then task to represent Malaysia in Asia-Pacific Legal Metrology Forum (APLMF), ASEAN Consultative Committee for Standards and Conformance (ACCSQ) and ACCSQ-WG 3 (Legal Metrology). He is now the Chairman of ACCSQ-WG 3, since 2010.

Dr. Takayoshi KUROIWA
Manager, Reference Materials Office, NMIJ, AIST

Dr. Takayoshi KUROIWA is Manager, Reference Materials Office/Metrology Management Center & Inorganic Analytical Chemistry Division of National Metrology Institute of Japan (NMIJ), AIST.

From 2001 to present, Dr. Kuroiwa has worked in NMIJ which is part of the National Institute of Advanced Industrial Science and Technology (AIST). His experiences includes developing and establishing the accurate trace metal analysis and speciation analysis of organo-metals for environmental and food samples, and developing certified reference materials (CRMs) as the researcher of the Environmental Standards Section of Inorganic Analytical Chemistry Division.

Mr. Michael FRASER,
APLAC Secretary
SRB Forum Chair

Mr. Michael FRASER is Manager International Liaison with the National Association of Testing Authorities, Australia (NATA). NATA is the authority responsible for the accreditation of laboratories, inspection bodies, calibration services, producers of certified reference materials and proficiency testing scheme providers throughout Australia. It is also Australia's compliance monitoring authority for the OECD Principles of GLP. NATA under a Deed of Agreement provide staff for the Asia Pacific Laboratory Accreditation Cooperation secretariat.

Mr. Fraser, in his various roles at NATA since December 1989, has been involved in national, regional and international standardisation and conformity assessment activities. He earned a Bachelor of Science degree in Chemistry from the Melbourne University Victoria, Australia and a graduate Diploma of Education from Hawthorn Institute of Education, Victoria, Australia.

Since July 2010 Mr. Fraser has been the secretary of Asia Pacific Laboratory Accreditation Cooperation, one of the five Specialist Regional Bodies of APEC.

Inspiring the Next Generation
of Standards Professionals

Annex C.

Questionnaire of Survey and Written Interview

Korean Standards Association
Korean Agency for Technology and Standards
For APEC Sub Committee on Standards and Conformance (SCSC)

APEC Survey to Identify Competence Requirements of Standards Professional - Type A. For Individual Company

*APEC Project CTI 07/2013T

APEC Sub-Committee on Standards and Conformance (SCSC)

Prepared & Submitted by: Republic of Korea
Co-Sponsored by: China, Indonesia, Japan, Malaysia, Peru, Singapore, USA, Viet Nam

Requested Action: Survey Response ***by March 31, 2014***

Note: Your timely contribution is very much appreciated.

You are cordially invited to participate in the Survey for the project of '*Inspiring Next Generation of Standards Professional Development*' Please respond by **March 31, 2014** to the project editor, Dr. Donggeun CHOI of Korean Standards Association.
(Email: stannovation@gmail.com, Phone:+82-2-6009-4850, Fax:+82-2-6009-4839)

APEC Project Survey on Standards Professional - Type A. For Individual Company

1 February 2014

To: APEC SCSC member economies (and related Organizations & Companies)

Subject: APEC Survey to develop 'Standards Professional Development'

The APEC Sub-Committee on Standards and Conformance (SCSC) is undertaking a project, led by Korea, to define next generation of standards professional, future human resources in the area of standards and conformity assessment, so as to improve the competitiveness of the APEC member economies.

APEC has commissioned the Korean Agency for Technology and Standards (KATS) with support from Korean Standards Association (KSA) to conduct the project. The objectives of this project questionnaire are:

- To define what 'standards professional' – covering standards and conformance, with a focus on 'documentary standards'
- To identify current & future competence requirements for standards Professional bot h in standards-specialty companys and companies
- To share recommendations for the discussion in the APEC Subcommittee on Standar ds and Conformance (SCSC) to inspire standards Professional

On behalf of the APEC SCSC member economies, we are writing to invite you to participate in this important initiative. Attached please find a survey questionnaire as a starting point for the project. We worked to simplify the survey questionnaire so it can be completed within modest amount of time. You are cordially requested to respond ***no later than March 31, 2014***, six weeks after the 2014 SCSC I meeting.

Thank you in advance for your contribution. If you have questions or suggestions, please contact Korea at by email stannovation@gmail.com or by phone +82-2-6009-4850.

Sincerely,

Choongang CHO
Project overseer of APEC CTI 07/13T
Korean Agency for Technology and Standards (KATS)

Donggeun CHOI
Project editor of APEC CTI 07/13T
Korean Standards Association (KSA)

1 Company Overview

1.1 Employees and Annual Turnover of whole company

CATEGORY	RESPONSES
1.1.1 Economy	
1.1.2 Name of company	
1.1.3 Official Website	(weblink to an company chart, if available:)
1.1.4 Annual Turnover	(year: , in US$)
1.1.5 Number of Employees	
1.1.6. Contact Point (for this survey)	Name : Email : , Phone : Postal Address :

1.2 Number of Employees in Standards-related Tasks

In your company, how many employees are involved in standardization, conformity assessment, and metrology related tasks? We understand that the number of employees submitted here can be approximation for various reasons.

When you respond to this question, you may need to consider that often standards-related task is partial task of an employee. For example, if one hundred employee's responsibility has around 30% of their duties related to standards, your response can be 30 employees in 1.2.1, 1.2.2, and 1.2.3.

CATEGORY	SUB-CATEGORY	COMPOSITION RATIO OF EMPLOYEES in the CATEGORY (%)					
1.2.1 Standardization (# of employees: _____)	Planning and Evaluation	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Development:	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Dissemination	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Others	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
1.2.2 Conformity Assessment (# of employees: _____)	Testing	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Inspection	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Certification	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Accreditation	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Others	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
1.2.3 Metrology (# of employees: _____)	Scientific Metrology	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Industrial Metrology	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Legal Metrology	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Others	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
Total number of Employees involved in Standards-related Tasks : _____							

1.3 Number of Senior Executives in Standards-specialty positions

In your company, do you have any senior executives who are explicitly responsible for standards-related issues as their major duty? If so, please provide us with the number of senior executives.

For clarity purpose, senior executives in this survey are those who are less than top five percentages of total employees. These senior executives could be engineering/research fellows as well as management executives.

CATEGORY	SENIOR EXECUTIVES	(if yes) NUMBER OF SENIOR EXECUTIVES
1.3.1 Standardization	☐ Yes ☐ No	
1.3.2 Conformity Assessment	☐ Yes ☐ No	
1.3.3 Metrology	☐ Yes ☐ No	
Total number of senior executives: _____		

2 Job Analysis and Profiling

2.1 Jobs for Standardization

2.1.1 Standardization – Current Status Profiling

If your company has people working in the standardization area, how many employees majored in science or engineering degree; hold graduate (master or doctor) degrees; are females?

Category	Characteristics	Responses
Planning and Evaluation - Strategy/policy setting and legislation; - Cooperation with SDOs - Performance and achievement evaluation - Standardization needs/trend analysis	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Development - Development (company standards) - Development (external SDO's activities)	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Dissemination - Standards information management (copyediting, publication, distribution) - Training for standards application	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks (e.g.: TBT inquiry related issues, standards and regulation, etc)	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.1.2 Standardization ─ Requirement Profiling

When your company recruits people for standardization tasks, what kind of requirements or preferences do you have in terms of degree, major, or other experience, or personnel certification?

Tasks of Standardization Professional	Required Minimum Degree	Required Major	Preferred Minimum Experience	Preferred Personnel Certification (if any)
Planning and Evaluation - Strategy/policy setting; - Cooperation with SDOs - Performance/achievement evaluation - Standardization needs/trend analysis	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Development - Development (company standards) - Development (external SDO's activities)	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Dissemination - Standards information management (copyediting, publication, distribution) - Training for standards application	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Others - Any other tasks (e.g.: TBT inquiry related issues, standards and regulation, etc)	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)

2.1.3 Standardization – Sample Requirements (Advertisements)

If available, please share a few examples of job advertisements of standardization professional. The description or advertisements usually include wanted title and requirements for education (degree, major), experiences, knowledge, skills, and attitudes.

Position Title	Job Descriptions (Main Responsibilities)	Competence Requirements (ex: Education, Experiences, Knowledge, Skills, Attitudes, Others)
1. _____ _____	- - - - -	- - - - -
2. _____ _____	- - - - -	- - - - -
	-	-

2.1.4 Standardization – Training Program: Status and Needs

Please share current status and future needs of standardization related training programs.

Category	Current Existence of Training Program		Future Needs or Priority for Strengthening related Training Programs
	Internal	External	
Planning and Evaluation - Strategy/policy setting - Cooperation with SDOs - Performance/achievement evaluation - Standardization needs/trend analysis	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Development - Development (company standards) - Development (external SDO's activities)	☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Dissemination - Standards information management (copyediting, publication, distribution) - Training for standards application	☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others: Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.1.5 Standardization – Personnel Certification: Status and Needs

Please share current status and future needs of standardization related personnel certification.

Category	Current Existence of Personnel Certifications		Future Needs or Priority for Personnel Certification
	Internal	External	
Planning and Evaluation - Strategy/policy setting - Cooperation with SDOs - Performance/achievement evaluation - Standardization needs/trend analysis	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Development - Development (company standards) - Development (external SDO's activities)	☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Dissemination - Standards information management (copyediting, publication, distribution) - Training for standards application	☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others: Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.2 Jobs for Conformity Assessment

2.2.1 Conformity Assessment – Current Status Profiling

If your company has people working in the conformity assessment area, how many employees majored in science or engineering degree; hold graduate (master or doctor) degrees; are females?

Category	Characteristics	Responses
Testing - Testing procedure development - Testing for materials, component, and product; - Testing for new product development	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Inspection - Inspection procedure development - Receiving inspection for materials - In-process inspection; - Final inspection for product	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Certification - Acquisition & maintenance of certification for product, service, or management system	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Accreditation - Accreditation related tasks	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.2.2 Conformity Assessment – Requirement Profiling

When your company recruits people for conformity assessment tasks, what kind of requirements or preferences do you have in terms of degree, major, or other experience, or personnel certification?

Tasks of Standardization Professional	Required Minimum Degree	Required Major	Preferred Minimum Experience	Preferred Personnel Certification (if any)
Testing - Testing procedure development - Testing for materials & product, - Testing for new product development - Standardization needs/trend analysis	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Inspection - Inspection procedure development - Receiving inspection for materials - In-process inspection; - Final inspection for product	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Certification - Acquisition & maintenance of certification for product, service, or management system	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Accreditation - Accreditation related tasks	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Others - Any other tasks	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)

2.2.3 Conformity Assessment – Sample Requirements (Advertisements)

If available, please share a few examples of job advertisements of conformity assessment professional. The description or advertisements usually include wanted title and requirements for education (degree, major), experiences, knowledge, skills, and attitudes.

Position Title	Job Descriptions (Main Responsibilities)	Competence Requirements (ex: Education, Experiences, Knowledge, Skills, Attitudes, Others)
1. _____ _____	- - - - -	- - - - -
2. _____ _____	- - - - -	- - - - -
	-	-

2.2.4 Conformity Assessment– Training Program: Status and Needs

Please share current status and future needs of conformity assessment related training programs.

Category	Current Existence of Training Program		Future Needs or Priority for Strengthening related Training Programs
	Internal	External	
Testing - Testing procedure development - Testing for materials/component/ product - Testing for new product development - Standardization needs/trend analysis	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Inspection - Inspection procedure development - Receiving inspection for materials - In-process inspection; - Final inspection for product	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Certification - Acquisition & maintenance of certification for product, service, or management system	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Accreditation - Accreditation related tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.2.5 Conformity Assessment – Personnel Certification: Status and Needs

Please share current status and future needs of conformity assessment related personnel certification.

Category	Current Existence of Personnel Certifications		Future Needs or Priority for Personnel Certification
	Internal	External	
Testing - Testing procedure development - Testing for materials/component /product - Testing for new product development - Standardization needs/trend analysis	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Inspection - Inspection procedure development - Receiving inspection for materials - In-process inspection; - Final inspection for product	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Certification - Acquisition & maintenance of certification for product, service, or management system	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Accreditation - Accreditation related tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.3 Jobs for Metrology

2.3.1 Metrology – Current Status Profiling

If your company has people working in the metrology area, how many employees majored in science or engineering degree; hold graduate (master or doctor) degrees; are females?

Category	Characteristics	Responses
Scientific Metrology - Application of measurement standards	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Industrial Metrology - Establishment of management system for calibration laboratory (ISO/IEC 17025) - Calibration procedure development; - Calibration; Application of reference materials	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Legal Metrology - Compliance with laws/acts on legal metrology	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.3.2 Metrology Assessment – Requirement Profiling

When your company recruits people for metrology tasks, what kind of requirements or preferences do you have in terms of degree, major, or other experience, or personnel certification?

Tasks of Standardization Professional	Required Minimum Degree	Required Major	Preferred Minimum Experience	Preferred Personnel Certification (if any)
Scientific Metrology - Application of measurement standards	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7years ☐ 8 years or longer	(please provide the title)
Industrial Metrology - Establishment of management system for calibration laboratory (ISO/IEC 17025) - Calibration procedure development; - Calibration; Application of reference materials	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Legal Metrology - Compliance with laws/acts on legal metrology	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Others - Any other tasks	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)

2.3.3 Metrology – Sample Requirements (Advertisements)

If available, please share a few sample job advertisements of metrology professional. The description or advertisements usually include wanted title and requirements for education (degree, major), experiences, knowledge, skills, and attitudes.

Position Title	Job Descriptions (Main Responsibilities)	Competence Requirements (ex: Education, Experiences, Knowledge, Skills, Attitudes, Others)
1. _____ _____	- - - - -	- - - - -
2. _____ _____	- - - - -	- - - - -
	-	-

2.3.4 Metrology – Training Program: Status and Needs

Please share current status and future needs of metrology related training programs.

Category	Current Existence of Training Program		Future Needs or Priority for Strengthening related Training Programs
	Internal	External	
Scientific Metrology - Application of measurement standards	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Industrial Metrology - Establishment of management system for calibration laboratory(ISO/IEC 17025) - Calibration procedure development; Calibration; - Application of reference materials	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Legal Metrology - Compliance with laws/acts on legal metrology	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.3.5 Metrology – Personnel Certification: Status and Needs

Please share current status and future needs of metrology related personnel certification.

Category	Current Existence of Personnel Certifications		Future Needs or Priority for Personnel Certification
	Internal	External	
Scientific Metrology - Application of measurement standards	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Industrial Metrology - Establishment of management system for calibration laboratory (ISO/IEC 17025) - Calibration procedure development; - Calibration; Application of reference materials	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Legal Metrology - Compliance with laws/acts on legal metrology	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

3 Overall Recommendations to APEC SCSC

3.1 Comments on Definition/Classification of Standards Professional

If you have any comments to improve the proposed interim definition and classification of standards Professional in this survey (Annex A), please submit it here:

_____
_____
_____
_____

3.2 Career Path and Vision for Standards Professional

In order to inspire next generation of standards Professional, what kind of career development programs or career path (best practice) need to be developed?

_____
_____
_____
_____

3.3 Recommendations for APEC SCSC Members

What kind of individual or collective actions does your company recommend to APEC SCSC Members for the upcoming years of 2015~2020? Please indicate your interest or priority in terms of education/training program development, contents development, digitalization, personnel certification and its mutual/multi-lateral recognition, joint activities, etc

_____
_____
_____
_____

This is the final page of the survey. We'd like to thank you in advance for your contribution. At the completion of our project, we will share the result with you through the APEC publication website (publications.apec.org) or the project website (www.wisestandard.org)

APEC Survey to Identify Competence Requirements of Standards Professional - Type B. For an Individual Standards-Specialty Organization

*APEC Project CTI 07/2013T

APEC Sub-Committee on Standards and Conformance (SCSC)

Prepared & Submitted by: Republic of Korea (final)

Co-Sponsored by: China, Indonesia, Japan, Malaysia, Peru, Singapore, USA, Viet Nam

Requested Action: Survey Response ***by March 31, 2014***

Note: Your timely contribution is very much appreciated.

You are cordially invited to participate in the Survey for the project of '*Inspiring Next Generation of Standards Professional Development*' Please respond by **March 31, 2014** to the project editor, Dr. Donggeun CHOI of Korean Standards Association.
(Email: stannovation@gmail.com, Phone:+82-2-6009-4850, Fax:+82-2-6009-4839)

1 February 2014

To: APEC SCSC member economies (and related Organizations & Companies)

Subject: APEC Survey to develop 'Standards Professional Development'

The APEC Sub-Committee on Standards and Conformance (SCSC) is undertaking a project, led by Korea, to define next generation of standards professional, future human resources in the area of standards and conformity assessment, so as to improve the competitiveness of the APEC member economies.

APEC has commissioned the Korean Agency for Technology and Standards (KATS) with support from Korean Standards Association (KSA) to conduct the project. The objectives of this project questionnaire are:

- To define what 'standards professional' – covering standards and conformance, with a focus on 'documentary standards'
- To identify current & future competence requirements for standards professional bot h in standards-specialty organizations and companies
- To share recommendations for the discussion in the APEC Subcommittee on Standar ds and Conformance (SCSC) to inspire standards professional

On behalf of the APEC SCSC member economies, we are writing to invite you to participate in this important initiative. Attached please find a survey questionnaire as a starting point for the project. We worked to simplify the survey questionnaire so it can be completed within modest amount of time. You are cordially requested to respond ***no later than March 31, 2014***, six weeks after the 2014 SCSC I meeting.

Thank you in advance for your contribution. If you have questions or suggestions, please contact Korea at by email stannovation@gmail.com or by phone +82-2-6009-4850.

Sincerely,

Choongang CHO
Project overseer of APEC CTI 07/13T
Korean Agency for Technology and Standards (KATS)

Donggeun CHOI
Project editor of APEC CTI 07/13T
Korean Standards Association (KSA)

1 Organization Overview

1.1 Employees and Budget of whole organization (within the economy)

CATEGORY	RESPONSES
1.1.1 Economy	
1.1.2 Name of organization	
1.1.3 Official Website	(weblink to an organization chart, if available:)
1.1.4 Annual Budget(Turnover)	☐ Budget ☐ Turnover (year: , in US$)
1.1.5 Number of Employees	
1.1.6. Contact Point (for this survey)	Name : Email : , Phone : Postal Address :

1.2 Number of Employees in Standards-related Tasks

In your organizations, how many employees are involved in standardization, conformity assessment, and metrology related tasks? We understand that the number of employees submitted here can be approximation for various reasons.

When you respond to this question, you may need to consider that often standards-related task is partial task of an employee. For example, if one hundred employee's responsibility has around 50% of their duties related to standards, your response can be 50 employees in 1.2.1, 1.2.2, and 1.2.3.

CATEGORY	SUB-CATEGORY	COMPOSITION RATIO OF EMPLOYEES in the CATEGORY (%)					
1.2.1 Standardization (# of employees: _____)	Planning and Evaluation	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Development:	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Dissemination	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Others	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
1.2.2 Conformity Assessment (# of employees: _____)	Testing	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Inspection	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Certification	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Accreditation	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Others	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
1.2.3 Metrology (# of employees: _____)	Scientific Metrology	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Industrial Metrology	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Legal Metrology	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
	Others	☐ 0%	☐ ~20%	☐ ~40%	☐ ~60%	☐ ~80%	☐ ~100%
Total number of Employees involved in Standards-related Tasks : _____							

1.3 Number of Senior Executives in Standards-specialty positions

In your organization, do you have any senior executives who are explicitly responsible for standards-related issues as their major duty? If so, please provide us with the number of senior executives.

For clarity purpose, senior executives in this survey are those who are less than top five percentages of total employees. These senior executives could be engineering/research fellows as well as management executives.

CATEGORY	SENIOR EXECUTIVES	(if yes) NUMBER OF SENIOR EXECUTIVES
1.3.1 Standardization	☐ Yes ☐ No	
1.3.2 Conformity Assessment	☐ Yes ☐ No	
1.3.3 Metrology	☐ Yes ☐ No	
Total number of senior executives: _____		

2 Job Analysis and Profiling

2.1 Jobs for Standardization

2.1.1 Standardization – Current Status Profiling

If your organization has people working in the standardization area, how many employees majored in science or engineering in degree; hold graduate (master or doctor) degrees; are females?

Category	Characteristics	Responses
Planning and Evaluation - Strategy/policy setting and legislation - Cooperation/coordination with SDOs - Performance/achievement evaluation - Standardization needs & trend analysis	Majored in Science or Engineering	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
	Holding Master or Ph.D Degree	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
	Females	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
Development - Committee secretariat (processing) - Development (by staff) - Development (by technical committees) - Development (by cooperative SDOs)	Majored in Science or Engineering	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
	Holding Master or Ph.D Degree	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
	Females	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
Dissemination - Copyediting & publication; - Sales & marketing; Information services - Consultancy and training	Majored in Science or Engineering	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
	Holding Master or Ph.D Degree	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
	Females	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
Others - Any other tasks (e.g.: TBT inquiry related issues, standards and regulation, etc)	Majored in Science or Engineering	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
	Holding Master or Ph.D Degree	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%
	Females	☐ ~20 ☐ ~40 ☐ ~60 ☐ ~80 ☐ ~100%

2.1.2 Standardization – Requirement Profiling

When your organization recruits people for standardization tasks, what kind of requirements or preferences do you have in terms of education degree, major, or other experience, or personnel certification?

Tasks of Standardization Professional	Required Minimum Degree	Required Major	Preferred Minimum Experience	Preferred Personnel Certification (if any)
Planning and Evaluation - Strategy/policy setting and legislation - Cooperation/coordination with SDOs - Performance/achievement evaluation - Standardization needs & trend analysis	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Development - Committee secretariat (processing) - Development (by staff) - Development (by technical committees) - Development (by accredited/cooperative SDOs)	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Dissemination - Copyediting & publication; - Sales & marketing; Information services - Consultancy and training	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Others - Any other tasks (e.g.: TBT inquiry related issues, standards and regulation, etc)	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)

2.1.3 Standardization – Sample Requirements (Advertisements)

If available, please share a few examples of job advertisements of standardization professional. The description or advertisements usually include wanted title and requirements for education (degree, major), experiences, knowledge, skills, and attitudes.

Position Title	Job Descriptions (Main Responsibilities)	Competence Requirements (ex: Education, Experiences, Knowledge, Skills, Attitudes, Others)
1. _____ _____ _____	- - - - -	- - - - -
2. _____ _____ _____	- - - - -	- - - - -
	-	-

2.1.4 Standardization – Training Program: Status and Needs

Please share current status and future needs of standardization related training programs.

Category	Current Existence of Training Program		Future Needs or Priority for Strengthening related Training Programs
	Internal	External	
Planning and Evaluation			
- Strategy/policy setting and legislation	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Cooperation/coordination with SDOs	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Performance/achievement evaluation	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Standardization needs & trend analysis	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Development			
- Committee secretariat (processing)	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Development (by staff)	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Development (by technical committees)	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Development (by cooperative SDOs)	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Dissemination			
- Copyediting & publication;	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Sales & marketing; Information services	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Consultancy and training	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others			
- Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.1.5 Standardization – Personnel Certification: Status and Needs

Please share current status and future needs of standardization related personnel certification.

Category	Current Existence of Personnel Certifications		Future Needs or Priority for Personnel Certification
	Internal	External	
Planning and Evaluation			
- Strategy/policy setting and legislation	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Cooperation/coordination with SDOs	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Performance/achievement evaluation	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Standardization needs & trend analysis	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Development			
- Committee secretariat (processing)	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Development (by staff)	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Development (by technical committees)	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Development (by cooperative SDOs)	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Dissemination			
- Copyediting & publication;	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Sales & marketing; Information services	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐
- Consultancy and training	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others			
- Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.2 Jobs for Conformity Assessment

2.2.1 Conformity Assessment – Current Status Profiling

If your organization has people working in the conformity assessment area, how many employees majored in science or engineering in degree; hold graduate (master or doctor) degrees; are females?

Category	Characteristics	Responses
Testing - Testing service development & operation - Establishment of management system for testing laboratory (ISO/IEC 17025) - Testing method development; - Testing	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Inspection - Inspection service development & operation - Establishment of management system for inspection body ISO/IEC 17020); - Inspection criteria & method development; - Inspection	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Certification - Certification scheme development & operation - Establishment of management system for certification body (ISO/IEC 17065, 17021); - Certification criteria & method development - Certification audit/assessment	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Accreditation - Accreditation scheme development & operation - Establishment of management system for accreditation body (ISO/IEC 17011) - Accreditation criteria & method development - Accreditation assessment	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.2.2 Conformity Assessment – Requirement Profiling

When your organization recruits people for conformity assessment tasks, what kind of requirements or preferences do you have in terms of education degree, major, or other experience, or personnel certification?

Tasks of Standardization Professional	Required Minimum Degree	Required Major	Preferred Minimum Experience	Preferred Personnel Certification (if any)
Testing - Testing service development & operation - Establishment of management system for testing laboratory (ISO/IEC 17025) - Testing method development; - Testing	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Inspection - Inspection service development & operation - Establishment of management system for inspection body ISO/IEC 17020); - Inspection criteria & method development; - Inspection	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Certification - Certification scheme development & operation - Establishment of management system for certification body (ISO/IEC 17065, 17021); - Certification criteria & method development - Certification audit/assessment	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Accreditation - Accreditation scheme development & operation - Establishment of management system for accreditation body (ISO/IEC 17011) - Accreditation criteria & method development - Accreditation assessment	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Others - Any other tasks	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)

2.2.3 Conformity Assessment – Sample Requirements (Advertisements)

If available, please share a few examples of job advertisements of conformity assessment professional. The description or advertisements usually include wanted title and requirements for education (degree, major), experiences, knowledge, skills, and attitudes.

Position Title	Job Descriptions (Main Responsibilities)	Competence Requirements (ex: Education, Experiences, Knowledge, Skills, Attitudes, Others)
1. _____ _____	- - - - -	- - - - -
2. _____ _____	- - - - -	- - - - -

2.2.4 Conformity Assessment– Training Program: Status and Needs

Please share current status and future needs of conformity assessment related training programs.

Category	Current Existence of Training Program		Future Needs or Priority for Strengthening related Training Programs
	Internal	External	
Testing - Testing service development & operation - Establishment of management system for testing laboratory (ISO/IEC 17025) - Testing method development; - Testing	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Inspection - Inspection service development & operation - Establishment of management system for inspection body ISO/IEC 17020); - Inspection criteria & method development; - Inspection	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Certification - Certification scheme development/operation - Establishment of management system for certification body (ISO/IEC 17065, 17021); - Certification criteria/method development - Certification audit/assessment	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Accreditation - Accreditation scheme development/operation - Establishment of management system for accreditation body (ISO/IEC 17011) - Accreditation criteria/method development - Accreditation assessment	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.2.5 Conformity Assessment – Personnel Certification: Status and Needs

Please share current status and future needs of conformity assessment related personnel certification.

Category	Current Existence of Personnel Certifications		Future Needs or Priority for Personnel Certification
	Internal	External	
Testing - Testing service development & operation - Establishment of management system for testing laboratory (ISO/IEC 17025) - Testing method development; - Testing	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Inspection - Inspection service development & operation - Establishment of management system for inspection body (ISO/IEC 17020); - Inspection criteria & method development; - Inspection	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Certification - Certification scheme development/operation - Establishment of management system for certification body (ISO/IEC 17065, 17021); - Certification criteria & method development - Certification audit/assessment	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Accreditation - Accreditation scheme development/operation - Establishment of management system for accreditation body (ISO/IEC 17011) - Accreditation criteria/method development - Accreditation assessment	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.3 Jobs for Metrology

2.3.1 Metrology – Current Status Profiling

If your organization has people working in the metrology area, how many employees majored in science or engineering in degree; hold graduate (master or doctor) degrees; are females?

Category	Characteristics	Responses
Scientific Metrology - Establishment & dissemination of national measurement standards - Research & development of measurement standards - International Key comparison	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Industrial Metrology - Calibration service development & operation - Management system for calibration laboratory (ISO/IEC 17025) - Calibration procedure development; Calibration; - Reference material production - Management system for reference material producer (ISO Guide 34) - Reference material certification (ISO Guide 35)	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Legal Metrology - Policy and Legislation for legal metrology - Type approval, verification and periodical Inspection for measuring instruments; - Net weight certification for pre-packaged food	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	Majored in Science or Engineering	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Holding Master or Ph.D Degree	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
	Females	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.3.2 Metrology Assessment – Requirement Profiling

When your organization recruits people for metrology tasks, what kind of requirements or preferences do you have in terms of education degree, major, or other experience, or personnel certification?

Tasks of Standardization Professional	Required Minimum Degree	Required Major	Preferred Minimum Experience	Preferred Personnel Certification (if any)
Scientific Metrology - Establishment & dissemination of national measurement standards - Research & development of measurement standards - International Key comparison	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Industrial Metrology - Calibration service development & operation - Management system for calibration laboratory (ISO/IEC 17025) - Calibration procedure development; Calibration; - Reference material production Management system for reference material producer (ISO Guide 34) - Reference material certification (ISO Guide 35)	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Legal Metrology - Policy and Legislation for legal metrology - Type approval, verification and periodical Inspection for measuring instruments; - Net weight certification for pre-packaged food	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)
Others - Any other tasks	☐ Bachelor (or lower) ☐ Master ☐ Ph.D	☐ Science & Engineering ☐ All others ☐ None	☐ ~3 years ☐ 4~7 years ☐ 8 years or longer	(please provide the title)

2.3.3 Metrology – Sample Requirements (Advertisements)

If available, please share a few sample job advertisements of metrology professional. The description or advertisements usually include wanted title and requirements for education (degree, major), experiences, knowledge, skills, and attitudes.

Position Title	Job Descriptions (Main Responsibilities)	Competence Requirements (ex: Education, Experiences, Knowledge, Skills, Attitudes, Others)
1. _____ _____	- - - -	- - - -
2. _____ _____	- - - -	- - - -

2.3.4 Metrology – Training Program: Status and Needs

Please share current status and future needs of metrology related training programs.

Category	Current Existence of Training Program		Future Needs or Priority for Strengthening related Training Programs
	Internal	External	
Scientific Metrology - Establishment & dissemination of national measurement standards - Research & development of measurement standards - International Key comparison	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Industrial Metrology - Calibration service development & operation - Management system for calibration laboratory (ISO/IEC 17025) - Calibration procedure development; Calibration; - Reference material production - Management system for reference material producer (ISO Guide 34) - Reference material certification (ISO Guide 35)	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Legal Metrology - Policy and Legislation for legal metrology - Type approval, verification and periodical Inspection for measuring instruments; - Net weight certification for pre-packaged food	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

2.3.5 Metrology – Personnel Certification: Status and Needs

Please share current status and future needs of metrology related personnel certification.

Category	Current Existence of Personnel Certifications		Future Needs or Priority for Personnel Certification
	Internal	External	
Scientific Metrology - Establishment & dissemination of national measurement standards - Research & development of measurement standards - International Key comparison	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Industrial Metrology - Calibration service development & operation - Management system for calibration laboratory (ISO/IEC 17025) - Calibration procedure development; Calibration; - Reference material production - Management system for reference material producer (ISO Guide 34) - Reference material certification (ISO Guide 35)	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ~20 ~40 ~60 ~80 ~100%
Legal Metrology - Policy and Legislation for legal metrology - Type approval, verification and periodical Inspection for measuring instruments; - Net weight certification for pre-packaged food	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%
Others - Any other tasks	☐ Yes ☐ No	☐ Yes ☐ No	☐ ☐ ☐ ☐ ☐ ~20 ~40 ~60 ~80 ~100%

3 Overall Recommendations to APEC SCSC

3.1 Comments on Definition/Classification of Standards Professional

If you have any comments to improve the proposed interim definition and classification of standards professional in this survey (Annex A), please submit it here:

_____
_____
_____
_____

3.2 Career Path and Vision for Standards Professional

In order to inspire next generation of standards professional, what kind of career development programs or career path (best practice) need to be developed?

_____
_____
_____
_____

3.3 Recommendations for APEC SCSC members

What kind of individual or collective actions does your organization recommend to APEC SCSC members for the upcoming years of 2015~2020? Please indicate your interest or priority in terms of education/training program development, contents development, digitalization, personnel certification and its mutual/multi-lateral recognition, joint activities, etc.

_____
_____
_____
_____

This is the final page of the survey. We'd like to thank you in advance for your contribution. At the completion of our project, we will share the result with you through the APEC publication website (publications.apec.org) or the project website (www.wisestandard.org)

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