

IEEE P2520.1 Working Group  
Meeting Minutes  
25 October 2021  
WG Chair: James Covington  
WG Secretary: H. Troy Nagle (Interim)

1. Call to Order  
Chair called meeting to order at 10:06 AM EDT. He announced that the meeting was being recorded for the purpose of preparing minutes.
2. Roll Call and Disclosure of Affiliation  
*Affiliation FAQs:* <http://standards.ieee.org/faqs/affiliation.html>  
The Chair asked the Secretary to check for a quorum. No new members were participating. The List of Participants is shown in **Attachment A**. A quorum was achieved (17 of the 22 voting members were present).
3. Approval of Agenda  
The Chair asked for approval of the agenda. Troy Nagle made the motion; Krishna Persaud seconded. Without objection to unanimous consent, the motion was adopted.
4. Approval of Previous Meeting Minutes  
The Chair asked for approval of the June 2 Meeting Minutes as circulated. Radislav Potyrailo made the motion; Susana Palma seconded. Without objection to unanimous consent, the motion was adopted.
5. IEEE-SA Patent & Copyright Policies
  - a. Call for Patents  
<https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.pdf>  
Per standard IEEE SA WG meeting practice, the Chair reviewed the required policy regarding potentially essential patents. No one raised concerns for consideration.
  - b. Copyright Policy <https://standards.ieee.org/ipr/copyright-materials.html>  
Per standard IEEE-SA WG meeting practice, the Chair reviewed the required policy regarding copyrights. There were no questions or concerns.
6. Technical Discussion P2520.1:  
To begin the technical discussion, the Chair that we focus on these questions for today's discussions:
  - Whom else should be invited to the WG?
  - Are the tests sufficient as defined?
  - Are we ready to focus on Pass/Fail criteria?
  - Should we solicit some outside opinions?

Before starting the discussion of these questions, the Chair reviewed some aspects of the German Standard VDI/VDE 3518 Part 3. He thus provided some background material so we can avoid overlap with what others have done. Specific aspects that were reviewed were:

#### “Determining the Presence of, and Differences in, Odour

- Use of human panel ...
- Have "yes/no", dual and triangular test
- Yes-no test:
  - To determine the presence or absence of odour, and is also referred to, as an "A test" and "not A test" in accordance with QIN 10972/ISO 8588:2017
- Dual comparative test
  - The electronic nose is exposed in random order to odour samples A and B (see DIN 10972 and DIN EN ISO 5495).
- Triangular test
  - Based on the triangle test of DIN EN ISO 4120, this test determines whether it is possible to spot a sample whose odour is different from among a set which also includes two equal samples that differ from the first one.

#### Paired Comparison Test

- This method is only applicable if the products are relatively homogeneous.
- The method is effective
  - a) for determining
    - whether a perceptible difference exists (paired difference test), or
    - whether no perceptible difference exists (paired similarity test) when, for example, modifications are made to ingredients, processing, packaging, handling or storage operations, or
  - b) for selecting, training and monitoring assessors.
- It is necessary to know, prior to carrying out the test, whether the test is a one-sided test (the test supervisor knows a priori the direction of the difference, and the alternative hypothesis corresponds to the existence of a difference in the expected direction) or a two-sided test (the test supervisor does not have any a priori knowledge concerning the direction of the difference, and the alternative hypothesis corresponds to the existence of a difference in one direction or the other).

#### Triangular Test

- Both the number and the order within a triple sample group (and in the series of triple sample groups) shall be random:
  - The possible distributions are twice A and once B or twice B and once A.
  - The possible permutations are AAB, ABA, BAA, ABB, BAB, BBA.
- A random generator can be used to obtain the sequences.

- For each examination of a triple sample group, the task is to state and document which single sample differs from the other two. The evaluation by the test supervisor is in terms of "correct" and "false" outcomes per triple sample group.
- The answer "no difference" is regarded as false. The minimum number of correct answers when testing nine triple sample groups has to be at least six (significance level a 0,05) or seven (significance level a 0,01)"

Next, the Chair gave an introduction to ISO 4120 Sensory analysis – Methodology – Triangle test and ISO 8588 Sensory analysis – Methodology – “A” – “not A” test. These standards reference ISO 3534-1 Statistics – Vocabulary and symbols – Part 1; ISO 5492 Sensory analysis – Vocabulary; ISO 8586:2012 – General guidelines for the selection, training and monitoring of selected assessors and expert sensory assessors; and ISO 8589 Sensory analysis – General guidance for the design of test rooms. An interesting point was noted that between 10 and 50 assessors who are familiar with the “A” product shall be used in the test procedure, and that each should deliver between 20 and 100 evaluations. The data is captured into a table and a statistical formula is used to determine the result.

At this point in the discussion, the Chair shared his screen with the latest draft of our P2520.1 Standard and began soliciting suggestions from the WG. Various options for paired comparison and triangular testing were considered. Members discussed methods for employing some of these options. PCA analysis tools are included in most of the current commercially available systems. A PCA-based triangle test is the most objective. But P2520.1 will not be using human panels. Human panel testing will probably be required in application-specific standards in the series. Will sensor sensitivity be a test requirement in all standards in the series? Perhaps not. However, in P2520.1 we will provide a table of test chemicals and the sensor sensitivity to the chosen subset of three-test chemicals will be important. An example might be P2520.4.1 Chemical Manufacture. P2520.4.1 might require that the equipment under test (EUT) pass P2520.1 using three specific chemicals as a prerequisite to undertaking the tests for P2520.4.1.

Other topics of discussion were also considered. Some systems such as ion-mobility spectrometry create channels as their outputs. Access to the actual sensors themselves is not available. Also, flexibility in signal processing will be important so supervised versus unsupervised methods will be allowed. General agreement was achieved for adopting the triangular test for our standard series. Various options for sensor/channel data transformation and feature extraction were reviewed.

A P2520.1 consensus was achieved for allowing an unsupervised transformation for differentiation. Next, we must determine the pass/fail criteria. P2520.1 can require a supervised transformation when we get to the identification stage of the standard.

The Chair will post a new draft to iMeet Central and asked all WG members to review in advance of the next meeting (insert your comments by Nov. 22).

**NOTE:** During the meeting, the cost of IEEE Standards was stated to be \$1,000. A post-meeting review shows that the actual prices vary from \$35 to \$400.

7. New Business/Activities for the Next Meeting

There was no New Business.

8. Future Meetings

The Chair announced the next meeting of the WG will take place on November 29.

9. Adjourn

The Agenda being completed and without objection to unanimous consent, the Chair adjourned the meeting at 11:10 AM.

**Attachment A: Participants (18)**

<b>NAME</b>	<b>AFFILIATION</b>
Christopher Jensen	Self
Duke Oeba	Oregon State University
Etienne Bultel	Aryballe
Ettore Massera	ENEA
Fengchun Tian	Chongqing University
Hua-Yao Li	Huazhong University
James Covington	University of Warwick
Katayoun Emadzadeh	Self
Ko Chung Wong	Oxford Technology
Krishna Persaud	University of Manchester
Paul Kagan	AWLDM Systems
Pierre Maho	Aryballe
Radislav Potyrailo	GE Research
Sandrine Isz	Alpha-MOS
Saverio de Vito	ENEA
Susan Schiffman	NC State University
Susana Palma	NOVA University of Lisbon
Troy Nagle	NC State University