

IEEE P2520.1 Working Group #10
Meeting Minutes
24 January 2022
WG Chair: James Covington
WG Secretary: H. Troy Nagle (Interim)

1. Call to Order

Chair called meeting to order at 10:04 AM EST. 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 19 voting members were present).

3. Approval of Agenda

The Chair asked for approval of the agenda. Troy Nagle made the motion; Susana Palma seconded. Without objection to unanimous consent, the motion was adopted.

4. Approval of Previous Meeting Minutes

The Chair asked for approval of the October 25 Meeting Minutes as circulated. Susana Palma made the motion; Radislav Potyrailo 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 presented a slide showing the focus of today's discussion:

- Revisit where we are with the standard.
- Today focus on Level 1 pass criteria.
- Introduce concept of Silhouette clustering.
- Consider pass/fail criteria for Level 1.

The focus for this meeting is on the level 1 pass criteria. Silhouette clustering has been suggested as a method for our use. We also discussed the Level-1 pass-fail criteria.

Next, he summarized Where are We?

- Basically, score of 1 is good, -1 is poor and 0 is when the groups are next to each other.
- Can use average of closest point?
- From this calculate the "Silhouette Coefficient"
- This is the maximum value of the average from any specific cluster.
- Do we want to use this or define something else?
- Consider pass/fail criteria for level 1?
- What scores do we want to use?
- What distance criteria should we define (or should we?) - just define Euclidian distance?

Our recent efforts have been on very specific pass-fail criteria. We have developed a consensus of these three testing levels: differentiation, identification, and quantification. Differentiation is simply trying to tell the difference between two or three chemicals. Identification is testing these chemicals to know what they are, and qualification provides some form of concentration information. Our progress on Levels 1 and 2 is good, but Level 3 needs more work. We haven't completed the pass-fail criteria for any level. Level 1 has been difficult to complete. Setting the pass criteria for differentiation have been a real problem. Hopefully the others will be easier to define.

We test the EUT with three chemicals from a list that we will provide. We could test at different temperatures, and we test it over time so this can become our 3 levels. We agreed during WG#9 that we were going to recommend a method of clustering the data, an unsupervised technique such as PCA. Silhouette clustering may enable us to create a simple numerical score that could be used as a pass/fail criterion. Hierarchical clustering and Multi-Dimensional Scaling were also mentioned as alternatives. If vector spaces are employed, angles provide measures of correlation. Data analysis tools provided with most commercially available instruments have a PCA option. We may need to leverage that fact.

The Chair then gave a summary of Silhouette Clustering:

- Currently, the EUT is allowed to collect data by whatever the measurement process.
- The user then transforms the data using an unsupervised technique such as PCA.

- We are proposing to use silhouette clustering as a measure of the quality of that cluster.
- Each cluster is represented by a so-called silhouette, which is based on the comparison of its tightness and separation.
- Silhouette shows which objects lie well within their cluster, and which ones are merely somewhere in between clusters.
- The entire clustering is displayed by combining the silhouettes into a single plot, allowing an appreciation of the relative quality of the clusters and an overview of the data configuration.
- The average silhouette width provides an evaluation of clustering validity.
- Basically, score of 1 is good, -1 is poor and 0 is when the groups are next to each other.
- Can use average of closest point?
- From this calculate the "Silhouette Coefficient"
- This is the maximum value of the average from any specific cluster.
- Do we want to use this or define something else?
- Consider pass/fail criteria for level 1?
- What scores do we want to use?
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At this point in the meeting, the Chair shared his screen displaying version 15 of our standard. Recent changes were reviewed, and additional edits were made in response to WG participant suggestions. Editing continued until the end of the meeting.

The Chair will post today's slides and the latest version of the standard to IEEE iMeet Central.

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 February 28.

9. Adjourn

The Agenda being completed, Susana Palma made a motion to adjourn; Radislav Potyrailo seconded. Without objection to unanimous consent, the Chair adjourned the meeting at 11:05 AM.

Attachment A: Participants (19)

NAME	AFFILIATION
Carlos Diaz	Ambiente et Odora
Christopher Jensen	Self
Domenico Cipriano	Ricerca Sistema Energetico, Milan
Duke Oeba	Self, Oregon State University
Ehsan Danesh	Alphasense Ltd
Etienne Bultel	Aryballe
Fengchun Tian	Chongqing University
Hua-Yao Li	Huazhong University of Science and Technology
James Covington	Professor, School of Engineering, University of Warwick
Katayoun Emadzadeh	Self
Krishna Persaud	University of Manchester
Paul Kagan	AWLDM Systems
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
Vanessa Lalitte	IEEE-SA Staff