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Standard Guide for Structured Small Group Product Evaluations¹

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1. Scope

1.1 This guide covers those occasions in which a small group of individuals (generally between three and ten) with potentially different functional roles and degrees of training in sensory and product evaluation, evaluates a product or series of products for a specific objective, with a pre-identified decision to be made, but without the use of formal hypothesis testing or statistics. In the product testing industry, these are often referred to as “benchings,” “cuttings,” or “bench screenings” or, in the case of food products, “tastings,” “informal tastings,” “team tastings,” or “technical tastings.” In this guide, the term “Small Group Product Evaluation” (SGPE) is used.

1.2 The aim of this guide is to provide best practices to ensure that SGPE are conducted with sufficient rigor to enable the most appropriate decision or to yield the needed learning while considering the risk. Because the participants may be heterogeneous with respect to functional role, knowledge of the issue at hand, sensory sensitivity, and degree of sensory or product evaluation training, the likelihood of agreement on a path forward is not assured. Additionally, participants may have certain biases with respect to the issue to be decided, because of prior knowledge or their role within the organization. These potential derailers can be addressed through proper planning and execution of an SGPE. When SGPE are unstructured, unfocused and experimental error and biases uncontrolled, the outputs of SGPEs do not inform decisions or deliver the desired learning in a scientific manner. The goal of this document is to elevate the practice of small group product evaluations by outlining a structure, defining decision criteria in advance, and providing guidelines for implementation, drawing upon existing sensory theory and methods. Outputs from these SGPE are used to inform decisions and determine next steps including the risks involved with each of these.

SGPE are widely used, and when properly conducted, are an option in the sensory professional’s toolbox. SGPE should be conducted only when the risks are known, stated, and shared. Limited timing and resources alone are not adequate reasons to utilize SPGE testing and forgo formal sensory testing. Risks in doing so must be clearly communicated and agreed to by all involved parties.

The proper uses of SGPE are several: to screen variables, to establish hypotheses, to gain information about a product set or category, to take a course of action where a low risk product decision is needed or for product learning throughout a development program. In all of these cases, the team must accept the risks that come with having SGPE outputs to inform a decision. One risk involved in SGPE is missing small differences among products (beta risk), when the goal of the evaluation is to find such differences, particularly those differences that might be important to the consumer. An SGPE failure to find differences does not mean that product similarity or equivalence is established, since much larger sample sizes than are common to SPGE’s are required to establish similarity/equivalence.

1.3 This guide covers the planning and implementation processes, including objective setting, method determination, number and types of participants, ballots, sample preparation, decision criteria, products to be included, review of information collected, and management of the post-product evaluation discussion to arrive at a decision within the small group. Documenting and communicating SGPE outputs are also covered, as well as next steps if a decision cannot be reached. Worked examples across industries including food, household, and personal care are included. The different types of SGPE covered include those commonly executed but is not exhaustive.

1.4 This guide does not cover the use of small group evaluations to pilot research or test protocols before implementation in larger scale testing. In addition, the use of small group evaluations to substitute for larger evaluations that incorporate formal hypothesis testing and statistical analysis or to replace hedonic testing are neither recommended nor included within this guide. SGPE that are regular activities of a quality function and product reviews that are done for demonstration or informative purposes with no defined decision criteria are also not covered in this guide.

¹ This test method guide is under the jurisdiction of ASTM Committee E18 on Sensory Evaluation and is the direct responsibility of Subcommittee E18.05 on Sensory Applications--General.

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1.5 See 5.2 for a best practice recommendation for the role of the sensory professional or trained delegate in the planning, designing, conducting, or oversight of structured SGPE.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

E1885 Test Method for Sensory Analysis—Triangle Test

E2139 Test Method for Same-Different Test

E2164 Test Method for Directional Difference Test

E2610 Test Method for Sensory Analysis—Duo-Trio Test

E3009 Test Method for Sensory Analysis—Tetrad Test

3. Summary of Guide

3.1 The aim of this guide is to provide best practices for small group product evaluations (SGPE), which are often referred to as “benchings,” “cuttings,” or “bench screenings” or, in the case of food products, “tastings,” “informal tastings,” “team tasting,” or “technical tastings.” SGPE are used to address learning objectives, make a product decision to conduct upcoming research, or make a product decision that has business implications when formal, larger scale testing is not required. Best practices are needed to ensure actionable outcomes or clarity in learning from SGPE when a small number of people are evaluating the samples and personal and political agendas may be in play among multiple stakeholders. This guide outlines a structure for planning and implementing an SGPE. Outputs from these SGPE will be more actionable and will lead to better informed decision-making or more clarity in learning than when these best practices are not followed.

4. Significance and Use

4.1 Using best practices for SGPE ensures that decisions made will be based on scientific principles, and the outputs obtained will be more objective than those evaluation sessions conducted without this planning, structure, focus, and best practices. These small group evaluations contrast with more formal product tests that include a prequalified participant sample, hypothesis testing, and statistical analysis. Without best sensory practices and procedures, SGPE may be unstructured, unsystematic, difficult to manage, and may lead to outputs that are unclear, not credible, or ignored. Additionally, the use of proper sensory practices reduces bias among participants with specific sample knowledge or a desire to advance an agenda. This guide provides a framework for conceptualizing, organizing, and executing these SGPE.

4.2 SGPE are used in situations in which formal, hypothesis-driven product evaluations are not required. These include situations in which the decision risk is ~~small, and/or~~ small or stakeholders feel comfortable in making a decision with the attendant ~~risks—risks, or both.~~ risks. Examples of these situations may ~~include:~~ include limited availability of samples or other resources, potential patent exposure, or low incidence of target population. The SGPE could be an initial screening step or a precursor test before a more formal product test. In the proper context, SGPE can also be a decision-making tool in and of itself. Using the framework presented here provides a degree of rigor that may be absent when a few people evaluate a product without controlled conditions. A poster presented at the 2009 Pangborn Sensory Science Symposium (**1**)³ reported the results of a survey on SGPE. ~~Fifty-nine percent—59 %~~ of respondents (N = 92) stated that, at their place of employment, typically, non-sensory professionals organized SGPE. **Table 1** summarizes key differences between a typical unstructured product evaluation with a small group not following best practices and an SGPE that follows the best practices outlined in this guide.

5. Definition: SGPE Definition—SGPE

5.1 An SGPE generally consists of three to ten people chosen based on one or more of the following criteria: sensory acuity, prior knowledge, availability, or investment in the outcome of the evaluation to make a decision concerning a product, products, or a product category. Participants complete a given sensory task that may be quantitative ~~and/or~~ or qualitative in nature, or both, as instructed by a sensory professional. Responses are collected by the sensory professional, compared to pre-defined decision criteria, and a discussion of the responses and larger context ensues. A consensus decision and next steps are reached, recorded, and communicated.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

³ The boldface numbers in parentheses refer to a list of references at the end of this guide.

TABLE 1 Comparison of Not Best Practice SGPE versus Best Practice SGPE

Feature	Not Best Practice SGPE	Best Practice SGPE
# Participants	Variable	3–10
Rationale for selecting participants	Availability	Specified
Decision criteria	None	Specified
Structured ballot	No	Yes
Hedonic response	Sometimes	No
Product presentation	Unsystematic	Balanced as possible
Independent judgments	Sometimes	Yes
Discussion	Variable	Yes
Decision is data-driven	Sometimes	Yes
Output and decision recorded	Sometimes	Yes

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(https://standards.iteh.ai)

5.2 *Sensory Delegate*—Planning for an SGPE should be done by the sensory professional. If it is not possible for the sensory professional to plan the SGPE or to attend the evaluation session, a delegate should be appointed by the sensory professional. The sensory professional coaches the delegate in conducting the SGPE. The delegate assumes the roles and responsibilities of the sensory professional with particular emphasis on conducting an unbiased evaluation session. The delegate should maintain contact with the sensory professional pre- and post-product evaluation session. If the organization conducting the SGPE does not employ a sensory professional, a staff member, or members, may be trained to do so using the tools and techniques outlined in this guide.

6. Issues to Consider Before Planning an SGPE

6.1 *Effect Size Matters*—The processes of planning, conducting, overseeing, and interpreting the outputs of an SGPE described in this guide include the collection of both quantitative (numerical) and qualitative (verbal or written comments) data. Both of these data types may be used to inform the final conclusion. It is expected that there will be patterns in respondents’ numerical ratings. It is also expected that there will be patterns or themes in the respondents’ product descriptions. If an effect is large, it is likely detected by even a small group. Thus, the likelihood of missing large differences among products or not detecting an intense sensory property in a single product is likely to be small. However, if an effect is small, there is a greater likelihood of it being missed by a small group, especially considering differences in sensory sensitivity, product knowledge, and varied degrees of sensory training.

6.1.1 The measure of effect size was made popular by Jacob Cohen in his 1988 book, *Statistical Power Analysis for the Behavioral Sciences*(2), and a calculation of effect size has been used in more quantitative, formal testing. The sensory professional should consider testing approaches other than SGPE if the effect size is small and the risk of missing the effect is large, such as when deciding if a product lot scheduled for release is tainted.

6.2 *Considerations Before Planning and Preparing an SGPE*—Before designing and conducting an SGPE, the sensory professional should make the following assessments to determine if the execution of this structured evaluation is appropriate:

- 6.2.1 Can the issue or research question be structured and focused enough to be evaluated in a small group?
- 6.2.2 Will an SGPE address the objectives so a decision can be made?
- 6.2.3 How will the output be used? Will the output of an SGPE be used in the proper context keeping in mind its limitations?
- 6.2.4 Have the risks involved in using an SGPE been considered and communicated?
- 6.2.5 Can participants with the desired characteristics for an SGPE participation be found and are they available?

6.3 *When to Consider Using SGPE*—SGPE are appropriate and may be used in the following situations:

6.3.1 An SGPE can be used for a low-risk decision. A low-risk decision is one in which an erroneous decision by an SGPE will not have a major impact on the issue under consideration. Additionally, if the likelihood of an erroneous decision being identified and reversed in subsequent activities is high, then an SGPE can be considered low risk. The SGPE organizer needs to provide the necessary caveats upfront in the planning phase of the SGPE and the written documentation summarizing the SGPE results and decision made. The organization needs to accept these risks.

6.3.2 For projects involving screening of ~~products;~~products,

6.3.3 In exploratory or discovery ~~research;~~research,

6.3.4 When the discussion of product properties yields useful information and can provide guidance for next ~~steps;~~steps, and

6.3.5 When this guide’s recommendations can be implemented.

6.4 *When Small Group Product Evaluations Are Not Appropriate*—There are situations when SGPE are not appropriate:

6.4.1 When results will be interpreted as formal and taken out of context by users of the information. While it is not possible to know ahead of time whether and how results may be misused, it is incumbent on those who organize, lead, and summarize the evaluation to outline clearly how the recommendation and next steps were decided and the attendant risks accepted.

6.4.2 ~~When Consumer/Actual User Information Is Required for the Decision~~—When consumer/actual user information is required for the decision. If an organization has not conducted sufficient prior research with consumers (for example, drivers of liking, product optimization, or developed sensory based specifications) to be able to relay what consumers’ responses are likely to be (“we know our consumers don’t like heat/spice and this sample is quite hot”).

6.4.3 When the product or product category is key to the business with respect to revenue, margin, or strategy and the decision risk is too high.

6.4.4 When detailed and more precisely measured product attributes and intensities are needed.

6.4.5 When statistical risk assessment is needed to support a decision.

6.4.6 When the recommendations provided in this guide meant to provide structure and rigor to these evaluations cannot be followed.

6.4.7 When the leader of the SGPE cannot issue a report that properly describes the SGPE process and the limitations and risks associated with the decision and next steps.

6.4.8 When the main question to be answered cannot be properly addressed because of the capabilities or knowledge of individuals available to participate in the SGPE. For example, if the main objective is whether samples can be differentiated and only nondiscriminators are available, an SGPE is not appropriate. Additionally, if the main question is whether or not product differences are detectable by consumers or untrained panelists, and only trained panelists are available, an SGPE is not appropriate.

6.5 *When an SGPE MAY be Appropriate*—As previously stated in 6.3 and 6.4, an SGPE is appropriate in low-risk situations and may not be appropriate when the decision risk is high. The following conditions should be true to use an SGPE in high-decision-risk situations:

6.5.1 All stakeholders are aware of the risks inherent both in SGPE in general and those specific risks associated with the situation under ~~consideration;~~consideration,

6.5.2 All stakeholders are willing to accept the risks noted ~~above;~~above, and

6.5.3 The alternative to conducting an SGPE is making a decision with no product evaluation or input.

6.6 *Five Most Common Types of SGPE*—See Table 2 for a summary of the five most common types of SGPE or Rogeaux (3) for a slightly different classification scheme. An SGPE typically addresses, but is not limited to, one of the following five broad objectives:

TABLE 2 Summary of Five Common Sensory Objectives and Methods Used in SGPE

Type of Evaluation	Sensory Objective	Examples of Sensory Method or Task
—Check-in <u>Check-in</u>	Determine if sample achieves the sensory goal <u>Determine if sample achieves the sensory goal</u>	Compare to reference sample or description <u>Compare to reference sample or description</u>
—Narrow-down <u>Narrow-down</u>	Eliminate sensory redundancy or choose products with desired sensory profiles or both <u>Eliminate sensory redundancy or choose products with desired sensory profiles, or both</u>	Degree of difference products, sorting, qualitative mapping, and comparison to target sample or description <u>Degree of difference products, sorting, qualitative mapping, and comparison to target sample or description</u>
—Clarify <u>Clarify</u>	Understand external feedback <u>Understand external feedback</u>	Identify and describe attributes <u>Identify and describe attributes</u>
—Describe <u>Describe</u>	Identify sensory attributes for consumer ballot or other communication <u>Identify sensory attributes for consumer ballot or other communication</u>	Identify and describe common sensory attributes of a sample <u>Identify and describe common sensory attributes of a sample</u>
—Discover Sensory Dimensions <u>Discover Sensory Dimensions</u>	Discover sensory dimensions relevant to the category <u>Discover sensory dimensions relevant to the category</u>	Discover and describe sensory attributes of a category and determine representative products <u>Discover and describe sensory attributes of a category and determine representative products</u>

6.6.1 *Check-in*—Check-in is conducted to determine if a sample(s) is on track to meet a sensory goal or goals. Post Check-in, the sample(s) may proceed to further testing or the Check-in may result in a market decision. Examples of Check-in include:

6.6.1.1 Determination as to whether sensory properties have been maintained between sample development steps (bench→pilot plant→manufacturing plant) or after an ingredient or process change. If the team concludes and accepts that the risk is small in these projects, the step following the SGPE could be a market decision. Whereas, when the concluded risk of the outcome of the SGPE in these projects is moderate or large, further testing, such as a formal sensory test, would be warranted.

6.6.1.2 Determination as to whether a product is ready for larger scale or more formal sensory testing or for a market decision, such as an ~~introduction~~; introduction.

6.6.1.3 Determination as to whether a quality issue has been ~~addressed~~; addressed.

6.6.1.4 Determination as to whether an intended change to a specific sensory attribute has been ~~addressed~~; addressed, and

6.6.1.5 Determination as to whether product functionality or sensory attributes deliver as expected.

6.6.2 *Narrow-down*—A Narrow-down session is designed to reduce a set of samples with a next step generally of consumer or sensory testing. The criteria for elimination may be defined before evaluation. Examples of objectives for Narrow-down evaluations include:

6.6.2.1 The elimination of redundant sensory ~~profiles~~; profiles, and

6.6.2.2 Selecting samples within a desired range of sensory profiles.

6.6.3 *Clarify*—At times, product feedback is obtained from sources external to the project team or company. It is critical to understand the feedback before communicating a response or initiating product change. Examples in which clarification of feedback is needed may include:

6.6.3.1 Consumer complaints or ~~praise~~; praise,

6.6.3.2 Comments on social ~~media~~; media, and

6.6.3.3 Assessing consumer response from formal testing such as central location tests, home use tests, or focus groups.

6.6.4 *Describe*—It may be necessary to describe the sensory attributes pertinent to a set of products before taking some subsequent action.

6.6.4.1 If a new product is introduced to the market, it may be prudent for a small group to compare it to the company’s own products or other competitive products before a more formal evaluation.

6.6.4.2 Before testing products with consumers, an SGPE can provide a forum for initial exploration of consumer ballot development.

6.6.5 *Discover Sensory Dimensions*—Consumer research studies often involve exploration of an entire category. The organization should have all impacted parties agree on what sensory dimensions constitute category inclusion. Examples include:

6.6.5.1 Determination of product inclusion for a category ~~appraisal~~; appraisal, and

6.6.5.2 Determination of product inclusion for competitive assessment.

6.7 *Communicating an SGPE Output to a Wider Audience*—The outputs and decisions from an SGPE result from a particular set of people evaluating a specific product set in a specified context. Thus, any communication of these findings should be done with the appropriate caveats.

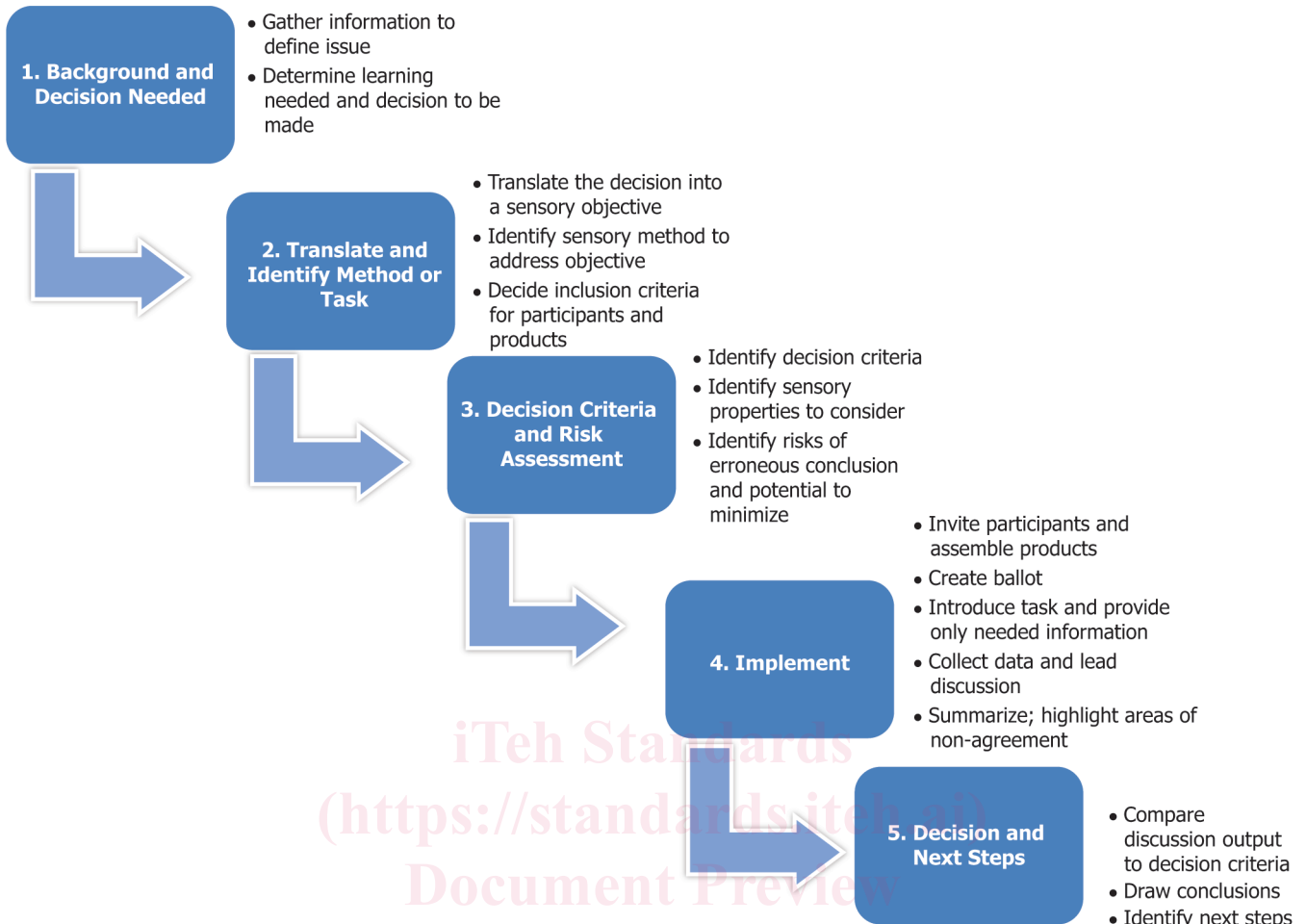
7. ~~Five-Step~~ Five-step Framework for an SGPE

There are five steps to planning and executing an SGPE as shown in Fig. 1.

Step 1—Background and Decision Needed

7.1 *Gather Information to Define Issue*—Before executing an SGPE, an overall objective should be identified with a specified decision criterion. To set an objective that meets the needs of stakeholders, the sensory professional should discuss all relevant background with parties representing different functions. Thorough background investigation enables objective setting that considers all points of view of the stakeholders, their learning needs, the decisions to be made, and next steps. The sensory professional should be sensitive to the issues at hand while remaining unbiased, particularly when an issue has become or has the potential to become politically charged or when certain individuals have a personal agenda. Relevant background includes the business situation, business strategy, product information, and history associated with the issue, including any prior development and testing and feedback from internal or external sources.

7.2 *Determine Learning Needed and Decision to be Made*—Once the background and pertinent issues are identified, the sensory professional, in collaboration with the broader set of stakeholders, can identify the decision to be made or learning needed. The SGPE should provide input to enable making the decision based on independent product evaluations and a majority or consensus result. Examples of decisions from the five broad objectives include: Check-in: “determine whether the reformulated product is ready to move to the next phase of testing;” Narrow-down: “choose products among a larger product set to be included in subsequent testing;” Clarify: “understand consumer complaints to determine next steps;” Describe: “investigate the attributes to be included on a consumer ballot;” and Discover Sensory Dimensions: “identify products that represent the relevant sensory dimensions for a category appraisal.”



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FIG. 1 Steps for Structuring an SGPE

Step 2—Translate and Identify Method or Task

7.3 *Translate the Decision into a Sensory Objective*—Once the decision to be taken is identified and classified within the five broad objectives, the sensory professional should determine the specific sensory question that needs to be answered or task that needs to be completed as well as the appropriate methodology and participants for the SGPE. Sensory questions within the five broad objectives found in **Table 2** may include:

7.3.1 *Check-in*~~Check-in~~—To determine if a sample meets a sensory goal:

7.3.1.1 If the goal is to demonstrate that a sample has or has not changed from a prior version or to determine whether a sensory issue has been addressed, the sensory question may include any of the following:

- (1) Which sample is more (or less) X?
- (2) Are these two samples the same or different?
- (3) How are these samples different?

7.3.1.2 If the goal is to determine whether a sample is ready for further testing or market introduction, the sensory professional needs to determine the criteria that are to be met to achieve that goal. Examples include:

- (1) How different is the sample compared to a reference?
- (2) Is the X defect present in this sample?
- (3) How different is the sample compared with competitor X?

7.3.1.3 If the goal is to determine whether sensory attributes deliver as expected, the question to be asked may be:

- (1) How X is this sample?
- (2) If I described this sample as X, would you agree or disagree?

7.3.2 *Narrow-down*:

7.3.2.1 In cases in which a set of samples needs to be reduced, the sensory question focuses on eliminating samples with redundant, irrelevant, and or inappropriate sensory profiles. Examples include:

(1) Group the samples into sets with similar sensory attributes. Narrow-down can be done by a sorting task whereby participants individually group samples into sets with similar sensory attributes or using check all that apply followed by grouping based on unique attributes, or using more complex multivariate sorting techniques such as qualitative multivariate analysis [consensus sorting of products based on predetermined sensory dimensions with qualitatively defined attributes (Beckley) (4)].

(2) Rank the samples in order of intensity for a sensory attribute.

7.3.2.2 If the goal is to select samples within a desired range of sensory profiles, examples include:

- (1) Eliminate samples that are stronger (weaker) in attribute X compared with a reference.
- (2) Rate the samples for attribute X on a scale.

7.3.3 *Clarify*:

7.3.3.1 When feedback needs to be clarified, a reference sample, if available, may be needed to compare against the sample in question:

- (1) What differences are there between the Reference and Sample X?
- (2) Which sample has more (or less) of attribute X?
- (3) Or, if no reference is available: Would you agree that this sample has attribute X as described from an external source?

7.3.4 *Describe*~~Describe~~—When the goal is to develop a consumer ballot or communicate sensory properties of a product to others, gathering open-ended comments is often appropriate:

7.3.4.1 *For a Food Product*—Document all sensory attributes within the dimensions of aroma, appearance, taste, texture, feeling factors, and aftertaste.

7.3.4.2 *For a Non-food Product*—Document sensory and or functional attributes as relevant to the products under study.

7.3.5 *Discover Sensory Dimensions*~~Dimensions~~—When the goal is to develop an understanding of the sensory attributes of an entire category, the salient sensory attributes should be explored and agreed upon as a first step:

- (1) What sensory attributes are common to this set of samples?
- (2) What sensory attributes would set a sample apart from the others?

7.4 *Identify Sensory Method to Address Objective*—The choice of a sensory method is based on the nature of the task, the products' sensory profiles, and the ability of the participants to complete the tasks involved. Methods range from the simplest, such as recording sensory attributes of one or more samples, to more complex, such as rating, ranking, or sorting samples into categories. No matter the method chosen, best practices for sensory evaluation should be implemented: independent judgments, blind sample coding where appropriate, consideration of the number of samples to be evaluated in one session, appropriate temperature controls, proper rinsing and evaluation intervals, sample evaluation order, potential for sensory fatigue and carryover, minimization of sensorial distractions, and response recording as instructed. Structured ballots are best used for these evaluations. See Sensory Testing Methods, MNL-26 (5).

7.5 *Participants*:

7.5.1 *Number of Participants*—Generally, three to ten people participate in an SGPE. If there are more than ten people, the data collection and discussion can become unwieldy. A larger number of people may not allow all participants to express their point of view. Participation by fewer than three people will not allow a pattern to emerge or a majority to be determined. While odd

numbers of participants make it easier to reach a majority, the absolute small number of participants makes it essential to consider all points of view before making conclusions or a decision.

7.5.2 *Decide Inclusion Criteria for Participants:*

7.5.2.1 The choice of participants is important, as their sensory acuity, prior training, and project background knowledge will affect the outcome. The criteria for including specific individuals in the evaluation session are often based upon all of these. However, in reality, participants in the SGPE may be included based on more mundane realities such as their availability or project participation.

(1) *Sensory Activity:*

(a) Participants may be chosen because they *do* have known sensory acuity for the product attributes under consideration; in this case, there would be a desire to understand the situation from the perspective of highly sensitive individuals (sensitive consumers). Additionally, those with known sensory acuity can act as tie-breakers or may diffuse politically tense situations with an objective view of the sensory properties.

(b) Participants may be chosen because they *do not* have known sensory acuity for the sensory attributes under consideration; in this case, there would be a desire to understand the situation from the perspective of less sensitive individuals (some consumers).

7.5.2.2 Participants' sensory capability and prior training will affect the results obtained. If it is important to notice a particular sensory difference, participants with known sensitivity to that sensory difference should be included. If, on the other hand, it is important to reflect to the general consumer population, participants with a wider range of sensory acuity should be included.

(2) *Prior Knowledge:*

(a) Participants may be chosen because they *do* have prior knowledge or background in the issue at hand; in this case, there could be a desire to have these participants address the issue directly to enable better decision making.

(b) Participants may be chosen because they *do not* have prior knowledge or background in the issue at hand; in this case, there would be a desire to make the decision in the absence of this background.

7.5.2.3 While the sensory professional may have gathered all relevant information, as issues arise during the evaluation, participants with specific product knowledge can aid in answering new product, context, or background questions and may assist in drawing conclusions and reaching consensus. However, product knowledge known in advance may also result in biases when evaluating products. In most cases, best practice is to share the specific product identity or technical information after the independent evaluation is completed.

(3) *Investment in the Outcome:*

(a) Participants may be chosen because they *do* have an investment in the outcome; in this case, it would be important for these individuals to experience personally the SGPE to see how the decision was reached, rather than be informed of the decision at a later time.

(b) Participants may be chosen because they *do not* have an investment in the outcome; in this case, these individuals' outputs are likely to be unbiased and the outcome could be seen as more objective.

7.5.2.4 It is generally advised to invite those individuals who are invested in the outcome so that they can witness the objective steps taken to evaluate the product, hear the discussion, and see how the decision was reached. Alternatively, the outcome can be shared with those invested in the decision in a separate session, either with or without product evaluation; this however, involves an extra step. Additionally, it is recommended that those individuals invested in the outcome experience the sensory properties of the products and hear the group discussion as it occurs.

7.5.2.5 There are additional considerations when inviting participants to an SGPE. Where possible, the sensory professional should be present (see 5.2). The sensory professional may or may not participate in the product evaluation itself per organization protocol but should instruct the participants as to the task at hand and lead the subsequent discussion. If there are individuals within the organization that have the power to override or ignore the group decision, these individuals should be invited to the evaluation session. The goal of including these individuals is for them to have firsthand knowledge of how the results and recommendations were obtained.

7.5.2.6 Individuals that cannot follow directions or participate in a discussion without emotion should not be included in the evaluation. The sensory professional should learn who the stakeholders are for the issue at hand and whom to invite or exclude from the evaluation session.

7.6 *Decide Inclusion Criteria for Products:*

7.6.1 Products included in the SGPE should meet specified criteria. For evaluations to assess whether a sample has met a sensory goal (Check-in), the prior product version(s) should be included, if available. When the goal of the evaluation session is to clarify external feedback or decide whether a sample contains a defect (Clarify), inclusion of a control product, if available, or in-market products may be useful, including competitive products as well as products with and without defects, depending on the specifics of the feedback. For describing sensory attributes, before construction of a consumer ballot or for communicating with another party (Describe), the range of products that the ballot or communication is to cover should be included to ensure complete attribute selection. For discovering sensory dimensions (Discover Sensory Dimensions), a range of products sufficient to represent the variation in sensory attributes typical for the category should be included.

7.6.2 The inclusion of additional products may be helpful in illustrating differences/similarities between those and the product(s) in question. These may include manufacturing samples from the same or different plants, pilot plant or benchtop samples, retail

samples, differently aged samples, or competitive products. In the case in which a sample is being compared to a labeled reference, it may be useful to include a blind control. In all cases, the sensory professional should consider the impact of adding additional samples to the evaluation set.

Step 3—Decision Criteria and Risk Assessment

7.7 Identify Decision Criteria:

7.7.1 The decision criteria refer to the measures that will determine the sensory conclusion. Without these, the output from an SGPE cannot be effectively used to address the decision that needs to be made. The fewer criteria, the better. Having multiple criteria increases the chance that products fall short. Below are examples of decision criteria:

- (1) Majority rules,
- (2) Trends or patterns of responses,
- (3) Alignment after discussion, and
- (4) Some combination of the above.

7.7.2 Decision criteria need to be specified in advance of conducting the evaluation. The sensory professional is typically responsible for setting the decision criteria and communicating it to participants. It should be stated that there will be times when the decision criteria are reconsidered by comments or reasoning by one or more participants during the discussion portion of the product evaluation session. While decision criteria should not be changed without a rationale, a participant may make a compelling case for a course of action that is not aligned with the predetermined decision criteria. For example, prior relevant research could be recalled or new information discussed to reframe the issue under consideration. While it is incumbent on the sensory professional leading the SGPE to obtain all relevant background, it is recognized that there will be times when pertinent information is revealed during the SGPE.

7.8 *Identify Sensory Properties to Consider*—It is important to identify those sensory properties that will impact the decision and those that may be ignored in the evaluation session. For example, if the goal is to eliminate products with redundant flavors, appearance and texture attributes may be excluded from the evaluation. Or, if a Check-in is limited to appearance of a food product, it may be unnecessary to taste the samples. If aroma in package is the focus of a skin care cream evaluation, it may not be necessary to apply it to the skin.

7.9 Identify Risks of Erroneous Conclusion and Potential to Minimize:

7.9.1 In the preparations for an SGPE, the sensory professional should openly discuss risks and limitations with the stakeholders or other relevant parties before implementation. Both decision risk relevant to the use of company resources in research and development (R&D) as well as the business risks need to be clearly stated and directly discussed.

7.9.2 Risks are present in any testing or evaluation scenario. When formal product testing involves the formulation of hypotheses and statistical inference, risks can be quantitatively specified and addressed through participant sample size and size of difference to be detected. In the case of an SGPE, the information collected and decisions made are based on small numbers and formal statistical analysis is not conducted. Thus, risks cannot be specified numerically. However, while the nature of risks remains the same, the risks associated with an SGPE are different from those of a trained panel or appropriate consumer test. For issues of difference/similarity (typical of Check-in or Narrow-down objectives) and product inclusion/exclusion in a larger sample set, risks fall into two general classes: (1) falsely concluding that differences exist or are meaningful, and (2) falsely concluding that differences do not exist or are not meaningful. For issues of identification of typical category attributes (typical of Clarify, Describe, and Discover Sensory Dimensions), there is a risk of missing relevant attributes. There may be a risk of inclusion of attributes that confuse consumers when the goal is to describe.

7.9.3 Despite the inability to specify numerical risks, there are ways of minimizing risks associated with decision-making in small group settings. These involve understanding the importance of the product to the organization; review of all relevant data and background, including the appropriate participants; and identifying in which direction the risk is more acute: missing a real or important difference or identifying a false or unimportant difference. The more important the product in question is to the organization and the decision to be made in an SGPE, the more important it will be to minimize decision risk.

Step 4—Implement

7.10 Invite Participants and Assemble Products:

7.10.1 Invite participants that meet criteria determined in Step 2.

7.10.2 Assemble the products that meet criteria in Step 2.

7.11 *Create Ballot*—The ballot, used to record responses to the samples, should be simple and focused around the issue at hand to enable efficient collection and collating of responses. Items, such as binary responses, “yes”/“no” “agree”/“disagree”, “yes”/“no,” “agree”/“disagree,” and “same”/“different” are good options. These binary responses can easily be tabulated by means of counting (5). If using a Check-in evaluation to discriminate between samples: “determine if Product A is different from/similar to Product B,” “determine if Product C is sweeter than Product D,” or “determine which among these products is closest to the benchmark,” many discrimination methods are available (for example, Test Methods E1885, E2610, E2139, E3009, or E2164 as examples of proper discrimination test execution; as previously stated, statistical hypothesis testing in an SGPE is not recommended). To narrow down a sample set, which involves eliminating redundant sensory profiles and extreme outliers, sorting,

ranking, or scaling methods may be appropriate (6) as well as simple, open-ended questions (“write down all perceived flavors in these samples”). If attribute scaling is needed, simple category scales are recommended, minimizing the number of categories. Hedonic scales should not be used in an SGPE as a small group of employees would not be representative of the relevant consumer group. For some objectives (such as describe or Discover Sensory Dimensions), collecting open-ended comments may be the best approach.

7.12 Implement—Once the sensory method has been identified, the sensory professional should set the context for the evaluation, deciding how much background and objective information is to be shared with participants. This includes a general discussion of the issue at hand and identifying the sensory criteria that are relevant to the sensory question to be answered. While too much or inappropriate information may bias the evaluation, the simple instruction to “taste these samples” or, in the case of non-food items, “evaluate these samples” is generally not sufficient to focus participants’ attention and should be avoided. For example, the sensory professional should tell the SGPE participants what type of products they will be tasting and, broadly, what decision will be made. Further, instructions should indicate how many products will be evaluated, in what order, and on what the SGPE participants should focus. The reveal of the product’s identity should be provided at the end of the independent evaluations and after the discussion. If it is necessary to reveal the product identity before the start of the evaluations, then the sensory professional and participants should understand that the outputs will be based on more than just the sensory experience. Post evaluation, more information about the objective and further discussion of the risks may ensue as participants focus on both the numerical and qualitative data. It is up to the sensory professional to decide the balance between not providing sufficient information to set the context for the evaluation and providing information that may bias the participants.

7.13 Collect Data and Lead Discussion:

7.13.1 The sensory professional introduces the task and decision criteria or learning needed to the participants. Specific evaluation instructions should be provided and standard sensory practices should be used for the evaluation session (6). Participants should be exposed to and evaluate products in the same manner. Samples should be evaluated independently with product evaluation order balanced to the degree possible, unless a specified order of evaluation is appropriate for the task. If, for example, samples vary in the level of spice/heat, it may be appropriate for all participants to evaluate them in order from least to most heat. Samples may be evaluated in logical subgroups as appropriate. Inclusion of duplicate samples that have been blind-coded may be included as needed to manage bias. Responses should be recorded independently.

7.13.2 After the independent evaluation is completed, the sensory professional solicits responses that have been recorded. The sensory professional, those more familiar with the products, or those of high rank in the organization should give their opinions at the end of the responses to avoid biasing or intimidating other participants.

7.14 Summarize and Highlight Areas of Non-agreement:

7.14.1 The sensory professional tabulates the responses in real time to identify if there is a majority response or a pattern in the responses. If there is, these results are compared against the predetermined decision criteria. The results are summarized and the outcome is provided. A discussion should take place even if there is agreement to ensure that all rated and open-ended responses are considered. As previously stated, participants’ hedonic opinions are not relevant to the discussion and should be discouraged. However, participants should be encouraged to speak from the consumers’ point of view, if known (“we know that younger moms believe that when diapers are very soft, they are less absorbent” or “the core consumer of this product does not like spice/heat and these products are all quite spicy/hot”). The leader should have some familiarity with the ways in which small groups operate, their benefits and disadvantages, group dynamics and methods for coming to agreement and handling disagreements. See Chambers (7) for a review of these topics. While Chambers deals mainly with discussions arising from descriptive analysis with trained panels, the principles apply to other situations where group dynamics are in play.

7.14.2 The sensory professional needs to be prepared for an inconsistent pattern in the responses or lack of agreement in the discussion. Lack of agreement may be due to: (1) differences in sensory sensitivity among the participants, whereby some discern differences and others do not; (2) product differences that are too small to be reliably detected, particularly with a small group; (3) lack of consensus in the use of sensory descriptors; (4) lack of consensus in the determination of the size of differences between products, or (5) use of a heterogeneous group with differences in training or exposure to the products.

The reason for the lack of agreement may not be clear. In any case, the subsequent discussion should include the following options: (1) follow up with another SGPE or formal testing if the hypothesis is that an effect may be present but not discernible in the SGPE, (2) proceed as if differences were not found, if business risk in missing differences is low, or (3) proceed as if differences were found, if missing differences results in a high business risk.

7.14.3 It may be useful to conduct two rounds of evaluation, one in which sample differences are not identified and a second round in which sample differences have been identified. The first round is without context, while the second round is with context. This may aid in understanding the size of the differences and their relevance to typical usage. The inclusion of analytical or other relevant sample information may aid in reaching conclusions. If one participant’s opinion may sway the decision, a robust discussion should ensue to ensure that no single person drives the decision.

Step 5—Decision and Next Steps

7.15 Compare Discussion Output to Decision Criteria and Draw Conclusions—Patterns in the numerical responses and the subsequent discussion are summarized and compared to the decision criteria. Similarity in numerical and open-ended responses