

**OMB Control No. # 0693-0033 – National Institute in Standards and Technology Generic Clearance for Program Evaluation Data Collections**

A Standard Framework for Composable Information Flow Modeling to Characterize the Sustainability of Product Manufacturing

**FOUR STANDARD SURVEY QUESTIONS**

**1. Explain who will be surveyed and why the group is appropriate to survey.**

Survey participants will be industry representatives from small to medium size manufacturing companies. This group participated in prior roundtable meetings with the research team examining the topic of advancing sustainable manufacturing through improved manufacturing metrics, measurement methods, and process modeling.

**2. Explain how the survey was developed including consultation with interested parties, pre-testing, and responses to suggestions for improvement.**

The research team from Oregon State University (OSU) and National Institute in Standards and Technology (NIST) developed the survey questions based on input from a series of roundtable meetings. Initially, OSU researchers developed two alternative sets of survey questions and received directional input from NIST researchers. The OSU team revised the questions iteratively with NIST to arrive at the final set. Due to the small number of participants, no pre-testing was conducted in order to preserve statistical significance of the final survey results.

**3. Explain how the survey will be conducted, how customers will be sampled if fewer than all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.**

The link to an online Qualtrics survey will be distributed via email to the 31 participants from the prior roundtable meetings. No others will be targeted. The expected response rate is high (67% or better), given the low number of participants and targeted group. The survey will be open for two weeks to participants, after which a personal reminder email will be disseminated granting one extra week if the response rate is low at the two-week mark. The survey is part of a larger study conducted over 18 months where industry participants were invited to take part in roundtable meetings with NIST and Oregon State researchers present. One part of the roundtable meetings asked participants to brainstorm perceived barriers and recommendations for improvement within the sustainable manufacturing domain. This survey presents the results of that brainstorming session for rating by

participants based on the severity, or perceived importance of each barrier and recommendation. Thus the topics will be familiar and relevant to survey participants.

**4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.**

The survey questions are posed based on a Likert scale. Thus, the mean, median, and mode for each question will be calculated, as well as standard deviation. Furthermore, the desired/ expected response rate (67%) was sourced using a z-normal distribution. Out of 31 total survey participants, 21 are required to respond in order to meet our initial assumptions (confidence interval=95%, margin of error = 5%, and assumed mean = 0.5). Analysis will be done using Qualtrics, as well as in Excel. The statistical results of the study will not be generalized to the larger population than the roundtable participants, as that is not the intent of the study. Rather, the study results aim to strengthen the wider findings of the study and to clarify future avenues of research.