

How to engage a diversified model developer community towards the same ultimate goal?

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Question #1: Concerned about using surface potential vs. charge based model for sub-100nm nodes?

- “Don’t really care”
 - However, “Vt” based model is not an option
- But - - -
 - Model must be physical
 - To support targeting before process maturity and process skews
 - Applicable for technology assessment and lead product design
 - Model must accurately fit data and process variation
 - Support stable design for “non-lead” products
 - Support “copy exactly” technology transfer to manufacturing
- Model based on either approach can meet the requirements
- There are other more critical modeling requirements
 - Novel device structures, process variation, layout dependencies, etc.

Question #2: How many models we need - one standard model or more than one?

- One standard model is “clearly desired”
 - Unless a single model meeting all requirements does not exist
 - “Same” model characteristics across all EDA simulators
- Requirements
 - Should adequately meet all existing design requirements
 - Must be extensible
 - Should enable collaborative development

Question #3: What will be support issues for more than one model and will foundries support it?

- Will lead to duplicative model files and should be avoided
 - Different simulators are being used by different product groups or even within a given product group
 - Multiple models open the door for requesting multiple process files on the same technology
 - Lead to wasted CMC and company resource on model qualification, model support, and model file generation
 - May also lead to miscommunication in design if not all models are implemented in all EDA simulators
- Will foundries support multiple models?
 - Not preferred but will (???)

Question #4: What interaction the design community would like from model developer for better understanding of the model?

- Model parameters should be generated with design community as a partner – no perfect model will exist!
- On-line documentation on model usage
 - Physical phenomena and mapping to model modules
 - When and what model features should be turned on or turned off for accuracy/performance trade-off
 - Parameters for studying circuit sensitivity and relation to process and layout – variation becoming more important!
- Validation data from model component to circuit-level
 - Spell out the boundaries for model validity

Question #5: What does it takes for model to move from academia to industry?

- CMC to establish a “collaborative” model framework
 - To enable research in academia as a team but each with distinctive focus
- “*Formulation*” must be physical
 - To support process targeting and process skews
- “*Formulation*” qualified on data from measurement or numerical device simulation
 - Accuracy and adequate process coverage
- Demonstrated parameter extraction
 - Automated extraction with a clear methodology
- Approved/adopted by CMC

Question #6: Do we need “Standard Model” or “Model Standard”?

- Bottom line: “Standard Model” is needed
 - Insufficient expertise/resource for developing proprietary models and simulators at most companies
 - Companies with proprietary models/simulators also use EDA tools for design and external communications
- Should also establish base-line “Model Standard”
 - To enable effective collaboration among model developers
 - To enable proprietary model implementation into EDA simulators
 - Scope:
 - Model structure
 - Interface to simulator