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# Trends in Member Feedback on GRC Portfolio 5 Years Out

Summary for Summer Study Session 1

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# Fundamental Issues

- Different member companies have different businesses
  - How can GRC provide value to members with different business models – IDM, Fab-lite, Foundry, Equipment/Material/EDA Supplier, Fabless? – individually while maintaining a true consortial portfolio?
- IC Makers are changing their focus from scaling to product differentiation / functional diversification at different points along the roadmap – major rolling industry inflection point!
- Trend toward efficiencies – addressing cost, yield, variability, reliability – how will the character of research change – impact on attractiveness of semiconductor industry to PhDs with focus on technology?
  - How to show that innovation required for efficiencies is also good focus for universities
- Suppliers have to provide current solutions and choose where to invest for the future across above customer spectrum
- The various SRC research modes have specific charters, but a broad spread of program foci within each
  - How best to position each entity / research topic for rational programs given limited resources base? (... given also membership differences)
  - FCRP recompete might change things...

# Some Ideas to Start

Input from AMD, Freescale, GlobalFoundries
IBM, Intel, Mentor Graphics, TEL, TI

- Find ways to turn divergence into partially overlapping interest
  - Where is common ground? What are the clusters of interest?
- Need to have discussion of how much overlap is appropriate with FCRP for
  - NC-CMOS, NVM
  - 3D, BEP, Packaging
  - Very broadly, design technology
- Right place for ERM among GRC, FCRP, NRI?
- Need balance in focus for digital and analog / mixed signal
  - DS modeling
  - BEP (e.g. passives)
- Multi-core [and for that matter scaling and functional diversification] are all part of larger context of heterogeneous computing
- Support for functional diversification
  - e.g. interconnect centricity vs. just device, memory integration as well as logic, sensors, MEMS, heterogeneous integration...
- DSA is opportunity for academic contribution, but budget is already large and there are questions as to viability of e.g. Carbon-based interconnect structures
  - Consolidate under NMS?
  - Sustain rather than grow?

# Possible Approaches

- Zero Sum = hard choices
  - Possible to agree across all member interests to give up in enough areas?
    - With growing interest in system design/CAD, may need to curtail verification, physical/logical design and test
    - Reduce DSA for patterning to fund increase in e.g. design?
    - Areas like CNT devices that have been shown to have limited potential in order to focus more on things like graphene or III-V
- Possible approaches to address balance issues:
  - Cross “party lines”
    - Incorporate embedded A/MS into digital thrust
    - Digital circuit approaches to A/MS functions in A/MS thrust
  - Specialize: e.g. consolidate design tools in one place vs. spread in all design centers and SAs to free up resources elsewhere to address balance in remaining areas
- Address overlap with strategy to move focus through the research modes
    - Associate overlap with transfer from e.g. FCRP to GRC
    - Joint programs to initiate migration (*a la* FEP-RC from SRC to SMT)
- Change framing to broader issues and disciplines across areas
  - Cost reduction
  - Low power
  - Modeling, tools
  - Increase cross-thrust efforts
- Addressing design complexity (and software integration challenges in introducing products) seem increasingly to be common ground...

# Other Questions

- Define criteria: how many companies, how much budget constitute an area of overlapping interest?

- Are there focused topics or topics with time scales that the GRC can avoid and for which the FCRP can be responsible?

...Or ...

- Should we list focused topics or topics with time scales that the GRC can avoid in the core programs and for which the FCRP could be asked to be responsible?
  - (RCP should allow projects whether the topic was in the Focus Center or the GRC).

- Should the ESH center be moved to a different (higher) level of the SRC and should its charter be expanded? (to include packaging and 'electronics reclamation'? )

- Are there very specific topics that we like, that would help us recruit members that we would like to have join?