Partnering With EDA Vendors: Tips, Techniques, and the Role of Standards

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Abstract—Tips and techniques for EDA users partnering with commercial EDA vendors, including an examination of the critical role that standards play in a successful partnership. With an explicit buy-if-available bias assumed for the commercial EDA user, partnering strategies are compared with contract development, in-house development and wait-and-see/do-without strategies for functionality not commercially available.

1. Introduction

This paper is intended for CAE managers, CAE professionals, Design managers, and any engineer who has had to answer the question "I have a tool set, legacy libraries, and legacy designs that could form the basis for my new product sub-assemblies: how do I leverage this 'sunk cost' base and satisfy my product quality, cost, and time-to-market requirements, when I need to solve design problems that commercial EDA tools don't address today." EDA vendors may also benefit from the paper but the focus is the challenges of successful partnership from the customer's perspective.

First, some definitions for partnering and its alternatives: contract development, in-house development, and wait-and-see/do-without.

Partnership implies a relationship between two or more parties, in which each has equal status and a certain independence but also implicit or formal obligations to the other or others. The American Heritage dictionary defines a partnership as a "contract entered into by two or more parties in which each agrees to furnish a part of the capital and labor for a business enterprise, and by which each shares in some fixed proportion in profits and losses." An EDA partnership typically has both parties contributing knowledge as intellectual property and part-time or full-time staff.

Contract development implies that the customer defines unique or specialized solution requirements and pays the full cost of development, retaining ownership.

In-house development implies the development of a solution, using in-house staff and equipment or incrementally added permanent headcount.

Wait-and-see/do-without (probably the most common strategic alternative to buy-if-available) implies that the problem is not addressed directly with resources or initiatives. This is commonly the result of other problems/functionality receiving higher priority, low or narrow benefits accruing from a solution, or triage.

Second, the 90's reality for EDA is a paradigm shift away from a single vendor's turnkey or engineering-workstation-based solution to environments that must encompass:

- Multiple EDA software vendors
- In-house tools
- Multiple versions of Tools
- In-process designs relying on different tool versions
- Multiple hardware platforms and operating systems
- Proven standards for EDA
- An active evolution of standards for EDA

Finally, four key techniques for partnering I hope you take away from this paper:

- Start with an assessment of where you are and where you need to be in the next six to 18 months (the rate of change in silicon, computing, and EDA technology renders detailed planning moot beyond this horizon).
- Be clear on inputs and outputs: what do you expect the EDA vendor to contribute to the partnership, how will you be measured on the results of the partnership, and how you will measure the EDA vendor.
- Since a partnership is sharing of costs and benefits, understand what the EDA vendor expects you to contribute and how they will measure the benefits and success of the partnership.
- Stick to EDA industry standards for a successful partnership: they are the basis for
the vendor to extend the solution beyond you as just one customer and for you to enhance the solution with other vendors.

2. How are you measured?

Whether you are a Design manager, a CAE manager, or working in CAE support your contribution will be assessed both objectively by numerical measures and subjectively by the satisfaction level of your users and management chain. A successful partnership defines and delivers contributions to both objective and subjective measures on an agreed-to schedule.

The following laundry lists may be useful in explaining to the vendor how you are measured and how you will measure the benefits of the partnership:

• Typical Objective Measures
• Expense Dollars budgeted and spent
• Capital Dollars budgeted and spent
• Headcount, Full Time Equivalent
• Quantity and Quality of designs
• Design Cycle time

Typical subjective satisfaction measures
• Key problem from user perspective of environment
• Project After-Actions with vendor
• Downstream organizations included in assessment
• Formal repeated assessment of tools and design flows
• Number of designs released to production
• Learning curve for a new engineer or a new tool
• Current productivity of the average engineer
• Alignment of efforts with key challenges that senior management views as facing the organization.

A partnership will typically require less expense and capital dollars than contract development since the vendor can expect to explicitly recoup costs over more than one customer, will typically involve less internal headcount than in-house development since the vendor is providing headcount that you don't have to (and may also involve a variety of specialized personnel not on your staff and not needed on a permanent basis). The wait-and-see/do-nothing strategy will have the least impact on your budget but will obviously yield no improvements except indirectly from other initiatives; this strategy is likely selected as a result of a cost-benefit triage process.

3. Assessing where you are

Assess new partners and the replacement of current partners in the context of your existing relationships. The need to replace partners may be driven by their failure to meet current commitments or an inability to satisfy required capability enhancements. The following different types of existing partners form the context for evaluating current or new EDA partners: standard product part suppliers, ASIC/FPGA/PLD suppliers, foundry library supplier, and EDA Software suppliers. You should review with each existing partner the following key questions:

• What are problems with your current offering?
• What are the your plans to address these problems?
• What should other current partners do to save you time, money, or rework?
• What can I do as a customer to be a better partner?

Assess new partners or the replacement of current partners in the context of your current knowledge--which of your "have-dones" can be reliably translated into "can-dos." In an EDA partnership some of your knowledge will be on the table as intellectual property to be shared. In a contract development relationship it may either enable a superior ability to define your requirements or require confidential handling so as not to compromise a key competitive advantage. Your knowledge base also determines where you bring the greatest advantage to in-house development efforts, especially if it's unique to your staff and encompasses a significant portion of the problem. Low knowledge or gaps in knowledge can sometimes drive a wait-and-see/do-nothing strategy when, in fact, what you don't know can hurt you. A knowledge gap can also drive a partnership strategy when you can explicitly fill it with the vendor's knowledge or a contract development strategy when you realize you don't have the know-how but don't believe that it is important for you to acquire.

4. Where do you want to be in 6-18 months?

Use the development of a technology roadmap as opportunity for joint planning and mutual expectation setting between CAE, Design, Manufacturing, and management. Focus on the design tool requirements for the product generation after the one currently in active
development. This technology roadmap can then be compared against capability roadmaps from current and potential partners. Some questions to answer in drawing a roadmap:

- What will the proven design flow be: what the results should the average engineer routinely achieve?
- What will the emerging design flow be: what results will early adopters achieve on their second design?
- What will the worst case design flow be: what root causes of severe design errors or frequent design errors will be eliminated? What will remain?
- What defects should be caught in design reviews, in prototypes, in pilot production and in volume production?
- Which rate limiting steps in the design flow will be eliminated? Which new ones will be promoted?
- What is the evolution of design scope: what will design size, speed, complexity, and density be?
- What manual data preparation or redundant data entry will be remain (include downstream functions)?
- What manufacturing design rules or test requirements will be verified by eye?

From an EDA tool oriented perspective either a partnership, contract development, or in-house staff can provide documentation, training, bug fixes, minor enhancements, and new functionality. Trade-offs between each strategy can be evaluated as follows:

Documentation for the bulk of the functionality is typically provided by the vendor—every customer needs it; some local customizing may be done by in-house staff or under contract if it satisfies unique needs. If basic documentation is unusable you should probably select a new partner as this will have repercussions in product specification and quality; be careful that early adopters are much more forgiving of documentation problems than the majority of users.

Training is similar to documentation except that it may make sense to contract or bring in-house the delivery of on-site training if users travelling off-site has a high cost.

Bug Fixes are typically covered under a software maintenance agreement as a part of the partnership. If your EDA vendor has not made satisfactory progress on bug fixes it may make sense to cease software maintenance, apply the budget to contract for work-arounds and in parallel work on tool replacement. In-house work-arounds are also very common but run the risk of diverging from the vendor's development trajectory if they are not immediately fed back into maintenance and feature releases.

Minor Enhancements are similar to bug fixes except they may more profitably be contracted or developed in-house if they are unique to you; these also run less risk of diverging as the vendor may not intend the product to be extended in the manner contracted/in-house developed. To support both near term bug fixes and minor enhancements it may also make sense to request major functionality: a supported macro language and an application programming interface that supports both read and write access to the underlying design data. Any contracted or in-house development can then be done in the API and be buffered from the changes in the tool as it evolves.

New Functionality, if it can be expressed at an industry standard level, is best handled with a partnership. Otherwise the trade-offs between contracting, in-house development and wait-and-see outlined in section 3 apply. What to expect from an EDA partner? Expect your EDA partner to provide training, documentation, application support, consulting, bug fixes, minor enhancements, and major new functionality, subject to the trade-offs analyzed in section 4.

Expect your EDA partner to understand and contribute to improvements in the areas where you are measured by your users and management. Vendor should: Provide timely and accurate information for your objective measures. Assist your internal sales efforts to users and management; set expectations appropriately and then exceed them. Make an impact on the problems that senior management views as the key challenges facing the organization.

Expect your EDA partner to endorse, support, and rely on industry standards and standards efforts. Vendor should:

- Link integration efforts to standards (e.g., EDIF, CFI, VHDL, OVI), reducing the risk that a new release will scramble your framework with other vendors.
- Offer solutions based on standards.
- Be active in standards efforts.
- Use this as an opportunity to work with other vendors on interoperability, instead of forcing
communication through a customer and integration at a customer site.

Expect your EDA vendor to be candid about the benefits of the partnership and the nature of the vendors special value or competence: a commodity partnership will focus on business and integration requirements, with the value-add provided by companion services; a technology product partnership will focus on end-user feature requirements and integration needs, with the value-add provided by the successful introduction of new functionality into production designs. Example 1994 commodity products: Schematic Capture; Logic Simulation; Verilog and VHDL simulation environments; Manual editor for PCB Design. Example 1994 value-added product: System Level Design Entry (ESDA); Models for Timing and Signal Integrity Analysis at Board Level; Partitioning Tools for mix and match of multiple PLDs, FPGAs, and ASICs.

6. How customer should measure vendor

Agree in advance on how you will measure the benefits of the partnership and how you will communicate about problems in the partnership:

- Define how the vendor will verify any deliverables prior to shipment.
- Define the acceptance tests you will use at each stage of development and for final delivery, make as many of these as possible available to the vendor to limit confusion and increase understanding.
- Keep your own log of problems and review it periodically with the vendor.
- Agree up front on how problems will be escalated. Limit the number of internal people who can call the vendor directly and/or create a special second level escalation for qualified expert users.

Agree up front on how you will each provide feedback and periodic assessments of the personnel assigned to the partnership directly or whose support is integral to success. Personality conflicts and a lack of trust can derail a partnership in minutes. Ensure that you and the vendor are aligned on how you will work internal people issues at both companies and that visible commitments are made to each other's success. The attitudes of both companies personnel does as much to shape perceptions of the partnership as any objective measures of progress, care must be taken to periodically assess the perspective of everyone directly involved.

Agree up front on which standards are key to the success of the partnership and why. A starting point can be an assessment of how well your vendor performs in the top 3 areas identified in the 1993 USE/DA Standards Survey:

- How well do they support standard interchange formats for data exchange (static/file)? Can you exchange data with other vendors?
- How well does the vendor support standard interchange formats for Inter-tool communication (dynamic)? Can they interoperate with other vendors?
- How well do they support for standards for High Level Design simulation languages? Are they OVI and VHDL compliant? Can you exchange models and designs with other vendors?

7. What does EDA vendor expect from the partnership?

Benefits that an EDA vendor expects to accrue from a partnership include:

- Revenue from initial license purchase, follow-on licenses, and maintenance. Note that this number is re-evaluated at least once a year if not quarterly.
- Customer endorsement confers prestige on vendor, if the customer is generally perceived to be technically sophisticated.
- Customer ultimately acts as a reference account, at least for a market segment.
- Baptism of fire for new tools: guidance on tool features based on real world concerns and constraints.
- Learning from you: you must plan in detail how they will learn from the partnership. If the vendor is cut off from learning they will never gain or soon lose your perspective.
- Vendor application and support staff is exposed to real problems on real designs under real deadlines.

Probably the largest single leverage point you is facilitating better communication, cooperation, coordination among your current partners to achieve a win-win-win situation. This capability to foster wider cooperation can be a significant customer contribution to an existing partnership.
Some techniques for getting your partners to partner include:

- Openly communicate of problems that fall in cracks between vendors, with each vendor given all of the information.
- Openly communicate your plans and anticipated requirements and ask vendors to share what they can in meetings you host.
- At least annually gather vendors together in one room to review what they each can do to reduce the others costs, time to market, or rework.

8. Conclusions

Two analogies and a word to the wise to help put EDA partnerships in perspective.

Silicon architecture analogy: Look at your EDA acquisition as equivalent to selecting a VLSI part or silicon architecture. If the tool does not accept and support recognized standards for data interchange and tool interoperability then it's like putting a part on the board with unique functions and pinouts; your system will require significant redesign if it doesn't work out. Selecting and designing in vendors who support recognized standards allows you to switch easily to other form/fit/function replacement tools, some of which may not have been written when you entered into the partnership.

Marriage analogy: is misleading, an EDA partnership may be described as finding a software supplier with a core competence in the problem area who is committed to interoperability in your in a multi-vendor environment, not "forsaking all others, for as long as you both shall live" but agreeing to share costs and rewards along an axis of advance in EDA Technology.

A word to the wise: it is vital that you align your incentives with those of the vendor. Examples abound of vendors starting and then cancelling a new initiative once easy or continued profitability was unavailable to them. The last ten years are littered with tools that vendors either discontinued as no longer profitable or raised the maintenance and service fees to where they could compensate for lack of sales. The latter frequently occurs after a merger or acquisition. You want to select partners who can and must be successful in the area(s) where you intend to collaborate.