RENAISSANCE
SERVICES

Supply Chain Collaboration: Achieving Success in a Dynamic Environment

White Paper

January 13, 2013

1825 Commerce Center Blvd
Fairborn, Ohio 45324
937-322-3227
www.ren-rervices.com

Supply Chain Collaboration: Achieving Success in Dynamic Environment

Executive Summary

It is an acknowledged fact that over the past decade, most aerospace and defense companies have significantly changed their make/buy philosophy. There are numerous drivers, including fewer major Defense programs, efforts to reduce costs in a global market place, and attempts to emulate the automotive Lean movement. This has led aerospace primes and OEMs to move from a vertically integrated capability to a systems integrator approach. The result is that companies have shifted from roughly a 50/50 make/buy ratio, to one approaching 20/80.

The natural expectation from this shift was to view the newly expanded supply chain as part of an "extended enterprise." In theory, these suppliers became partners in a collaborative environment, working closely with the system integrator to design and build high performing, highly affordable products. Perspectives on these collaboration models and their success vary—and the variance of opinion is often driven by a company's position in the extended supply chain.

Changing dynamics in the aerospace market place in recent years—a poor overall economy, inability to obtain credit, rising material costs, consolidation of some companies, and outright failure of others—have caused the large system integrators to rely on fewer "partner" suppliers. Moreover, these partners are generally at the top tier of the supply chain, with the expectation that they will administer the second, third, and lower tier suppliers in the interest of the system integrator. In essence, the entire game that was envisioned just few years ago has changed. While many of the changes were well-intended and done for strategic reasons, the notion of fostering an ongoing collaborative environment is only as good as the practices and tools available to assure that the environment yields the expected results.

This white paper describes best practices for fostering a successful collaborative environment—both culturally and through application of selected tools.

Supply Chain Collaboration

A fundamental question is "what do we mean by collaboration?" For some primes/OEMs and their suppliers, it is nothing more than business as usual: the OEM provides a design and says "make it … and at this price." A more enlightened view has the supplier working early in the product lifecycle with the prime/OEM to suggest ways that the design can be made better for less money. A seemingly more progressive vision has the system integrator entrusting large portions of the design to the supplier, encouraging the supplier to deliver highly producible, affordable hardware based on a performance specification. In their own way, each of these approaches seeks to leverage the supplier's core competency in order to get the best hardware at the lowest cost.

Assuming that the supply chain collaboration vision is not the first one described above, there are ways to fully leverage the collaborative experience to the mutual advantage of the prime/OEM and the supplier. Whether for build-to-print or supplier-designed products, there are ways to foster a business culture and apply selected tools that will result in high-quality affordable hardware.

Setting expectations is a basic first step. Who is in charge of the supply chain? How will the collaborative process work? What are the metrics that will determine success? There are plenty of anecdotal examples of how not to do it:

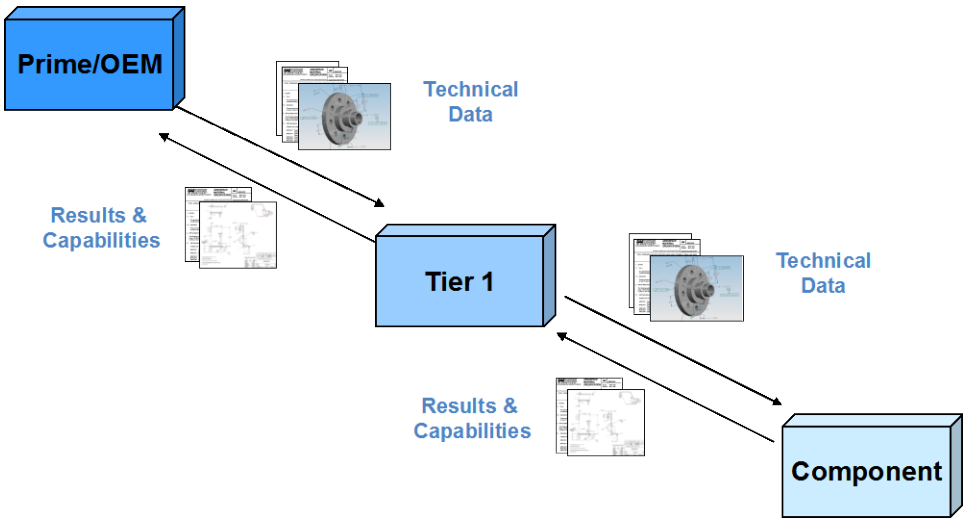
- During a supplier conference, a senior executive at one prime/OEM was asked how his overall supply chain approach—of placing the preponderance of responsibility on the suppliers—would work. He replied, "Our company's job is to sell, design, assemble, and deliver great products. Production and delivery of parts is now the responsibility of the supplier, as they would manage all of the contractually flowed down requirements." That program is now several years behind schedule.

- At another presentation for a major military program, an executive for the system integrator described how all of the responsibility for the supply chain would reside with the first tier. When asked how much visibility he had into the second and third tiers, he replied without hesitation, "none." It seems his primary metric was avoiding contractual protests. After a lengthy history of overruns and schedule delays, the program was cancelled.

Recent experiences with major military and commercial programs reveal that despite the efforts to make a new and improved supply chain, a few key ingredients were left out of the recipe. As the anecdotes cited above indicate, assuming that the ownership of the overall product and multi-tiered supply chain would naturally pass to the tier one supplier did not happen. These first tier, "partner" suppliers were expected to become design engineering sources, supply chain managers, and deliver in real-time to a master schedule, while possessing the real-time tools, processes, and visibility to manage this new, expanded and ever-changing supplier network.

Even the casual industry observer is aware that the hands-off, let-the-first-tier-handle-it approach has been less than successful. The primes/OEMs have been forced to re-engage, and are now scrambling around the globe or camping out on-site, not just expediting parts or solving problems, but struggling to make sure that the most basic paperwork and traceability data exists. Major cost overruns and delivery delays are attributable to this lack of supply chain visibility and true disconnect.

Regardless of the way a supply chain is constructed, it is about relationships—buyer/seller, designer/producer, sender/recipient, and any number of other combinations. The one thing all of these relationships have in common is requirements and results. A prime/OEM has a set of requirements that are flowed to a supplier. It can be a first tier supplier responsible for a large segment of the supply chain; the first tier supplier may in turn send some or all of these requirements to a group of lower tier suppliers. For their part, the suppliers are expected to provide results that satisfy the requirements, typically in the form of a product and the supporting documentation that accompanies the product.



It is how this requirements and results relationship is managed—first culturally and then through application of selected tools—that determines supply chain success. There are five factors, whose consideration will improve the collaborative experience, make the supply chain function smoothly, and lead to tangible cost reductions.

1. Be selective—collaborate only on the parts that really need it
2. Establish a climate that promotes trust
3. Engage the right resources—engineering and business
4. Provide clear requirements
5. Apply tools and methods to make it happen

A closer look at each of these will provide insight into their application.

1. Be Selective

A system integrator provides value through a clear understanding of the system, its constituent elements, and their interaction. In addition, it is essential that the system integrator be able to sort the "easy" from the "hard." One problem in recent years is that, as primes/OEMs have become system integrators, they have eliminated many of the technical and engineering resources who possessed the knowledge to segregate the easy-to-make-parts from the complex components that require a high level of engineering attention. This group of engineers and related technical resources, which represented the "common sense layer" of knowledge, is either greatly diminished or non-existent today. It is important to recognize that the starting point for a collaborative effort is to somehow rekindle this knowledge and apply it to the sorting process. There are tools that can enable revitalization of this knowledge, even if it has been allowed atrophy. They are discussed later in this white paper.

A family of products that has historically been delivered with acceptable quality, on-time, and within cost targets forms the "easy" list. Even if the designs are somewhat different for a new or modified system, it is incumbent on the system integrator to apply sufficient knowledge to form this list. These parts can most likely be placed in the supply chain with confidence and minimal oversight.

With the "easy" list in hand, the preponderance of attention should be applied to the "hard." This is the list of critical, historically difficult, or outright new elements of the product. For example, for a new jet engine design, one needs to think about the best way to engage the supply chain in the decision processes for the engine "core" (compressor, combustor, high pressure turbine). Bringing these three pieces together is the essence of system integration—and the ultimate drivers of performance and affordability. A wise system integrator fully understands their complexity and the critical nature of their interactions. Similarly, a wise system integrator understands that bringing a casting supplier into the process early will provide insight into the performance and producibility of the high pressure turbine airfoils.

This is one of numerous examples of the selective thought process that must take place as supply chain collaboration decisions are made. It is the climate in which this casting supplier is brought into the product development process that will have a substantial impact on downstream success.

2. Establish a Climate that Promotes Trust

Any industry participant will quickly see that this suggestion reflects a clear grasp of the obvious: "Of course we have to work with the supply chain in a spirit of cooperation and trust". Yet, there are numerous anecdotes of suppliers intentionally holding back one or more key pieces of knowledge because they are sure that the prime/OEM will "steal" the information, give it to a competitor, and later use it to leverage both the original supplier and the competitor.

This concern is exacerbated by the loss of the "common sense layer" of engineering and technical knowledge. Typically a supplier is required to work through a purchasing organization, whose response to technical questions is often "read your purchase order, it has the requirements; if you can't make the part we'll find somebody who can." This kind of relationship not only does not establish an atmosphere of mutual trust, it discourages the supplier from making positive suggestions.

Another factor influencing the climate is commitment of senior management. It is not uncommon for senior leaders of primes/OEMs to proudly stand up and describe in glowing terms how they are collaborating with their suppliers. This usually occurs at supplier conferences, during which the Kool-Aid is flowing freely. The reality is that these executives—the relationship "owners" within their companies—may be sincere in their commitment to collaboration. Unfortunately, the message frequently does not reach the buyers who have the day-to-day interactions with the supply chain. Their metrics frequently focus exclusively on reducing price. This "owner/buyer disconnect" can be a major inhibitor to collaboration and creation of an atmosphere that encourages it.

The question is: how can this climate change? Too many primes and OEMs hide behind contractual requirements and competitive restrictions—particularly for military programs. This is the path of least resistance. If the supply chain is indeed an essential part of the extended enterprise, system integrators must exercise their knowledge of contractual mechanisms to promote collaboration, rather than simply using contract clauses as a fig leaf to excuse business-as-usual practices that have historically yielded bad results.

In short, if supply chain collaboration is truly a business objective, it is time to find ways to interpret contractual guidance in a way that will enable the ability to say "yes" versus being used as a club to say "no."

3. Engage the Right Resources

Assuming that it has been determined to pursue collaboration through a selective process and in a climate that engenders trust, the next step is to apply the right resources. There is no argument that the procurement organization must be part of dialogue. However, this should be used as an enabler rather than an inhibitor of candid technical discussion. As such, the appropriate engineering and technical resources must engage early—and as often as possible.

The notion of integrated product/process teams (IPT) is good. However, the IPTs must be more than ways to simply check boxes and fill squares in order to pass through product development tollgates. Having a supplier as part of IPT, but not really acknowledging the supplier's input simply causes the expenditure of valuable resources, leading to downstream frustration.

Once again, the "common sense layer" of engineering and technical skill becomes critical. It is not enough to bring a manufacturing engineer to the party after the design is finalized and ask for input for how to enhance producibility. To use the turbine airfoil casting analogy cited earlier, it is essential to bring design engineers and the appropriate manufacturing engineers—from both the system integrator and the supplier—together early enough in the product lifecycle that they can make a difference.

4. Provide Clear Requirements

If the right parts are selected for collaboration, there is a positive climate for candid exchange, and the right resources are engaged, it is impossible to fail—correct? Not exactly. The best team in the world, working under the best conditions, and applying their time to just the right set of parts can still end up with an over-weight, un-producible, expensive monstrosity. Inability to establish clear requirements—and to subsequently flow them and obtain results feedback— can be an open switch that will derail the best of intentions.

It is at this point that establishment of a technical data package (TDP) is essential. Too often the TDP is viewed as a mundane, clerical exercise that is little more than putting a staple through a stack of documents. If this is how these vitally important requirements are treated, all of the hard work and good intentions of the collaborative process will be negated.

A key enabler that offers a way to collaboratively establish a TDP, flow requirements, and get early feedback as to their clarity and applicability is National Aerospace Standard 3500. NAS 3500, entitled "Technical Data Package: Composition, Communication, and Application," offers both the guidance and the tools to determine requirements, construct a TDP for use at any stage in the product lifecycle, flow information in a bi-directional way, and establish a risk mitigation plan for areas of disconnect.

NAS 3500 was generated by a team representing both system integrators and members of the supply chain. Any system integrator seeking to ensure clear formulation, distribution, and understanding of requirements should consider application of NAS 3500.

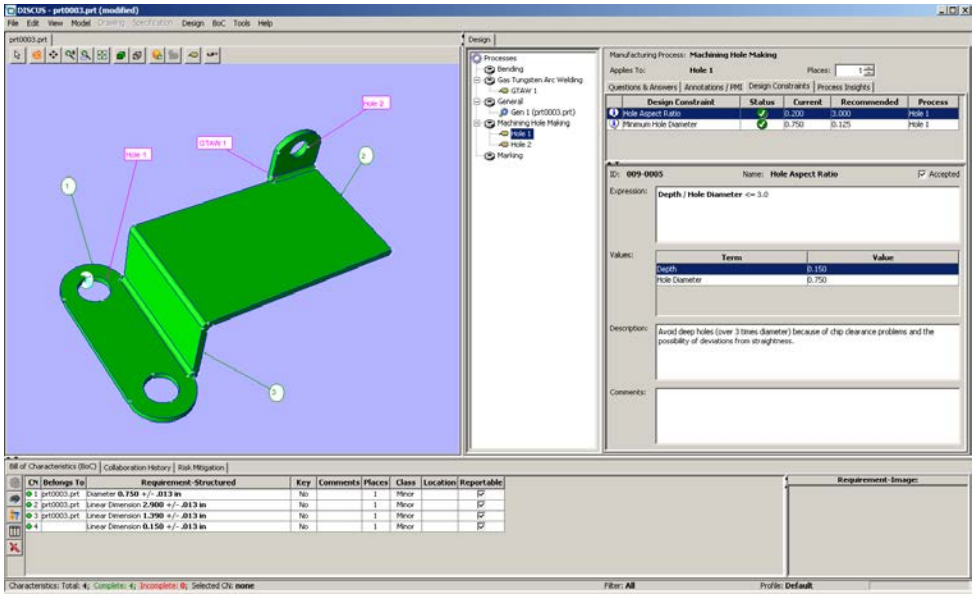
5. Apply Tools and Methods to Make it Happen

System integrators have spent considerable effort preparing and making data available to suppliers. This has been a step forward in the "requirements" piece of the collaboration process. Some have sought to reduce the amount of paper required back from the supplier—partially streamlining the "results" piece. On-line drawing and requirement systems, supplier portals, and bulk shipping documentation repositories have reduced the effort and saved time in passing documents back and forth.

These systems were primarily designed to provide a secure portal through which packaged bundles of documents could be shared. Typically, these systems give the illusion of collaboration, while users are in reality expending time and effort to create documents, pre-package them, review them, and enter data manually from multiple sources. They then must retrieve results, which are also manually entered somewhere else for status and metrics.

The challenge is to find a way to make TDPs accessible in real-time and to have the ability to make suggestions to enhance producibility and affordability early enough that these suggestions can make a difference. In effect, this means either enabling or replicating the knowledge of the "common sense layer" in such a way that system integrators and suppliers can work in a truly collaborative environment.

In addition to NAS 3500, there are software tools that can serve as the technical platform for integration of process knowledge and design practices, enabling collaboration throughout the supply chain. It must be noted however, that tool application without a commitment to achieve the other activities described above will simply lead to disappointment.



Assuming application in a digital design environment, such a tool should be "CAD neutral," allowing the supplier to receive, evaluate, and annotate a solid model image during that dynamic period when a part approaches detailed design, but before it is too late to make meaningful suggestions.

Using the combined design and manufacturing knowledge, the system can both store and dispense essential process insights, specification references that apply to individual processes, and design constraints. It then enables the application of this knowledge as direct characteristic-level annotations to the design. These annotations are then systematically captured in a "bill of characteristics" that allows them to be managed going forward over the product lifecycle.

Conclusion

There are plenty of examples of supply chain collaboration failing to live up to its promise. Somehow, the very simple concepts of “requirements” and “results” get lost in the rhetoric, even as highly sophisticated tools are applied to enable the process.

As the five activities described previously show, it is ultimately about selectively determining where collaboration will work best; ensuring an environment that supports open communication; bringing the right people together; making sure the requirements are understandable and that there is a mechanism for clarification; and employing the right tools to make all of this happen.

After that, it’s just a matter of common sense and adherence to the fundamentals.

To learn more about how Renaissance can help you with a collaborative supply chain, contact:

1825 Commerce Center Blvd
Fairborn, Ohio 45324
937-322-3227
www.ren-services.com