

Focused COTS and the Cohesive Approach to Embedded Systems

No one would argue that today is a Commercial Off The Shelf (COTS) world, but for many COTS users the choice of using COTS has the added meaning of “Monster COTS,” where only big public companies can make COTS equipment. Nevertheless, there are several unique ways in which smaller companies (“Focused COTS”) providing the same COTS equipment can make themselves the only logical choice of a hardware provider, regardless of the end product’s installation size. The areas in which these Focused COTS excel include,

- Deployment Cost and Support Issue
 - Uncontrolled Upgrades
 - Asynchronous Upgrades
 - Black Box Testing Fallacy
 - Land Mine Problem
- Life Cycle Performance Curve
- Promise versus Deliver
- End Product Differentiation
- The ROI Rub
- Technical Deprivation

Deployment Cost and Support Issue

Deployment cost reduction seems to be the Holy Grail of the COTS argument. The argument states that when you choose a COTS hardware path in a given life cycle, development cost and cost of deployment are all dramatically reduced. While this is true for non-recurring development, deployment costs are largely based on support issues and how your company will meet the support needs of your customers. Some new deployment cost adders come with the COTS-driven product and do not exist in strictly preparatory systems; these include uncontrolled upgrades, asynchronous upgrades, black box testing fallacy, and land mine debugging.

Uncontrolled Upgrades

The COTS market can mean that at certain times in a product’s life cycle, you will be forced to upgrade certain parts of your system. For example, your system is deployed with a Monster COTS board. The Monster’s board is a result of a schizophrenic, hurried development to catch up on an assumed gold mine in a new form factor. The big company is not afraid of any alleged commodity aspects of this new market and plunges into it. But the gold mine never materializes (or the company simply misjudges the market size), and Monster COTS - feeling stock holder pressure - drops non-fruitful product lines to focus on their “Core Competency.” Wall Street loves that talk and the stock price recovers. However, your product line loses a core aspect of your system; a change is required and this change was not planned or controllable. The end result is that your deployment cost increases because you now have actually two product lines: the first product line based on the Monster COTS board and now a second line based on its forcibly introduced replacement.

Asynchronous Upgrades

Take a simple COTS system of two boards. One board has an 18-month product life cycle and the other has a 24-month product life cycle; only once every six years do the release dates of the next-generation products align. Add a third board into the system with yet another slightly different product life cycle and you are rapidly approaching times scales equaling that of an astronomical conjunction of the seven visible planets. Now add OS patches, BIOS updates, firmware revisions and your application upgrades into the time sequence, and the definition of you shipping a COTS assembled product could feel almost weekly pressure to change. Elect not to perform one of those upgrades and Monster COTS will automatically label your issues as “needing an upgrade” and refuse to support your out of date product until the upgrade is attempted, no matter how remotely related the update is to your problem. The support costs skyrocket as your product has multiple levels of fixes deployed in the field. Asynchronous upgrades are likely to cause the biggest headaches and support problems of full COTS system deployments in the future.

Black Box Testing Fallacy

Taken to the extreme, COTS could mean interchangeable building blocks where the only differentiator is price. In this arena, COTS may mean “Commodity Off The Shelf” and again points toward the success of only Monster COTS. If this is what COTS means to your company, then product changes will occur from potential price reductions of the newly introduced boards. The pressure to keep costs down will mean that all COTS boards will be treated as black boxes and will be deployed as soon as basic application equivalency is demonstrated. Sure, this can be successful on a lot of deployments, but, in the telecommunication world where down time equals monetary damages, can you afford to rest on simple application equivalency testing? The Black Box Testing Fallacy is also a two-way street. For example, if a Monster COTS product passed NEBS in one chassis but fails in your deployed chassis, will the Monster COTS be willing to help overcome your unique issues?

The Land Mine Problem and Time Based Measured Support

Many Monster COTS suppliers claim better support than smaller focused companies, but can this be proven? Most big companies have separate design and support divisions and while support division will be trained within these Monster COTS companies, the question remains on whether the support staff will be intimately familiar with their own board to help you debug every issue. The idea of being intimately familiar with your actual application does not even enter their mind. The first level of support from any Monster COTS will be manual or datasheet regurgitation, where the technician simply parrots what is already in the manual or from some basic flowchart. Once through this initial morass of questions and answers, the second even more frustrating level begins.

At this level FAEs are engaged. The FAE begins to look through the mine field of differences and tries to figure out where you have departed from the Monster COTS dictated path through it. Once a difference is found between how the Monster COTS intended the board to be used and your actual use, that difference is labeled “the problem.” In our previous NEBS example, your chassis is labeled the difference. However, while true, this is not really the answer you needed. This second phase of support can also take on an even more damnable type of support we’ll call “Time-Based Measured Support.” If Monster COTS uses this model, the FAE will be judged by the Monster COTS’s superiors on how quickly the FAE can turn the problem back to “waiting on customer response.” Now the FAE is free to choose the most ludicrous, unrelated question he can and ask it quickly to the customer. Timing is all

that matters—not quality of support—for that is the one matrix that decides his performance. When a problem is encountered he is free to ask, “What color shoes are you wearing?” and then may switch the problem status to “waiting on customer feedback.” A few questions like this and your engineers will realize that they alone must solve the problem. Your last questions will still be “waiting on customer feedback,” and the Monster COTS pats themselves on the back, believing that they have provided world-class rapid response.

Focused COTS suppliers can offer the chance to engage in sort of a technological partnership with their customer. This technological partnership centers on direct engineer-to-engineer engagements, roadmap alignments, and quality customer support. This helps alleviate the above issues. These engagements allow roadmap alignments with your product releases - not the converse in which your product releases center on the releases of a new Monster COTS board. Through this technological partnership, engineers from both companies grow and gain intimate familiarity with each other’s products. This familiarity allows any next generation product from a Focused COTS to be tested well beyond application-level equivalency. The heart of technological partnership is a friendship beyond simple required support and the realization that the one companies’ success of its products depends on the success of your applications. This desire leads debug efforts with quality and urgency, focusing on timely, relevant answers to all issues. These debug efforts culminate with fixes, work-arounds, and solutions which are easiest to field implement; not simply with identifying the guilty. This technological partnership can even grow into a special relationship where part of the verification of next generation Focused COTS products are tested by the COTS supplier with your application running in their lab. This ultimate partnership, a sort of technological partnership nirvana, exists when a Focused COTS supplier can actually be looked upon as an extension of your engineering team. Monster COTS support will look like a group of engineers perfunctorily performing a set of tasks when matched against a Focused COTS customer relationship that enters into this relationship.

Global Promises from a Small Fish in a Big Pond

If there is one way that Monster COTS really pushes its strength, it is through “global” world messaging. Yes, we live in a “global market,” and that is not debatable. Monster COTS will frequently offer enticing items like “global support” or “global co-marketing.” Here the promise is broad intimacy with a large multi-faceted company by offering support, marketing and sales assistance on a global level. But intimacy with a large multi-faceted company is an obvious oxymoron, and the promise of global intimacy even more so. The likelihood of a handful of negotiators buried deep within Monster COTS actually being capable of delivering this level of support from their huge company is remote to even the largest of its customers. The defense here is easy: Ask them to document their global promises with a success story for one of their existing engagements, and inquire about personal references within those global success stories to back up the claim of global assistance. Talk is cheap, but if they are truly offering this promised global level assistance, surely some similar engagement should be documented. And, if it is not, then can the promises being made actually be kept?

Beyond the technical partnership, smaller Focused COTS offer sort of a corporate benevolence, where your program managers will even have the ability to communicate with the CEO or president of the Focused COTS company. Certainly, the risk that someone is promising the undeliverable is less likely when this sort “buck stops here” communication is available.

End Product Differentiation

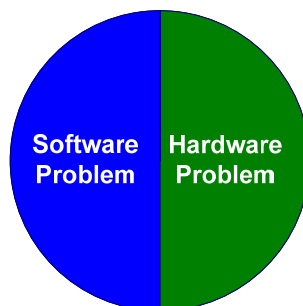
Monster COTS will tell you that your differentiation comes from software. This is true of your current generations, but has the differentiation issue been addressed for multiple generations of your product? If your software development team was able to restructure your application for an incremental increase of 50%, there is no doubt they would be highly rewarded. 2X, 3X and 4X performance increases only come through hardware upgrades. If you and your competition are using the same Monster COTS hardware, an alignment of performance increases is assured. An extreme possibility exists that your competition can approach your customer with the promise that their application will run on your COTS deployed hardware. They may even promise to reuse portions of your deployed solution. Now, not only have you lost the customer because of an assured performance alignment, but your company losses recurring revenue from existing installations. Focused COTS can and are willing to provide minor “look and feel” changes as well as fully customized features, peripherals, and even boards. Sometimes non-recurring efforts are needed to assure future success through differentiation.

The ROI Rub

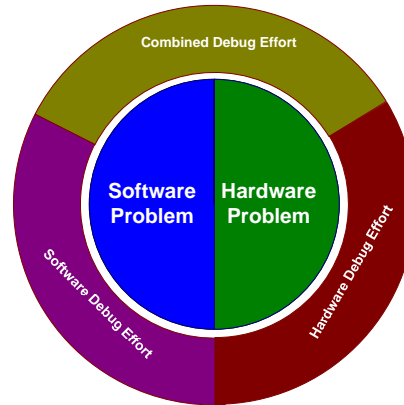
Alan Shepard, America’s first astronaut, once said, “It’s a very sobering feeling to be up in space and realize that one’s safety factor was determined by the lowest bidder on a government contract.” This statement exemplifies to the ROI Rub. Monster COTS will focus on all efforts where ROI is greatest. The same is true of the profitable Focused COTS supplier, but the size of the needed ROI varies greatly. In the earlier phase of new COTS form factors, Monster COTS suppliers engage every opportunity in the hunt of ROI, never knowing which customer will hit it big. As time moves on, middle-sized and smaller opportunities will be left to wither on the Monster COTS vine as attention will increasingly go to the bigger customers. Feature sets will match those driven by only the largest customer. Support is focused on the largest customer. There is an order of magnitude of difference between a good Monster COTS customer and a good Focused COTS customer; an order of magnitude of difference in needed ROI, and therefore an order of magnitude of difference in the importance of each individual engagement.

Technical Deprivation

Let’s suppose that all things being equal there is an exact 50/50 mix of hardware and software problems to be overcome in a product’s life. These problems can range from initial system assembly through field issues.



There are three possible methods to debug these issues: software engineers only, hardware engineers only, and a combination of both hardware and software engineers.



Approximately one-third of potential issues will require some amount of debugging from both software and hardware engineers. Some examples of these problems include OS driver issues which look like hardware problems, software bit-masking issues which cause the hardware to appear unstable, and unique portions of your software application that uncover any unnoticed hardware problem. A COTS-driven technical deprivation of your company's hardware ability means that these problems requiring a combined effort will be the hardest to overcome. But the technical deprivation doesn't end with debug issues; it can be extended to next generation systems. Monster COTS may not be free to choose the best in class silicon for next generation boards. If some new, exciting silicon is on the horizon that can deliver significant increases, your company's lack of hardware knowledge may put you at a disadvantage. Smaller Focused COTS companies are more nimble, and are free to choose the best in class silicon that offers truly differing performance. Partnerships with a Focused COTS will reduce this hardware technical deprivation. The technological partnership that was cultivated on the first deployment will mean that the Focused COTS has the ability to help you watch which hardware technology increases on the horizon will benefit your company, while debugging any issues rapidly.

Cost

The mother of all Monster COTS arguments is cost. In today's world, Focused COTS have access to large contract manufactures - the same used by Monster COTS. Therefore, no real advantage is gained from use of a Monster COTS product. Additionally, Focused COTS must compete against other Focused COTS, so even the focused companies must provide their service at lower cost. The COTS market itself drives cost down, and is something that both Monster COTS and Focused COTS must provide equally to be competitive.

Focused Company COTS Differentiator

This is truly a David-and-Goliath type comparison: Smaller, Focused COTS companies successfully competing against larger companies attempting to drive the market toward commodity seems as unbelievable as a boy defeating a 9 foot giant. However, like Voodoo Computers and Alienware competing in the presence of Dell and Gateway, if we ignore Saul's advice to carry his unproven ROI armor into battle and continue to deliver truly market focused products with the intimate interaction between managerial, manufacturing and engineering staffs, Focused COTS companies have a few stones with which to slay the bigger Monsters in the COTS market.

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