



COTS efforts, like SpaceX's Dragon spacecraft, stand out because they don't use the traditional model of cost-plus contracts. (credit: SpaceX)

## Yes we can! How to ensure “change you can believe in” for the space program

*by Derek Webber*  
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The new Obama administration comes into Washington this month to make good on its promise to bring real change. How should that promise play out in the space sector? Is it simply by choosing a different NASA administrator? Is it about choosing a different engineering architecture for achieving the nation's long term goals in space? Is it perhaps about changing the very destinations or timescales of the future exploration missions? It may be about all three of the above, but I

believe that, beyond those issues, there is something far more fundamental, though not nearly so sexy, that makes it possible to achieve our objectives affordably. It's about the way we procure our vehicles and services—and thereby making sure we get the real hardware we pay for, and the public has been led to expect.

What is it about the COTS program that so energizes the space community? Certainly, one of the recipients of funding, SpaceX, has so far done a magnificent job in doing what it had set out to do. But of course there have been failures, such as

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Rocketplane Kistler, too. Is there something radically new about the technologies being used by SpaceX in achieving its objectives, that could *not* have been used by, say, Boeing or Lockheed Martin at any time over the last forty years to provide the LEO cargo service that is currently a key part of the infamous “gap”?

The answer is no. SpaceX has simply (yet magnificently) done a good management job in starting from scratch and creating new, but traditional, engines and rocket hardware with cost reduction as a prime objective. Apparently, Rocketplane Kistler did not get it, and somehow thought they were operating under the “old rules”, which essentially meant simply asking for more when you needed it.

So what is the real thing about COTS that produces the results? And how is this related to the future direction the US and NASA could take in achieving its long-term goals in space affordably? It is simply very comforting for the lawmakers and the budget specialists on the Hill to be

dealing with fixed-price contracts. Within this kind of framework, they will be much more willing to commit the funds needed to make progress.

The traditional “cost-plus” approach to contracting that NASA currently uses for the bulk of its work is *not* the norm in most of the real commercial world. Out there, companies compete for contracts that result in *fixed-price* awards. Don’t tell me that you cannot use fixed-price contracting for space technology because it is so special, or so difficult, that nobody would take the risk of competing and winning, and then possibly losing money on the deal. Well, welcome to the real world! That’s the normal commercial risk that well-managed companies face all the time in deciding whether to bid or not, and at what price, for new equipment or services. We build bridges and buildings that way. And, ever since the early 1970s, communications satellites have been designed, built, and launched entirely on the basis of fixed-price contracts. Nevertheless, each new generation has pushed the technology envelope to its limits in order to meet the needs of the satellite services industry. So, even research is regularly included under the fixed-price rubric. By the way, there is no need to always award a fixed-price contract to the lowest bidder. It could for instance be awarded to the bidder with “the best combination of technical proposal, schedule, and price”. When Elon Musk made his bid for the COTS work, he was willing to take these normal commercial risks. And significantly, the big guys did not even bid. It would seem that they have so far had much easier, and entirely risk-free, ways to make money at taxpayers’ expense.

What are the benefits of fixed-price contracting for the beleaguered taxpayer? Well, for a start, it removes the whole problem of cost overruns. There is no more money

for the project than the amount contracted. There are no more open-ended commitments and annual budget nightmares. Furthermore, there are milestones. This means that a manufacturer has to demonstrate that it has achieved key tasks before it gets paid. In fact, in a well-written fixed-price contract, the taxpayers effectively get money back for non-achievement, and the milestones are one very good way that the US public gets to see real progress. Finally, there are performance and schedule targets. If the finished equipment or service cannot fully meet the targets that were included in the contract, there are financial penalties. If the product or service is late, there are also financial consequences.

Does this seem unreasonable? If not, then why does NASA operate the majority of its contracting on a cost-plus basis? Is it unfair to ask Boeing, Lockheed Martin, Northrop Grumman, and other companies to bid for Constellation-type work on a fixed-price contracting basis? If so, why? We need to distinguish genuine new research from the majority of the task, which is development work. After all, SpaceX has accepted just such arrangements, and has steadily progressed, meeting each COTS milestone in turn in developing its Falcon 1 and Falcon 9 vehicles and the Dragon spacecraft. Moreover, they have done so using only a minute fraction of the budget allocation that NASA has spent on a cost-plus basis for all its Constellation contracts. I had always thought that it was obvious, but perhaps it needs to be explicitly stated: *there is absolutely no incentive for a contractor on a cost-plus contract to ever finish the job.* Taxpayers have

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been shoveling money into the giant aerospace companies for decades without there having been tangible hardware, milestones, and test flights to justify the payments, although of course there have been plenty of PowerPoint slides.

NASA got something very right when they introduced COTS. They should be commended for that. But what is wrong is the ratio of COTS-type fixed-price contracts to the cost-plus contracts. COTS awards have totaled only \$500 million out of NASA's \$17-billion annual budget. This means that only the \$500 million is under real financial and schedule control protecting the taxpayers' assets. So, how should Obama's NASA administrator bring real change to the way the nation executes its space programs? COTS-type fixed-price contracting should be the *norm*, not the *exception*. It's pretty much the only way you can really be sure of getting "change you can believe in" for the space program.



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