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I've been following the various proposals for a shuttle replacement, and I find it a very disappointing lot. Ares, Direct and the Shuttle Derived Heavy Lift Launch Vehicle are all pretty much the same idea. Why would we want to go back to a throw away? Why throw away the engines, the computers, or anything we're not throwing away now? If we modularize the design of the shuttle so that its three main components were separate, we could gain in both efficiency and versatility and retain reusability. The nose section for the crew with all the computers and command equipment, the cargo section in the middle, and the engine section. You launch the system, release your satellite, deliver the cargo section to the space station or some other destination, detach the nose and tail from the cargo section and attach them to each other and reenter them. Because you're not bringing back the cargo section, your returning vehicle would be much lighter and require less heat shielding and smaller control surfaces. Because the nose is detachable, it could be separated from the rest of the vehicle in case of an aborted launch in progress. Because the cargo section is now payload itself, it can be configured to serve many additional purposes after it has released its primary payload. Because the engine section is detachable it becomes easier to service and upgrade. Because it's all detachable it's easier to modify the system as a whole. Since it no longer has to serve as a laboratory, it can be made to serve its human component better. Because the system can fly (or at least glide) back, we don't have to fish our astronauts out of the water or drop them on the ground.

What I'm getting at is creating a vehicle that is an orbital system as well as a launch system. Each component serving the most functions possible. The nose section can be made for manned or unmanned missions with the capability to land autonomously or be remotely piloted. The cargo section can be setup to deliver cargo and then be a laboratory or observatory or a giant lavatory. The engine section can be setup for launch and retrieve or deep space missions. I want us to create the infrastructure of space exploration. If we are serious about going back to the moon, we should not do it in the same rushed way we did in the sixties. We should launch everything we need to support an outpost before anyone sets foot there again. Even the return vehicle should be in place before we land. We can do this if we have the most efficient launch system possible. In this case the efficiency derives from making as much of the vehicle payload as is possible and reusing the rest. I'm proposing we change the shuttle from a box truck to a tractor trailer.

Think of buying a car or a big rig. There are certain features that vehicles are going to have in common, but you have special needs so you modify the baseline model. Maybe you have it done at the factory or maybe you modify the vehicle yourself. Either way it's a lot cheaper than building a vehicle from scratch. **That** is the real crux of any solution to the cost of space travel, economy of scale. If we build a factory to build space craft we could bring the cost down to the point where the space flight becomes relatively cheap. It would entice private industry to innovate on their own because now there is a destination. The more we do, the more we can do and technology has caught up to this concept. This can be designed and built and tested far quicker than when Rockwell International built the shuttles.

By modularizing the shuttle, we build a vehicle that can be improved as technology allows. It should be designed with upgrading in mind. By retaining reusability we avoid dropping our astronauts out of the sky in a rock. Why go back to doing things the way we first did them? It would seem to me we were only doing that because it was the easiest way, not the best. It would be like we really hadn't learned a thing in the last 40 years. We know how to build a shuttle. We know how to build a lifting body. We already have the knowledge and the technology to do this. Nothing has to be invented and we are still 20 years ahead of anybody else. Yes, this is a more complex idea and might cost more to do initially, but in the long run it would bring down costs significantly. I think if science took a back seat for a couple of years, we would be able to do more at less cost after we get our launch system.

It would also lend itself to innovation. Wouldn't it be a good thing to have some kind of dedicated medical facility in space? Wouldn't it be a good thing to have a vehicle in orbit that had the capability to capture and deorbit space debris or one that could retrieve and repair satellites without tying up our launch capabilities? These could all have a common source. A platform for others to innovate with. Someone buys a module and modifies it for whatever purpose and pays for the launch. A partially used cargo module can be thought of as having a real estate opening.

Consider this scenario: You launch a satellite. The payload does not use the full capacity of the vehicle, so you add supplies for the space station. You release the primary payload in orbit and then proceed to the space station with supplies. You dock with the station. You transfer the supplies. You undock the nose and tail of the vehicle from the cargo section with the station manipulator arms and attach them to each other. The cargo section can then be used as part of the station, or the basis of a new one. The nose and tail sections can be deorbited as needed. Done this way, it would take but a few launches to build a new space station and give the current station a reason to be. If a cargo section is setup as a booster, two launches can create a vehicle to move a huge amount of payload to the moon or deep space. You could launch this shuttle *plus* without a crew, and have an escape vehicle for the station. You could build a nose section designed for automated reentry and return experiments or hazardous materials or broken instruments. Imagine any need and any module section could be custom outfitted to fulfill that need. If we bring down costs enough this could be very feasible. Let private companies launch people and small payloads. No private entity would be willing to create such a system as this. If we really want to be the first nation to successfully exploit space, We the People must create it.

I'm proposing an approach to space flight that will maximize the use of current technology, build on older technology, and create greater flexibility in our launch system. For all it's flaws the shuttle does get a huge amount of payload into orbit. Unfortunately most of it is the shuttle itself. We need to change the ratio of launch system to payload. We need to change our idea of what is payload and what is not.

I made this proposal once before, which the good folks at Aviation Week and Space Technology printed in their Letters to the Editor section in the February 16, 1998 issue. I like to think I had an affect on concepts that were subsequently proposed back then, just as I would like to have an affect on the concepts being considered now. If we can't move forward in our thinking about this matter, why bother at all. We don't need to relive the past, we need to improve upon it.

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