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Making State Spaceports Economic Change Agents

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(Space Business Initiatives Session)

Introduction

Space transportation truly begins at the launch pad where the vehicle arrives for final processing prior to flight. Production of the launch vehicle and its payload likely occurred elsewhere. The question of who actually controlled the spaceport and its facilities was not a particularly controversial one or even a question at all until the 1990s. It is not controversial today but the question has become who should run the federal spaceports? Until that time, national security concerns drove the field along with the even more potent force of institutional inertia. Having the federal government specifically the military be responsible for spaceport operations was both logical and necessary since the early facilities were built for the purposes of ballistic missile testing. That situation has changed at least rhetorically more recently with the increasing internationalization of the space marketplace. Internationalization contains within it the kernel of enhanced competition – a dramatic change for the space transportation field. For years, national security and other considerations made the space transportation industry a series of nationalistic enclaves (McLucas, 1991). This situation usually still exists regarding any government payloads that normally fly upon national flag launchers. Since 1991, private payloads have been increasing their proportion of the market (despite some short term downward fluctuations as in 2001), meaning that space transportation is now increasingly driven by cost factors rather than simply national preference especially when the satellite consortium purchaser is international. Competition therefore becomes the new paradigm through which potential users look for the greatest value for the expenditure. As part of this new marketplace, state spaceports are becoming increasingly visible as potential players in the space transportation field. In this paper, state spaceports are described in terms of the forces driving change, the factors inhibiting their success, and a brief assessment of the future shape of state policy if long term success is desired.

Winds of Change

The forces creating the potential for establishment of state spaceports came from several directions. No one factor in itself created this new opportunity for state level activity rather the totality of circumstances drove the situation (Handberg & Johnson-Freese, 1998). Those forces can be conceptualized in terms of the changing international context, changing technologies and a changed domestic political climate (Handberg, 1995). First, the end of Cold War eroded the perceived necessity for continuing the stringent national security restrictions considered typical of the era. Evidence for that change came quickly with the entry of the former socialist states, Russia and China, into the international space transportation marketplace. The road however has remained somewhat rocky given continued concerns about technology transfer issues with regards to China. But, the result has been the creation of a space transportation marketplace that is becoming increasingly international in scope and competitive. Internationalization means that cost factors became increasingly critical in acquisition decisions by payload customers. At first, the focus was upon upgrading launch vehicles with a greater emphasis upon improving their marginal cost efficiency. That focus has led to greater concern with processing costs – the time and dollars spent getting the launch vehicle prepared for lift off. Newer launch vehicles such as the

Ariane, Delta and Atlas series rockets have achieved greater efficiencies while lifting larger payloads. These new efficiencies are fundamental to the new marketplace given that the Russians and Chinese represent lower cost alternatives although the political issues over technology transfer and reliability have depressed Chinese competitiveness temporarily (Bates, January 28, 2002).

One area in which major changes were projected is the question of launch facility or spaceport operation. Given the military or governmental beginnings of the original national space programs, spaceports were federal government owned and operated, meaning the military for the larger facilities with NASA operating the Wallops Island Facility. The national government in some institutional form was placed squarely in the situation of building and maintaining such facilities. As long as national security considerations dominated, federal control remained both logical and necessary. National security has not disappeared as a policy constraint but technological changes pointed to other options being viable.

The second force was that of technology changes although the realities have been more complicated than most originally expected. Among the technological factors was the changing mixture within the comsat market. By the 1970s, comsat technologies had focused upon increasingly large geosynchronous orbiting communications satellites. Satellite size growth meant the use of ever-larger launch vehicles, increasing the expense and complexity of operations. By implication and design, the field was dominated by large corporations or government entities to the exclusion of other players. These large corporate players had a mutuality of interest due to their past history as government contractors. By the late 1980s, the technology had advanced so that satellites could now be considered for use in LEO and middle earth orbits. These satellites were much smaller in size, relying upon new computer architectures and communication technologies to switch messages across multiple satellites rather than relying on a single fixed satellite. Such projected satellite fleets (one was raised at one point on paper up to 844 then down to 288 satellites, now even lower) demanded great number of launches by smaller rockets, partially reversing the earlier trend toward bigger is better. In addition, such satellites required different orbital inclinations, meaning more launch sites would be required for economical launch.

Also, by the earlier 1990s, the hype associated with the Delta Clipper had established the concept of a reusable launch vehicle (RLV) as a viable launch option at least politically. The X-33 and X-34 programs were the programmatic embodiments of that RLV concept with their tremendous potential to completely reshape the space transportation marketplace. A flock of paper RLVs flew across the media and computer screens. RLVs could in principle be launched and recovered from a multitude of potential geographic locations. That removed the constraint of geographic location. Standard expendable launch vehicles (ELVs) drop off stages, meaning that serious safety issues arrive if the area is populated. China has ignored that constraint with a resulting loss of life as a result. For the United States, spaceports were located along the coastline in order to improve safety. The space shuttles returning from orbit routinely over fly populated areas for landing in either California or Florida. There are risks but they are deemed manageable (Handberg, in press).

Technology change in either the form of smaller ELVs or RLVs opened the door for those states otherwise excluded to enter the space marketplace. Unfortunately, that ended when the small satellite market subsided, as the projected launches did not occur. Small launch vehicles also confronted adaptations by the large booster operators in the form of multiple satellite launches, further reducing the demand for launches. Plus, the major entries into the mobile communications market encountered extreme economic turbulence to the point that the first entry, the Iridium, went bankrupt. Iridium is back in service but its future remains unclear in terms of whether replacement satellite launches will occur or how many. That collapse has also revitalized comsat operations built around fewer but larger comsats, removing those launches from the small launcher marketplace.

The third force was the changed political-economic climate – a more gradual process

than the publicity and rhetoric would indicate. In the earlier 1980s, the Reagan administration embarked upon a series of decisions aimed at reducing federal involvement in nonmilitary space, effectively opening the space marketplace up to more players. Prior to the changes, twelve agencies had to assent before a nonfederal government launch could proceed. At the time, the early 1980s, however, the prospects for substantial change were minimized given the then existing international tensions which maintained security restrictions on space technologies.

Inertia and the Winds of Change

Change comes slowly and erratically in politics when the issue at stake is perceived as either esoteric or obscure or both. Engaging state governments in space-related activities represents an example of the latter situation. From the beginning, space activity was defined largely through the prism of being a national level concern given its extraordinarily close linkages to the critical issues of national security and international politics. The Apollo Project with its Cold War trappings hammered that subliminal message home. However, that era effectively ended with the crowning achievement of landing a man on the Moon but those old reflexes died hard. Patterns of organizational behavior were apparently engraved in stone but time and events have slowly chipped away at those old signposts. In the new era, the possibilities have dramatically escalated but must overcome both the old and the new. The latter being obstacles raised as the involved parties perceive change as the opportunity to improve their individual fortunes. The pursuit of individual advantage by all may in practice rebound to the detriment of all.

Regarding the establishment and operation of state spaceports, a number of factors impacted the field, further delaying even preventing progress toward the highly desirable goal of expanding the various states' economic fortunes, the fundamental driver underlying all these efforts. Those factors appear to group into three broad clusters. The clusters have been generically labeled for analytical convenience: bureaucratic, international-technological and federalism in action. No one cluster by itself is sufficient to explain the erratic nature of the field's development but each contributes to the continuing unevenness in moving forward. No magic bullet has appeared cutting through the confusion because the issue remains so peripheral to the broader agendas of the relevant decision makers. Many can see the potential benefits but none define themselves as being the major agent for creating change.

Bureaucratic

The first cluster labeled "bureaucratic" encapsulates the reality that the implementation of state spaceports breaks the mold of expectations that has defined the entire field since its inception. Beginning with the easiest part, the Air Force established itself around 1960 as the premier U.S. space service with regards such operations. Removing its major components to NASA eliminated the Air Force's major competitor, the Army. The Air Force, thus, for over forty years has defined its mission as operator of the nation's major spaceports. That mission as originally defined did not encompass supporting commercial space activities. Even when space operations expanded to include significant commercial activity, it remained clearly a secondary priority. National security needs overrode that aspect so that Air Force and by extension federal government procedures and policies remained restrictive rather than facilitating. The Air Force consistently acted to protect what it perceived as its institutional interests and by definition the national security interest since it considered the two to be synonymous.

The result has been a greatly delayed developmental process. State initiatives operate at distinct disadvantage since the Air Force has been until recently under minimal pressure to move more quickly. Range upgrading for example stalled for several years while funds were diverted to more pressing service needs. The result was that equipment and procedures remained slow and at times obstructive for non-government users. Delays and

impediments have made foreign competitors attractive to commercial payload owners because of their greater responsiveness. State spaceports have been touted as an alternative but due to their location mostly on federal property, the restrictions have not been overcome. The Air Force continues to control flight scheduling and operates the flight safety system, which means these state spaceports cannot break completely out of the box. Alaska's spaceport is somewhat less restricted both by design and location, not being located on a federally controlled facility. Change is clearly coming but only slowly. The Air Force recognizes it must adapt but concern exists that once control is released, some unforeseen dire consequences will ensue. Given the national security interests at stake, Air Force reluctance to change a system so accommodating their interests is understandable but disruptive to any orderly commercial developmental process. Air Force reluctance is not entirely selfish but rather reflects the reality that organizations once put in place are difficult to move in new directions.

The larger contextual problem, however, is just simply inertia, not particularly bureaucratic but human. Existing operating routines (comforting in their familiarity) must be broken along with well-worn thought groves. This response occurs both in public settings and private discussions, changing long held views is hard. One aspect is simply that until recently commercial space activities were perceived by many as somewhat disreputable even illegitimate when measured against the broader context of space activity. Space, remember, is the ultimate final frontier, expanding the human mind and aspirations. That attitude of disdain lingers in some Washington policy circles even though the recognition grows that the immediate future for human space activities will be more likely commercially based rather than continuing large government programs as in the past. On the other side, the commercial space sector, which the states are struggling to mobilize in support of their efforts, is habituated to federal government leadership. For industry, it has been difficult to challenge those who have led and provided (through DoD and NASA contracts) for nearly a half century. Those habits of deference are being slowly broken, more often by outside events than dramatic initiatives by the private sector. Remember the federal government (both military and civil) has been and remains the single largest and most constant source of revenue for the industry. Within the past several years, more commercial launches occurred than government but old habits remain difficult to break plus market fluctuations keep government payloads attractive. For all the criticism, NASA's shift to smaller space science missions generated more launches than earlier projections would have for more companies.

Moving the field forward as implied by the establishment of relatively independent state spaceports demands stepping far beyond the established patterns. That remains difficult for those losing total control (NASA and the Air Force) and for those who move into a totally commercial environment (the industry) where failure is not only possible but also likely. Iridium is the symbol of that possibility. Here, the thrust of the discussion comes from a more general perspective. Change was originally forced by events outside the space field but responses by the participants are tempered by their past experiences and future expectations. Thus, change comes albeit slowly, incrementally and erratically.

This can be seen the failure of the airport model to work in this particular context. Most advocates began with the assumption that spaceports were in many ways analogous to airports – organizations with which there exists a great deal of relevant experience. Airport construction, expansion and operations have become major economic multipliers for many communities. In a manner similar to interstate highways, a competitive airport can significantly alter and/or sustain economic distribution patterns. The difficulty was that spaceports do not fit the existing pattern of transportation policy. There were no established federal trust funds available to help defray construction costs as with airports. More critically, though commercial space launches have increased in numbers – the use rate is not equivalent to an airport. In a single day, a medium sized airport launches more planes than commercial rockets lift off world wide in a year. Therefore, revenue projections are lower and slower, discouraging those investors who demand quick more assured returns. In addition,

state spaceports must be multi-functional. One of their missions becomes generating future flights as exemplified by supporting research and development programs along with educational ones. The Florida Spaceport Authority has grasped that reality and worked with it. Airports do not routinely engage in such activities although they may support other's efforts to generate more business and thus flights. Treating spaceports as the next wave in the historical development of transportation policy is logical but not necessarily politically compelling which trumps technology. Similar struggles occurred over trains, trucks and canals at different points in time.

International-Technological

The second cluster is labeled "international-technological." This aspect reflects the fact that the implementation of space-related activities directly impinges upon the international legal system and is heavily influenced by technology change. Therefore, state spaceports must operate within the parameters of international law and practice. This reality has an inhibiting effect upon the states because the international system forces all commercial space operations to conform to rules generated when national government activities were the norm and the others the lonely exception. In addition, the international regime was implemented as the product of fierce negotiations between socialist states resolutely opposed to furthering capitalism in any form and capitalist states comfortable with nationally directed economies and desirous of maintaining their advantages in exploiting space. The result is a system, which regulates state space activities under tight national controls. Change as embodied in American state run spaceports is difficult to accommodate given the cumbersome negotiation process conducted through the United Nations. Therefore, states must operate within those existing rules whether they are effective or useful or not.

Additionally, commercial launch technologies are in a drastic state of flux as the struggle to lower dramatically high cost to orbit numbers accelerates. For state spaceports, the gamble comes in deciding what type launch pad to construct. That decision structures many future space launch options. A wrong choice locks a particular site into obsolete or noncompetitive launch options. This slows the decision process because delay allows further clarification (or confusion) regarding the most viable options. Uncertainty in the marketplace is accentuated by the continued growth in the number of international and national competitors, further complicating choices. The proliferation of possible flight choices reflects the fact that reliability problems have prevented any single vehicle or family of vehicles from dominating the market, thus easing the choice of launch pad configuration. The relatively small capital investments available for use in constructing these launch facilities makes correct choices even more critical if success is to be ultimately achieved.

Federalism in Action

In the abstract, federalism implies an arrangement by which the functions of government are parceled out in a somewhat rational manner across both state and federal levels. Obviously, the implementation process is more complicated in practice. Space activities reflect that messiness at three levels: the congressional-federal, among the states, and within the states. First, at the federal level, despite the legislation opening up the potential for state space activity, Congress has been largely indifferent to most suggestions for further legislation directing the bureaucrats to move more expediently on the issues. Thus, bureaucratic obstacles are only slowly overcome. The larger problem is simply that the fact that commercial state spaceports like many other state level economic issues are of interest to only a small proportion of the entire Congress. Simply put, their constituents are not engaged in such activities and are unlikely to be so in the future. Even if they are engaged, the relationship is often perceived as indirect. Recent efforts have attempted to assess the total impact of space activities upon the total U.S. economy. The dollar values are enormous (\$61.3 billion) when one considers the relatively small and concentrated nature of the industry (Associate Administrator for Commercial Space Transportation, February 2001;

Office of Space Commercialization, 2001). Space activities are perceived as being a function of more traditional national space participants not involving state governments. Therefore, the issue remains largely an abstract one – most of Congress rhetorically supports some general notion of privatization and state initiative but not with any particular intensity. Indifference remains the more usual response, meaning significant new legislative actions becomes unlikely and financial incentives from the federal level minimal. There has been much legislation introduced but little passed which supports state spaceport development or general space commerce but the opportunities and amounts are insignificant compared to other legislation. For example, among the bills proposed was the Invest in Space Now Act (HR 2177, 2001), Spaceport Equality Act (HR 1931, S.1243, 2001), both of which fell victim to the political gridlock in Congress. More critically, even if approved, those initiatives are considered unlikely to grow.

When Congress does act; however, it has often found the interested states divided as to what should be done and, more critically, who should be supported. California and Florida engage in fierce competition for whatever federal grant funds become available and are aggressively pursuing possible launch customers. This struggle between the largest and fourth largest states often paralyzes Congress or results in unsatisfactory proposals. Alaska and Florida have *de facto* allied on some issues since Alaska's spaceport will most directly compete with California for polar orbiting flights. Alaska was able to leverage their congressional standing to generate moneys specifically designated for their location. Virginia stands somewhat given the well-defined niche occupied by the Wallops Island Flight Facility. Conflict however is inherent between Virginia and Florida over any possible international vendor launches such as the Israelis with their small launch vehicles. International launch systems represent a new area of conflict because of concerns over access to national markets. Small launch vehicles have tended to be limited to national payloads although Pegasus has launched at least one Brazilian satellite.

This competition between the states is heightened by their recognition that the space launch game remains a zero-sum one. Over the next decade, there are only a finite number of launches projected even under the most optimistic scenarios (COMSTAC, May 2001). Those launch estimates vary dramatically but the reality is that there will only be a few occurring against the number of possible providers. Thus, dominance or major growth in one competitor's market share comes ultimately at the expense of the others. Also, international competitors are developing more launch options that will further reduce the number of available payloads.

Finally, state legislatures are supportive in principle but not fiscally despite the projected large economic impact of space-related activities upon the states. Several factors inhibit state legislative engagement with the issue. First, the aura of continued federal dominance inhibits the states. The potential for state participation is not truly appreciated or understood. Second, state spaceports or their equivalent compete in state budgets for scarce discretionary dollars. The budget revolution at the federal level and the devolution of responsibilities and costs of federal programs to the state levels is absorbing whatever discretionary moneys are available. When ranked by legislators and other members of the elite, space-related activities are not priorities compared to education, environment or roads, never mind welfare now devolved unto the states. Medicaid, for example, competes with state spaceports normally to the latter's detriment. Third, space-related activities when sold to the legislature are still perceived as future oriented programs rather than immediate. Given the uneven pace of the field's development, such perceptions are not inaccurate, reducing incentives to push forward. Politicians respond to visions of the future but are buffeted by more intense immediate pressures to help their constituents. Investments in space can in their view be deferred into the indefinite future. Only when the threat of a base or center closure or significant reduction in the scope of their operations arises do states become significantly engaged. That specter haunts Florida and the Kennedy Space Center long term despite the recent decision to move shuttle operations to KSC. Government space

operations are political by definition, the President's brother being governor did not hurt KSC's argument for moving rehab to the Center. Previously, Democratic members of Congress kept it there in California. Again, the threatened loss of constituent jobs mobilizes activity by key legislators and state governors. The two Florida Space Business Summits are reflection of that perceived need to respond to a changing possibly adverse policy and economic environment. Until that pressure arises however, most states defer to the federal role. Again, the issue becomes changing the expectations or habits carried forward from the early 1960's. Those patterns no longer are sufficient to meet state needs. No single factor explains the success or lack of success found among the various state spaceport initiatives. Rather, the combination reported above provides a more comprehensive explanation. Each state has motivated individuals who push their efforts forward but larger contextual variables often assisted or negated their efforts usually the latter. Change here is an outgrowth of technological dynamism combined with a fundamental restructuring of the politics underlying the field. State spaceports operate in a policy environment still in the process of becoming.

Some Immediate Steps

The immediate steps are occurring albeit in a marketplace growing even more confused than previously. Several states have long been aware of the possibilities inherent in a state spaceport. Florida, California and Virginia built upon existing federal spaceports – a situation that has proven both positive and negative. Negative in that the federal government had to consent before any operations could be instituted and positive because various infrastructures were already in place that facilitates flight operations. Alaska went it alone although supported by federal funding obtained by their congressional delegation, which had risen to power through the seniority system and change in party control. These four constitute the “old guard” in that the office of the Associate FAA Administrator for Commercial Space Transportation for operations has approved their spaceports. The aborted X-33 program with its possibilities for launch in nontraditional sites created interests among states formerly thought excluded. New Mexico with its White Sands based spaceport concept was the most publicly aggressive in seeking to become an RLV base. With the program's collapse and cancellation, those efforts must shift gears while the Air Force and NASA chart their next steps.

More important to these efforts are the attempts to overcome or at least minimize state differences in support of a larger goal. Two multi-state associations have either been formed or have extended their interest to incorporate state spaceports over the past few years. The Aerospace States Association (founded in 1989 with four members now incorporates 40 states plus the District of Columbia) has a more diffuse mandate of fostering both aeronautical and space activities. The National Coalition of Spaceport States (NCSS, July 26, 2001) came into existence on February 5, 2001, less than a month before the X-33 cancellation. There are fourteen member states (Alabama, Alaska, California, Florida, Montana, Nevada, New Mexico, Oklahoma, South Dakota, Texas, Utah, Virginia, Washington and Wisconsin) whose mission is “to regain American predominance in commercial space development.” Both of these organizations but especially NCSS represent formal efforts to cooperate in pursuit of more explicit recognition as to the economic value of space-related activities. Clearly, ten of the members perceive space more broadly than in just an active spaceport although their assumption is that future RLV technology development will create opportunities that they will be prepared to pursue.

Such efforts are essentially expanding the definition of U.S. transportation policy to incorporate space transportation. An entire litany of possibilities will follow although not without a struggle as existing stakeholders resist a new member. One can use the comsat market as a prototype for the future. Existing electronic media (over the air and cable) resisted the enhancement of comsat delivery of television and radio. Rules regarding local access and property restrictions upon dish size had to be attacked congressionally and

through the administrative process. Expanding the definition of transportation enables a number of tools to be utilized such as trust funds and other fiscal devices.

The other major factor stands outside the states' control – the commercial marketplace and the question of satellite size with effects upon usable launchers. Even if the trust fund question is resolved favorably to the states, the economic realities may be slower to respond in terms of launch demand. The reality is that states upon entering this field will find themselves immersed in the full play of capitalism. Whether the states can handle what that means in practice is an interesting and unresolved question. Governments are not normally so involved but here their instrumentalities, the spaceport authorities, must grapple with both national and international level variables. Success is not ordained but the first steps are being taken albeit with great trepidation. The ultimate irony is that state spaceports represent an extension of the state in an era in which the political rhetoric is for government retrenchment and withdrawal from many areas of public life.

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