NASA ALLIANCES: COLLABORATION WITHIN PUBLIC-PRIVATE PARTNERSHIPS

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ABSTRACT

This study explores collaboration between partners involved in public-private alliances formed by the National Aeronautics and Space Administration's (NASA). A brief analysis based on the comparative case study approach will be used to examine the formation and operation of two NASA research and development alliances: Advanced General Aviation Transport Experiments (AGATE) and Small Aircraft Transportation System (SATS). Literature on collaboration helps to frame the basis for this study. By exploring the development and interaction of these relationships, this study establishes the elements that facilitate collaboration. The importance of partnerships and collaboration with SATS and other aviation initiatives is advancing with government support. At a recent Congressional hearing, Secretary of Transportation Norman Mineta said, "The Department of Transportation is going to help SATS go from R&D [research and development] to implementation…implementation is already happening…the next generation national air transportation system plan will make the number of operations go up rapidly… SATS is very important to this and our future" (*Future of Air*, 2004). The study provides a foundation for future research into the varied public-private partnerships that constitute SATS

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This research explores what factors contribute to collaboration between participants. By investigating two general aviation public-private partnerships formed by the National Aeronautics and Space Administration (NASA) in 1994 and 2003, the study provides insight into their formation and working relationships. The terms “partnership” and “alliance” are used interchangeably throughout this paper. Alliances are “a novel form of voluntary interoganizational cooperation that involves exchange, sharing, or codevelopment and thus results in some form of enduring commitment between the partners” (Gulati & Garguilo, 1999, p. 1440). Accordingly, the primary importance of the study is to discover what effects collaboration by analyzing how Advanced General Aviation Transport Experiments (AGATE) and Small Aircraft Transportation System (SATS) were structured and developed over the course of their respective projects.

Public-private partnerships are beneficial when the organizations involved share a common goal and benefit from achieving it. In these situations, the advantages of collaboration outweigh those of competition (Hamel, Doz & Prahalad, 1989). Success is achieved when the partnerships meet program goals and participants’ expectations. The study analysis is shaped by the primary research question:

> What elements promote collaboration in public-private partnerships within AGATE and SATS?

The study analyzes the formation and operation of AGATE, the transition to SATS, and the establishment of SATS. A qualitative, comparative case study research design is used to systematically analyze data (Creswell, 1998; Miles & Huberman, 1994). By using a case study approach, the analysis provides a more thorough understanding of these two research and development alliances (R&D). The comparative case study approach is designed to add to the understanding of the phenomenon being examined (Yin, 1994).

In this study, the phenomenon describes the two public-private research and development alliances formed by NASA within the aviation industry. In relating the impetus for their formation, how these two specialized alliances were formed, how they functioned, and how they exhibited collaboration, the research will delineate corresponding issues between AGATE and SATS. The cases were built using an extensive study of available literature both electronically and traditionally published.

Holmes (1996) describes AGATE as a hybrid alliance that combines both a formal corporation-supported alliance with a formal government supported alliance. Continued federal budget constraints catalyze NASA's increased dependence on alliances and the use of public-private partnerships (Holmes, 1996). These partnerships are becoming increasingly prevalent in the transportation industry.

The AGATE and SATS programs were conceived to develop a transportation system and spark a resurgence of R&D within a rejuvenated general aviation industry of the 1990s (Holmes, 1996). These R&D public-private partnerships offered the potential for transforming the US transportation system.

LITERATURE REVIEW

To determine how NASA or the federal government may optimize its participation in public-private alliances, the study reviewed literature on collaboration theory (Doz, 1988; Gulati & Gargiulo, 1999). The case studies of AGATE and SATS use this literature as foundation (Miles & Huberman, 1994; Yin, 1994). The concepts presented in the literature form the basis for collecting and analyzing the data (Garro, 2000; Wimpenney & Gass, 2000).

The term collaboration has many definitions and associated meanings (Hord, 1986; Houston, 1979; Westphalen, 2000). This lack of agreement makes it difficult to discern a definitive description. However, for the purpose of this study, the researcher gathered a mixture of applicable literature from various areas of the social sciences with emphasis in both the public and private sectors. Forming a basic operational definition of the concept is critical to verifying the occurrence of collaboration. In this study, collaboration occurs when the individuals or organizations involved develop a "model of joint planning, joint implementation, and joint evaluation" (Hord, 1986, p. 22). The end result is an outcome that no single individual in the group could have achieved independently within the same time frame (Westphalen, 2000). Collaboration is an operational process that implies shared responsibility and authority in terms of decision-making (Hoyt, 1978).

Historically, organizations handled research and development (R&D) internally. In recent decades companies began using collaboration within interorganizational networks to enhance their R&D and other aspect of the production process (Powell, Koput & Smith-Doerr, 1996). The act of collaboration is often confused with the act of cooperation (Hord, 1986). In subtle contrast to collaboration, Hoyt (1978) distinguishes cooperation as assuming two or more entities act together to increase the success of their separate and autonomous programs. The complex nature of collaboration makes it more suitable than simple cooperation for dealing with multifaceted interorganizational relationships (Hord, 1986). Gray (1989) studied collaborative systems within the context of interorganizational partnering. By highlighting the cognitive interaction characteristics of the continual negotiation of relationships, Gray stressed problem solving and conflict resolution to achieve jointly accepted agreements and resulting outcomes.

Development of new technologies serves as a stimulant as well as a focal point to encourage collaboration (Powell et al., 1996). “Technology has been an enabler to collaborative systems from partnerships, to teams, groups, and organizations” (Westphalen, 2000, p. 30). By joining with other organizations, some of the risk associated with the new technologies or novel products is reduced. Appley and Winder (1977) describe collaboration as a relational system formed by individuals in groups. These individuals hold mutual objectives and a shared conceptual framework where interaction is just and fair. The aerospace industry is using collaboration in an increasing number of relationships to seize opportunities and maximize intellectual and technological growth (Westphalen, 2000). The basis of the objectives and interactions comes from a collective sense of consciousness, caring, commitment, and choice (Appley & Winder, 1977). This collective sense of consciousness also helps to stabilize the uncertainties of R&D and other new ventures in aerospace and other industries. By pooling resources with other organizations, the partners must come to terms with the outcomes and the risks.

Successful collaborative relationships tend to emerge from prior good experiences (Hord, 1986). Similarly, by accomplishing short-term goals, the collaborative relationship is likely to gain the momentum needed to sustain itself for the long-term goals. Personal experience is used as a major factor in the decision-making and relationship-building phases (Gulati, 1995; Hord, 1986). Each alliance is an opportunity to learn from the other partners and to build skills (Hamel, Doz & Prahalad, 1989).

Hord (1986) offers ten traits that reveal collaboration: shared needs and interests, time commitment greater than with cooperation, energy to sustain collaborative spirit, continuous communication, shared resources, organizational factors, relinquish personal control in favor of shared control, perceptions contributing to the collaborative climate, strong leaders, and personal traits including patience and persistence. These traits carry varying amounts of precedence depending on the structure of the alliance and the social context of its members.

Collaboration that develops based on involvement in a shared technological community can offer significant benefits to the participants (Powell et al., 1996). These benefits include combining resources and dividing labor, reducing isolation, enhancing motivation due to increased outside commitments, and increased momentum based on interpersonal relationships (Fox & Faver, 1984; Powell et al., 1996). In these situations, harmony or a lack of conflict does not signify success. Occasional conflict is needed to achieve the greatest benefit (Hamel, Doz & Prahalad, 1989). “Collaboration is competition in a different form” (p. 134).

Strategic objectives guide the collaboration, but each partner remains aware of individual goals. Within interorganizational collaborations, an organization’s value may be based on its internal assets, but the act of collaboration actually enhances the internal competencies. However, collaboration is not just a device to compensate for poor internal skills, nor is it just a collection of distinct business deals or independent relationships (Powell et al., 1996). Collaboration takes a great deal of time through frequent interactions and regular sharing (Hord, 1986). Organizations requiring stability and precise plans will have trouble handling the flexible environment required of collaborators (Westphalen, 2000).The effort of collaboration, just as involvement in prior alliances, affects an organization's willingness and preparedness to undertake such activities in the future.

METHODOLOGY

To understand collaboration and relationship formation processes, the case study method provides significant advantages for exploring a current alliance (Yin, 1994). "The public administration study with the richest information is thus a case study that reports detailed information about the conditions, critical events, and processes of a single entity" (Jensen & Rodgers, 2001, p. 237). As a form of empirical investigation, the case study explores the entity in its actual context (Creswell, 1998).

Research Question

- What elements promote collaboration in public-private partnerships within AGATE and SATS?
  - What elements hinder collaboration?
  - How does the organization adapt to enhance collaboration?
  - What kind of organization is best suited for collaboration in public-private partnerships?

By using a comparative cross-case analysis, this research examines the two general aviation-based alliances with reference to the three identified areas of literature. These alliances share a common foundation as NASA-led general aviation initiatives, but their goals, timelines, membership, and the industry environment in which they operate differ (Holmes, 1996). As government-regulated programs, both alliances exist as a bounded system with a specific start and end date. Established boundaries facilitate case development and analysis (Creswell, 1998; Yin, 1994).

A qualitative framework will be used for the design of this study given that qualitative research is particularly useful in exploring and understanding a social or human phenomenon (Creswell, 1998, p. 15). According to Merriam (1988), qualitative research focuses on process as opposed to outcomes. Therefore, it is an ideal structure to examine research questions which focus on how the organizational processes and structures of NASA affect its general aviation alliances (Agranoff & Radin, 1991).

Given the researcher’s role as the principal agent for data collection and analysis, a comparative cross-case analysis approach based on relevant literature is appropriate (Agranoff & Radin, 1991; Imperial, 2001; Miles & Huberman, 1994). The researcher is able to construct a case study that shares a descriptive understanding of the actual process and perceptions (Merriam, 1988).

General Aviation Industry Environment

AGATE and SATS were created to lay the groundwork and develop the technology and infrastructure for a system of small airports serving areas neglected by major airports in the United States (US). According to Bruce Holmes (1996), general aviation manager of NASA, AGATE's primary goals were to develop the technological components, operational foundation, and network for a small aircraft transportation system. The pre-competitive objectives incorporate advancement of industry design tools and guidelines as well as system standards and Federal Aviation Administration (FAA) certification methods. (Holmes, 1996). The basic concept of SATS is built on creating "a new generation of affordable small aircraft as computer-based 'clients' on an airborne internet, operating in a fully distributed system of small airports serving thousands of suburban, rural, and remote communities" (Holmes, 1996, para. 2).

AGATE and SATS programs were formed to develop a transportation system and spark a resurgence of R&D within a rejuvenated general aviation (GA) industry. The program is designed to produce outcomes that include establishing design guidelines, identifying certification issues, and providing systems standards (GAPO, 2001b, p. 15). These outcomes will be reached incrementally through the integrated assessment, demonstration, and development process.

The timing of these programs was critical to general aviation and the national transportation system. The mid-1990s were marked by renewed national attention to general aviation that includes all civil aircraft operating outside of commercial airlines and the military (Holmes, 2000). During the late 1970s, general aviation sales and production decreased significantly in the US (GAMA, 2001). In 1993, aircraft production totaled 954 aircraft versus 18,000 aircraft in 1978 (GAO, 2001). The downturn was reflected throughout the industry including the number of new pilots and advanced ratings. By 1994 only 96,000 student pilot licenses were issued compared to 150,000 in 1980 (GAO, 2001). As opposed to a mere subsidy, that may have only short-term effects, the GA community was searching for a more long-term solution to increased sales and the number of pilots.

Lawsuits and a sluggish economy further dampened any efforts to improve the role of the GA industry. In 1994 the General Aviation Revitalization Act (GARA) was passed as an effort to remove some of the limitations placed on the industry by expensive lawsuits. In terms of product liability lawsuits, GARA established an 18-year time limit against the manufacturers of aircraft with 20 or fewer seats. After the 18 years has passed from the time when the product was manufactured, the manufacturer could no longer be sued if an incident occurs (GAO, 2001). This time limit applied to all aircraft-related components, engines and airframes. No time constraints had existed prior to GARA's passage. In addition to GA operatives and industry members, the National Commission to Ensure a Strong Competitive Airline Industry (NCESCAI) was a principal GARA supporter. The NCESCAI endorsement, linked with NASA Administrator Dan Goldin as a vocal GA champion, was critical in achieving a successful passage of the law (Bolen, 2001).

The GARA combined with National Cooperative Research Act in 1984 (NCRA) and the Space Act Joint Sponsored Research Agreement (JSRA) provided the positive environment to foster industry collaboration. The NCRA promotes industry collaboration in R&D without the threat of anti-trust repercussions (Holmes, 1996). Within the shelter of the Space Act, the deliverables or output from AGATE are protected from the Freedom of Information Act (FOIA) for five years after completion (Holmes, 1996). This exemption gives the industry members greater incentive to participate and partner with the government. According to Holmes (1996), this serves the public's interest by giving lead-time to US industry and ensuring public dissemination. The industry partners have the opportunity to develop products for the market without risk of the new technology being usurped by a nonparticipant.

In 1994, NASA formed AGATE, an interorganizational network, to handle the mounting concerns of the GA industry. With NASA in the leadership role, the federal government modified its position as a subcontractor and became a venture capitalist participating as a member in AGATE along with industry and academia. Just as the space program introduced the

US to space travel, AGATE was created to make air travel accessible to the general public via personal aircraft.

The nine years since the passage of GARA and the completion of AGATE have seen significant changes in the GA industry. The AGATE program triggered technological transformations that have reverberated throughout aviation (GAPO, 2001a). The period has been marked by substantial development and enhanced safety mechanisms that have benefited all of aviation (GAO, 2001). In addition to safety, the AGATE technologies have been able to increase the affordability of aviation as well as augmenting airspace capacity (GAPO, 2001a).

According to GAMA (2001), there has been a significant turnaround in the aviation industry since the inception of AGATE and GARA. AGATE has provided crucial contributions to the revitalization of the industry (GAPO, 2001a). Since 1996, aircraft deliveries increased 300 percent and industry billings rose 350 percent (GAMA, 2001). Since 1994, sector jobs have risen by 10 percent and the US export market has reclaimed nearly 20 percent of its lost business (GAMA, 2001). Industry growth has been accentuated by an applauded downturn in accidents. Aviation accidents declined by 41 percent between 1992 and 1999. (GAO, 2001). There is no indication of a reversal of this trend. AGATE technologies played an important role in this industry rebound (Bolen, 2001).

AGATE Organizational Structure

Through NASA's General Aviation Program Office (GAPO), based at NASA's Langley Research Center in Langley, Virginia, AGATE focused its efforts on bolstering the industry and creating new transportation opportunities. This joint effort between industry, NASA and the FAA allowed the AGATE program seven years (1994-2001) to revive the GA industry (GAO, 2001). NASA allocated $52 million to operationalize this rebirth (AGATE Alliance, 2001).

Additional funding came from several of the participants in equitable proportions. In the seven-year life span of the program, the total investment exceeded $300 million dollars. Sixty-two percent of that was from federal sources, the remainder, or 38 percent, came from the private and nonprofit sectors (GAPO, 2001a). Centered on industry revitalization, NASA created separate work packages to group consortium members based on three principal areas. These areas were fundamentally safety, affordability, and ease-of-use.

AGATE Working Strategy AGATE's working strategy centered on its primary goal to develop the technological components that would render a safe, low cost, efficient, private use aircraft (GAPO, 2001a). As a follow-on program, SATS was tasked with developing the infrastructure for a transportation system that could alleviate the congestion at major hub-and-spoke airports as well as within the interstate highway system (Bowen, Hansen & Holmes, 2000). GAPO provided the primary leadership role and maintained budgetary control.

AGATE Partners Within AGATE, the approximately 72 participant organizations were organized into work packages with a total of 8 of an original 12 work packages completing the program (GAPO, 2001a). Each work package functioned with mutually shared program and work package goals as well as the competing interests of the participants. Industry partners and NASA decided the work packages groupings based on the perceived needs and goals of AGATE. Each work package shared varying degrees of the principal three goal areas. Some organizations were involved in multiple work packages, while others focused on just one. The number of participants in each work package varied from 4 members to as many as 20. The partners and NASA decided who was to be involved in each work package (Scarpellini-Metz, 2002).

By the time AGATE was fully structured and in operation, the work packages focused on innovative cockpit technologies that were broken down into eight sections. The work package number and working titles of these sections were as follows (GAPO, 2001a): (1) Flight Systems, (3) Integrated Design and Manufacturing, (5) Integration Platforms, (6) Flight Training Curriculum, (7) Systems Assurance, (8) Management of Public-Private Alliances, (11) Systems Engineering, and (12) AGATE Program (AGATE Alliance, 2001). The other work packages, such as, (2) Propulsion Sensors and Controls (4) Ice Protection, were canceled due to changing priorities and funding during the course of the program.

Companies participated at three categories of membership: principal, associate, and supporting. The level of participation depended on the financial and workforce resources that a company was willing and able to contribute (GAPO, 2001a). Principal members often offered important technical contributions in one or more work packages. Principal and government members led major tasks. Associate or supporting members handled only agreed upon sub-tasks. Each member played an important part in the creation of a successful team. Competitive groups operated within and between the work packages.

The organizational structure of AGATE blended management and leadership within the public and private sector. Typically NASA managers acted as work package leaders and reported back to GAPO. Overall, these leaders came from government organizations deemed by NASA to be most suitable to a specific area of focus. Also, every work package had a technical council made up of a representative from each of the voting members' organizations. Work package leaders functioned as the chairperson of these councils. The technical council established the work package's research and technology (R&T) priorities, prepared annual R&T plans, and distributed funds to work package members.

The previously-mentioned JSRA governed the AGATE program. The JSRA was constructed to avoid many of the barriers commonly associated with federal acquisition regulations (Office of Aeronautics, 1993). The agreement encouraged an open flow of information and collaboration across groups. Regular reports and feedback were considered critical to assisting the information flow and technological development. According to AGATE participants, "This unique agreement allowed for greater flexibility while allowing participants to take risks with higher payoffs, accelerate technology transfer, manage control of proprietary and joint technologies, and increase efficient use of limited resources" (Scarpellini Metz, 2002, p. 9). The JSRA mandated the distribution of all AGATE-related information. Additionally, all members agreed to the terms of the JSRA in writing. This included providing quarterly updates on project status and an account of the spending of AGATE funds. However, while the JSRA may have dictated the terms of the program, the agreement was difficult to maintain and enforce with the regular turnover in NASA management and leadership positions (Scarpellini-Metz, 2002).

SATS Organizational Structure

In 2000, Bruce Holmes, NASA’s General Aviation Program Office Manager, presented a General Aviation Roadmap with a 25-year strategy spanning the accomplishments of AGATE, as well as similarly organized General Aviation Propulsion (GAP) program, and the small aircraft transportation system. These programs depend on collaboration between public and private partnerships. SATS is organized and developed to be a safe travel option, releasing people and products from the constraints and time limitations of the present transportation system. People will be able to travel to a greater number of communities in less time (Holmes, 2000). By integrating progressive aircraft and communications technology with untapped aviation infrastructure, SATS is being established to satisfy national transportation needs. This system has the potential to alleviate the congestion and delays experienced in the current hub and spoke air transport infrastructure as well as serving communities and regions currently neglected (Tarry & Bowen, 2001). SATS aircraft will be built using innovative technology generated by AGATE and GAP in navigation, communication, and propulsion. Under the SATS design, users will be able to access over 5,000 general aviation airports across the US (Holmes, 2000).

Increased accessibility and mobility are the touchstone for developing SATS. To show that SATS will work, NASA launched a research initiative in 2001 to continue through 2005. The initiative operates within a public-private partnership similar to AGATE with the Department of Transportation/ FAA, state and local aviation authorities, as well as universities and service providers. SATS is operating with current funding support by Congress at $9 Million/year for five years of which $7 million is extended outside of NASA under contract (Bowen, 2001).

SATS Labs are more complicated organizations than the work groups associated with AGATE. The term *lab* comes from the idea that these groups make up working laboratories of a range of members experimenting with different technologies and concepts to further the purposes of SATS. There is some competition to be first as well as a shared desire for overall success (S.Siddiqi, personal communication, March 12, 2004). The labs were formed from within, not created by NASA or National Consortium for Aviation Mobility (NCAM). NCAM is the nonprofit organization selected by NASA to serve as the liaison between SATS members and NASA. S.Siddiqi indicated this was to allow the groups to foster themselves and achieve a credibility that can be developed through collaboration. NCAM also manages and integrated the technical advances and product outcomes created by SATS members. As the SATS Labs developed across the country they began to impact each other both through competition and collaboration.

SATS Working Strategy The focus is on introducing four operating capabilities that will ensure safe and affordable entry to practically every runway in the country regardless of most weather conditions (Holmes, 2000). The capabilities depend on advanced flight controls and flight deck display formats, as well as on-board computing and emerging technologies in navigation, communication, and surveillance. According to Holmes (2001), by the time of its completion, the initiative will provide a demonstration of integrated technology that will illustrate the potential for these emerging technologies in airspace operations and structure. "The SATS concept is based on a new generation of affordable small aircraft as computer-based "clients" on an airborne internet, operating in a fully distributed system of small airports serving thousands of suburban, rural, and remote communities" (para. 2). By stimulating latent markets of consumers, SATS may benefit from encouraging trips imagined, but never taken before this new system.

The aircraft and aircraft components designed in AGATE need to operate within a restructured air system in order to be fully operational. To prove that the SATS concept works, SATS partnership has been organized to concentrate on four basic hypothetical statements. These hypotheses guide the technological advances as well as the partnership configuration. According to Holmes (2000, para. 7), the four hypotheses are:

1. The public can safely operate a SATS vehicle in three dimensions, in near-all-weather, including abnormal operations.
2. The public can afford to travel by SATS.

3. SATS infrastructure is an affordable option for National transportation system investments.
4. SATS benefits all suburban, rural, and remote communities in terms of accessibility, mobility, economic opportunity, environment and quality of life.

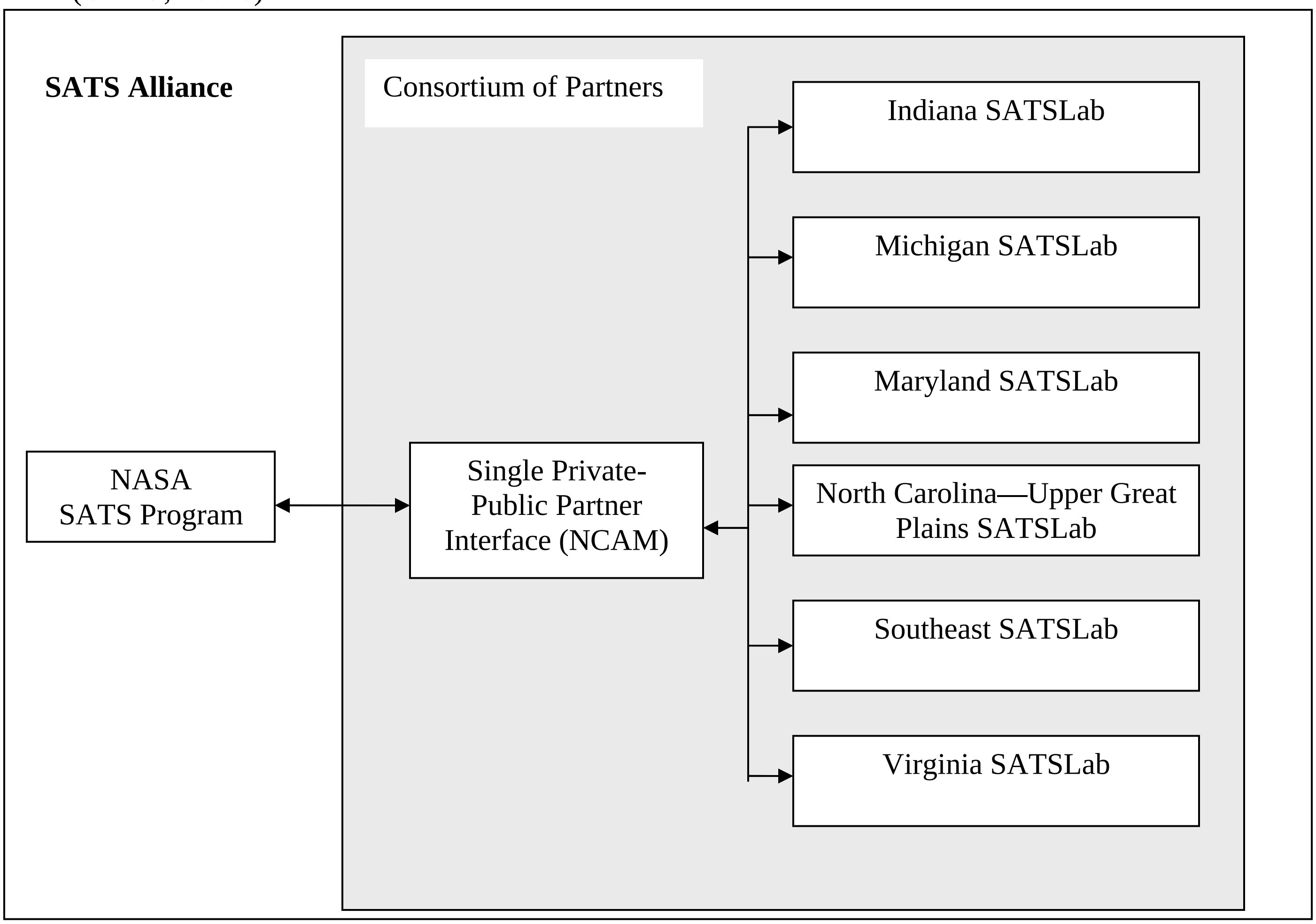
The integrated technology demonstration is based on three capabilities to demonstrate these hypotheses. These capabilities include Virtual Visual Meteorological Conditions (VMC) for Routine Instrument Meteorological Conditions (VMC) Operations, High Density Operations, and Automotive Synergies. Essentially, these capabilities prove that non-commercial aircraft operations would be able to conduct VMC-like operations in IMC conditions without an increase in airport protection areas. Also, SATS operators will function seamlessly without interference around and within Class B airspace associated with many hub airports. Finally, these capabilities share the potential to incorporate automotive design and manufacturing as well as operator and vehicle certification processes. This would enable an air vehicle cost to more closely reflect that of an automobile. Fixed-wing aircraft requirements for SATS are in accord with rotorcraft requirements. Vertical flight configurations may also be included in the SATS transportation fleet.

The impact of SATS is possible at four areas: National, regional/state, community/airport, and personal/business. The public good comes out of the increased mobility as well as the enhanced safety of travelers. In addition to travelers, SATS will benefit small cargo operators, emergency service providers, and other areas of public service aviation (Holmes, 2000). The advantages include reduced cost, faster service, greater airspace efficiency, and positive environmental impact. By no longer needing traditional protection zones, the additional cost of providing these zones is no longer necessary. Due to the reduced cost and enhanced infrastructure air transportation could be provided to over double the number of current communities served by 2010 (Holmes, 2000). In the long terms, the number may exceed 10-fold. In addition to increased mobility, this accessibility could create economic growth opportunities for these communities.

SATS Partners The SATS concept involves stakeholders in states, cities, counties, and rural communities that would benefit from SATS technologies in terms of mobility. The Aerospace States Association (ASA) 40 state members sanction or approve of SATS (Holmes, 2000). The collaboration depends on the contributions of industry, government, and academia to act on the technologies developed in AGATE (Tarry & Bowen, 2001). SATS members are linked to specific SATS Labs. These include the North Carolina—Upper Great Plains SATS Lab that the University of Nebraska participates in, as well as, the Southeast SATS Lab based in Florida, and the SATS Labs in Maryland, Michigan, Virginia, and Indiana. Michigan and Indiana are the most recent labs to join the consortium. The Virginia SATS Lab was one of the original laboratories established to begin experimenting with the SATS personal transportation system concepts. Internal conflicts precipitated a complete reorganization of the lab, but it is now actively pursuing the technologies needed to meet this deadline (L. Nguyen, personal communication, March 11, 2004).

The communication and exchange of information occurs primarily within each individual SATS Lab (Figure 1). The SATS members interact with each other within the SATS Lab, but are not involved in direct communication with members of other SATS Labs. If there is an exchange, this is facilitated by NCAM in its coordinating role. SATS Labs do not typically collaborate with each other in part due to the competition that is emphasized between them by the structure of SATS and the encouragement of NASA and NCAM. As opposed to the collaboration that was fostered between work groups in AGATE, SATS Labs operate in competition with each other and sometimes within the individual group or lab. However, all SATS Labs share the goal of developing the transportation system.

Figure 1. Program Relationships to Partners adapted from SATS Program Plan VO.8 draft (GAPO, 2001b)



SATS has until 2005 to complete its program cycle. The program has much to accomplish in order to live up to the SATS concept presented by Holmes (1996; 2000). There is little evidence in existing literature to demonstrate its ability to achieve the guiding hypotheses established at its formation. This lack of information may be due to the relationships established during SATS operationalization as well as a result of the SATS—AGATE relationship. The formation processes of these programs may provide a clearer explanation of this story when examined in a theoretical context.

DISCUSSION

NASA's research and development alliances are constructed to produce specific technology in terms of products and concepts. Due to their reliance, at least in part, on public funding, these alliances are accountable to the public for their results. Some results are difficult to measure. Even public-private partnerships that do not meet the intended goals may provide alternate advantages to the public, the scientific community, and the industry. The factors that encourage collaboration appear to be alliance formation patterns that foster two-way communication and permit shared usage of technology and information. Also, the flexibility of the organization/partnership to adapt and exhibit organizational learning throughout the partnership results in greater collaboration. By flexing to fit the new and changing needs of the various partners, the partnership is able to support collaboration.

Applying a comparative case study structure to this research helps to illustrate the role of organizational development in relation to public-private partnerships. A brief case overview was provided to offer an initial comparison AGATE and SATS and their relationships to each. Additionally, this study is limited by its narrow focus on two general aviation alliances. While NASA has often been the subject of previous research, the networks created by the AGATE program and subsequent SATS program are remarkable in their combination of the federal government, private industry and academia on essentially equal ground (GAPO, 2001a). Frequently NASA handles the development and management of projects by awarding private companies contracts to develop specific elements of a program. The organizational structure of some NASA programs, though effective in achieving technological advances, have been flawed in their management (Stillman, 2000). This flaw can hamper the overall effectiveness of the program. The management and organizational structure of AGATE could also influence the effectiveness of the AGATE as well as SATS and subsequent programs.

Additional research on collaboration based on alliance formation patterns and the occurrence of organizational learning will enhance understanding of public-private partnership. By developing a deeper knowledge of what elements promote increased collaboration between the public and private sectors, further research may discover the impact of specific organizational structures on NASA public-private partnerships such as SATS. Further research on the development and maintenance of public-private partnerships within the six SATS Labs, would provide a compelling picture of how a range of organizations self-selected themselves and initiated collaboration. Each lab is a unique entity with its own set of objectives and structural arrangement. However, all six labs are coordinated by the National Consortium for Aviation Mobility per agreement with NASA. An analysis of SATS may provide information that could in turn be useful to other public-private partnerships developing at the local, national and international level.

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