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Washington Goes to Sand Hill Road: The Federal Government's Forays into the Venture Capital Industry

Athar Osama, Ph.D.

Foreword

At a time when the federal government is attempting to ensure that the United States remains economically, technologically, and globally competitive, there is renewed interest in supporting innovative models and mechanisms that can spur and reward high-risk, high-reward research and development (R&D). Ranging from awarding competitive prizes to partnering with foundations and other non-profits such as regional technology based economic development and entrepreneurial support forums and specialized mission-oriented initiatives (e.g. the X-Prize Foundation), these funding approaches for science and technology have benefits that go beyond the traditional government request for proposals and grant-making competitions: they can address long-range, intractable, and "hard" problems; encourage the formation of multi-faceted, interdisciplinary teams; respond to quick turn-around and product-development cycles; and reward creative, out-of-the-box thinking. In many respects, they mirror funding schemes employed by private firms to stimulate innovation. The following paper by Athar Osama analyses one such pioneering approach by the federal government to encouraging high-risk, high-reward R&D: venture capital.

The icon of Sand Hill Road—a location in California’s Silicon Valley that is well known for the location and high concentration of venture capital firms—is powerful. It symbolizes America’s strong private sector, quick flow of capital and investments, and willingness to take risks. In Washington, D.C., the federal government has historically avoided such venture capital methodologies under the argument that they are solely the province of markets and private organizations. Osama shows, however, that there are advantages for the government moving towards this type of model to speed up and encourage the development of new technologies. This paper traces the history of the concept of government venture capital and then moves on to analyze a suite of the most well-known funds in this area: In-Q-Tel by the Central Intelligence Agency (CIA); the Army Venture Capital Fund at the United States Army; and Red Planet Capital by the National Aeronautics and Space Administration (NASA).

This is a critical point in time for government venture capital, as questions are being asked about its chances for success, appropriateness for stimulating R&D and commercialization, and relationship with other funding mechanisms in both the public and private sectors. These concerns are particularly pressing when considered in conjunction with the emergence of a new set of emerging and converging technologies—from nanotechnology to synthetic biology to advanced robotics—that will be researched, developed, managed, and commercialized simultaneously across state, federal, and international boundaries. Such innovations will lead to a number of open and interesting questions that need to be ad-

ressed in order to maximize the benefits of such funding approaches, including:

- What kind of rigorous evidence do we have that these models have been successful? Are there certain things that these funds do better than others?
- Is there enough public and political support to continue funding these endeavors? Could (or should) such support be created through better education and evaluation?
- Can government venture funds fill a niche at other science agencies—such as the National Science Foundation, the Department of Energy, and the National Institutes of Health—as they are already attempting to do at the CIA and the Army?
- What unexplored scientific, cultural, and institutional limitations need to be addressed before the funds’ full potential can be released?
- Who will act as a champion for these and other innovative funding mechanisms?

This paper is a first step in addressing such questions and illustrates that more work is needed to better understand how government venture funds—and other funding models for high-risk, high-reward R&D—can address the complex innovation challenges of the 21st century.

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ABOUT THE AUTHOR

Dr. Athar Osama holds a PhD in public policy with a specialization in science, technology, and innovation policy from the Frederick S. Pardee RAND Graduate School for Public Policy in Santa Monica, CA. Currently, Dr. Osama works as a Senior Consultant for ANGLE plc.—a UK-based technology commercialization consulting, management, and venture capital company with offices in United States and the Middle East, where he supports the company's technology and innovation policy consulting and new venture formation activities.

Prior to joining ANGLE, Athar worked as PRGS Doctoral Fellow at the RAND Corporation in Santa Monica where—alongside his doctoral dissertation—he worked on a variety of issues dealing with science and innovation policy including, but not limited to, management of innovation, R&D management and measurement systems, financing of new technologies, entrepreneurship and venture capital, and technology-based economic development. While at RAND, Athar was part of a study team that helped propose and create US Army's Venture Capital Initiative (OnPoint

Technologies), support restructuring of US Army's Research, Development, and Engineering Command (RDECOM), and devised R&D and outsourcing strategies for Army and USAF.

In addition, Athar has also specially focused on systems of innovation, venture capital industries, information and communication technologies, and higher education systems in developing countries. In 2005, Athar authored the first National Software Industry Study of Pakistan's Software Industry. Athar also consults with Science and Development Network (SciDev.Net)—a UK based charity focused on promoting the use of science for development in the South—on science and innovation policy issues.

He writes widely on issues at the intersection of science, innovation, and development across a range of print and online publications around the world. Athar holds a bachelor's degree in Aeronautical Engineering and is a graduate of Pakistan's Airforce Academy where he also won the coveted "Sword of Honor" for his all-round performance. Athar may be contacted at: Athar.Osama@gmail.com.

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“ Navigating a previously uncharted territory..., these funds have come under intense scrutiny from both a public policy and an ideological standpoint.”

1. INTRODUCTION

The role of the government, especially the federal government and its agencies, as a supporter and promoter of basic scientific research and development (R&D) is well established in academic literature and practice. The federal government has supported scientific and technological development through a host of direct and indirect policy options including, but not limited to:

- R&D tax credits;
- Federally funded R&D grants, through agencies such as the National Science Foundation (NSF) and the National Institutes of Health (NIH);
- Agency-specific procurement contracts, through agencies such as the National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD); and
- Support for high-risk endeavors, through agencies such as the Defense Advanced Research Projects Agency (DARPA), the United States (US) Small Business Innovation Research (SBIR) Program, and the Small Business Technology Transfer Research (STTR) Program.

More recently, however, there has been a move toward federal government involvement in and support for commercialization of new technologies. Among these endeavors are the Advanced Technology Program (ATP) and the Commercialization Assistance Programs (CAPs) established by various agencies. The most visible—and perhaps controversial—of these efforts, however, have been the setting up of federally funded, agency-specific venture capital funds by the intelligence community, the US Army, and NASA.

Established between 1999 and 2006, these venture capital funds were designed on the pretext of providing these agencies with access to science and technologies being developed in start-up companies across the United States and, in the process, influencing technology development and commercialization in a sector traditionally hesitant to work with the federal government. Navigating a previously uncharted territory with little or no evidence of actual benefits and goal achievement, these funds have come under intense scrutiny from both a public policy and an ideological standpoint.

The most recent development in this ongoing debate on the utility of the federal government's involvement in technology commercialization and venture capital arena was the decision, in 2007–2008 budgetary allocations, by the Bush Administration's Office of Management and Budget (OMB) to discontinue funding for at least one of the three federally funded venture funds currently in operation (NASA's Red Planet Capital). This action has once again pushed the viability and utility of such programs into sharp focus and public scrutiny.

This paper looks at the history of federal government's involvement in the venture capital market and makes policy recommendations about evaluating the success (or lack of it) of these programs from an evidence-based, rather than an ideological, perspective.

2. BACKGROUND

Government has long been a promoter and financier of high-risk scientific and technological research, not only as a key sponsor of research (from blue-sky basic research to applied research to development in the nation's public sector labs and universities) but also as an initiator of or a major contributor to special programs designed to help commercialize the results of scientific and technological research and to solve particular problems.

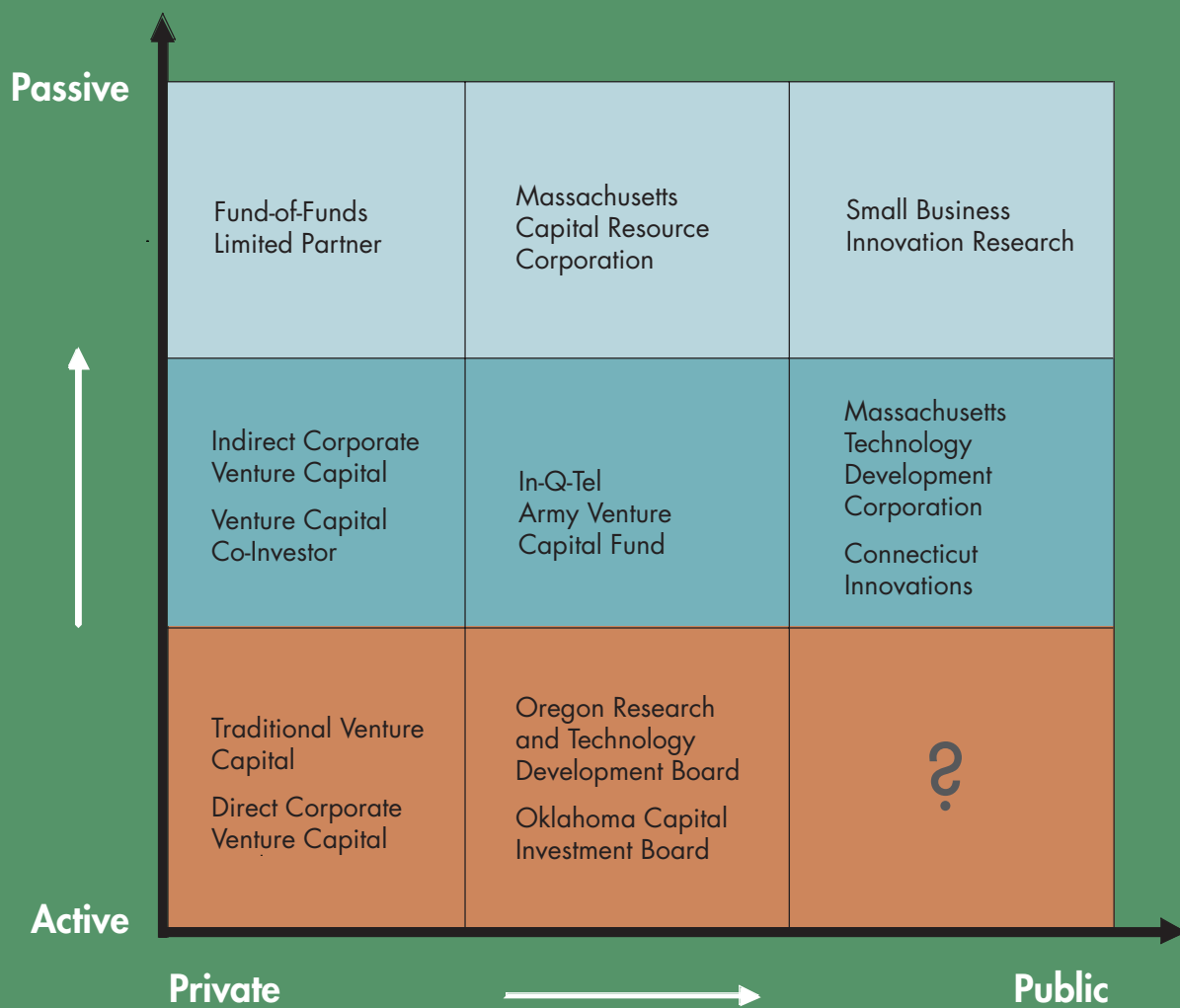
These interventions are generally justified on the basis of the presence of a market failure (in other words, the lack of markets to provide enough capital because of the high risks associated with these ventures) or asymmetry of information (in other words, the inability of various actors to evaluate the opportunity and the risks involved). In the management-of-innovation realm, a growing literature deals with the famous “valley(s) of death” between an idea and a commercialized product. The matter becomes more complex if one of the stakeholders (either the producer of the idea or technology or the final consumer) is the government as it introduces further complications often associated with government failures¹ and workings of bureaucratic organizations.²

Examples of these interventions include the US Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs, the Advanced Technology

Program (ATP), and the Defense Advanced Research Projects Agency (DARPA). The SBIR Program, for example, is one of the largest (in overall dollar value) programs in America today that funds small businesses and inventors. It is funded through a program that sets aside 2.5% of R&D budgets from agencies that have extramural R&D budgets greater than \$100 million. Today, 11 federal agencies, such as the Department of Health and Human Services (DHHS), the Department of Homeland Security (DHS), the Department of Energy (DOE), DOD, and NASA, participate in the SBIR Program. In fiscal year 2007, the budget request for SBIR across all agencies amounted to around \$128 million.

The SBIR Program is divided into three phases. The first phase comprises a feasibility (or proof-of-concept) study funded at \$100,000 over six months, the second comprises a full-fledged research effort funded at \$750,000 over two years, and the third (unfunded) phase seeks to commercialize the resulting technology. The legislation authorizing (and later re-authorizing³) the SBIR Program required two interrelated objectives or criteria for the program, namely, scientific and technological merit and the commercialization potential of the proposed idea. To date, more than \$12 billion have been awarded to small businesses to participate in the SBIR Program.⁴

While the SBIR Program is the largest and the most visible attempt by the federal government to share in and subsidize the risk inherent in research and new-technology development—in this case, for qualified small businesses—it is not the only one. A plethora of programs and interventions exist across the technology development and commercialization continuum as well as across the levels of government—federal and state, to be more precise—that attempt to address the market failure associated with the development of new, high-risk technologies by private sector actors.

Figure 1: Risk-Venture Capital: A Broad Institutional Typology

There are various ways to categorize the policy interventions used in this respect. Figure 1 presents an institutional typology that categorizes these instruments by their public or private character, on the one hand, and by the degree of involvement (active or passive) of the sponsoring entity, on the other hand.⁵

As Figure 1 illustrates, governments—both state and federal—have been involved in a variety of venture (or risk) capital activities for quite a while now, spanning a range of institutional typologies, from passive to active and from more private sector based to more public sector based. Many of these programs, such as Connecticut Innovations and Oklahoma Capital Investment Board (OCIB), are structured in a manner that utilizes the government as a passive financier rather than an active investor.

This approach has traditionally been favored for obvious reasons. Primarily, it merges the capabilities and characteristics of the government with those of the private sector. The government characteristics of this approach allows for access to “deep pockets” of funding, a willingness to correct perceived market failures, and the ability to take certain kinds of long-term risks. The private sector characteristics bring a set of in-depth technical and managerial know-how, financial incentives to perform, and existence of a mature risk capital market that could be “primed” to support new innovations. The result is that relatively small inducements and infusions of capital can be used to serve an unrepresented market segment, such as small businesses within a state, a certain under-funded sector, or unmet mission needs of various government agencies.

This began to change in the late 1990s with increasing willingness by governments—especially the federal government—to step beyond their traditional mandates and organizational characters to take on the role of active venture capitalists. This is depicted Figure 1 in the center-most cell of the grid as evidenced by the creation of venture funds such as In-Q-Tel by the Central Intelligence Agency (established in 1999) and Army Venture Capital Fund by the US Army (established in 2003), and Red Planet Capital by NASA (established in 2006).

In this paper, we focus on these funds as we explore questions such as the following: What were the political and organizational motivations behind the creation of these “hybrid” organizational vehicles? What were their objectives? How well did they meet them? And finally, what does it mean for the emerging role of the federal government in venture capital markets? Before we delve into these questions, however, we look at each of these funds and trace the intellectual development of the idea.

“What were the political and organizational motivations behind the creation of these ‘hybrid’ organizational vehicles? What were their objectives? How well did they meet them?”

“Throughout the 1990s, the pace of technological and commercial development in the information technology (IT) industry had reached unprecedented levels.... The U.S. government, especially the intelligence agencies, was scrambling to catch up.”

3. THE BIRTH AND EVOLUTION OF THE IDEA

The concept of direct involvement by the federal government in venture capital markets originated in late 1990s as a possible solution to an innovation problem faced by the intelligence community. Throughout the 1990s, the pace of technological and commercial development in the information technology (IT) industry had reached unprecedented levels in recent history—perhaps all history. The U.S. government, especially the intelligence agencies, was scrambling to catch up with technological developments in the commercial world.

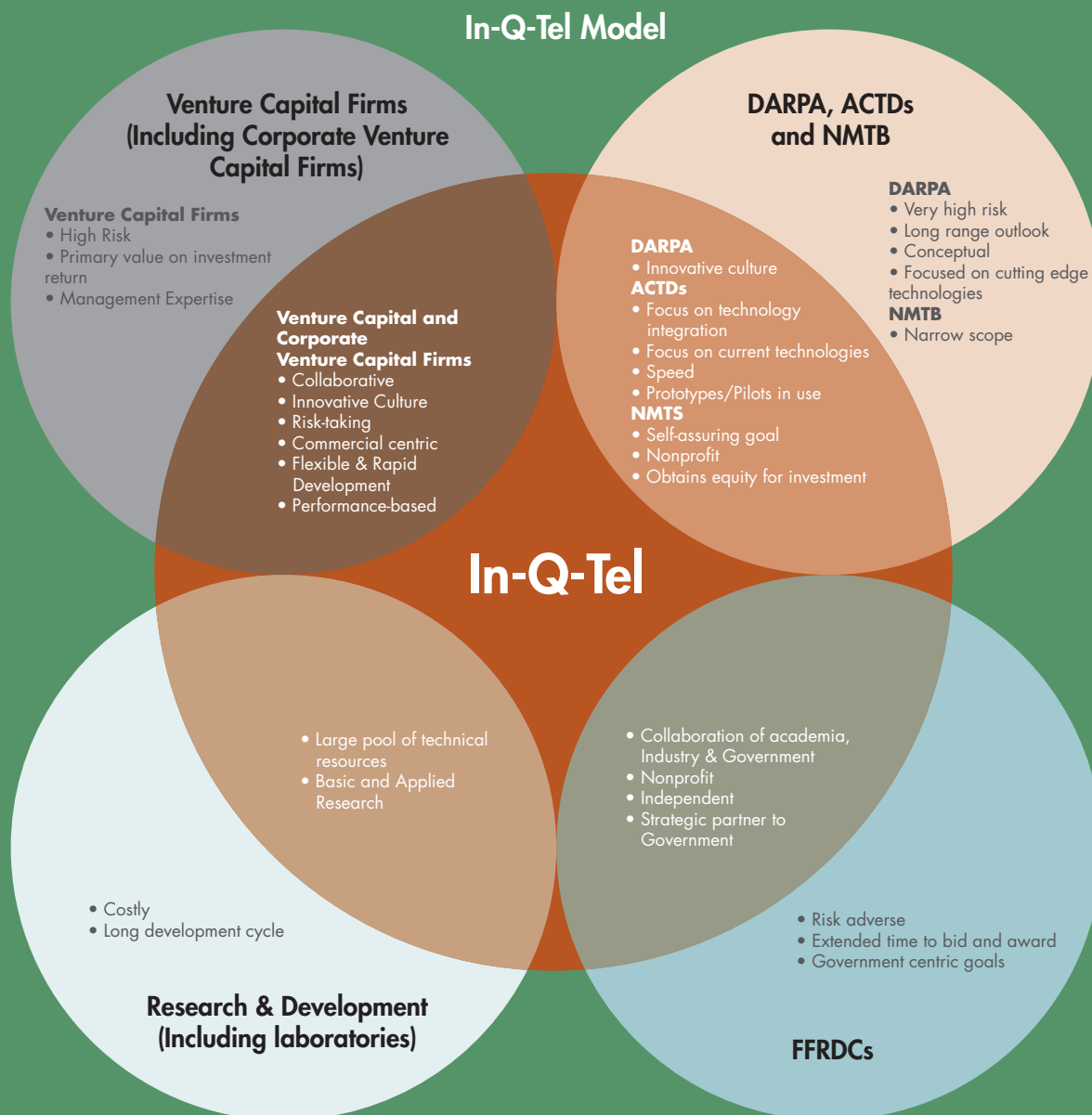
This, coupled with the need to attract and retain bright people knowledgeable about advances in IT, led to the perception of an “IT gap” among senior Central Intelligence Agency (CIA) officials, including the Agency’s Deputy Director for Science and Technology.⁶ This was acknowledged in the May 1998 Strategic Direction Initiative of the Director of Central Intelligence (DCI), and a small group of CIA officials (dubbed the Agency Group) was tasked with coming up a plan to remedy the situation.

The Agency Group procured the services of leading consulting and law firms to analyze potential models for technology procurement currently being used by intelligence, defense, and federal communities. The models analyzed included Federally Funded Research and Development Centers (FFRDC) and DARPA. The Agency Group also analyzed several traditional government technology procurement methods⁷ and various models of technology development. Finally, Group members interviewed more than 100 executives from the public and private sectors.

On the basis of this background research, the Group concluded that none of the models fully satisfied the unique requirements of the Agency. It recommended the creation of a hybrid model designed to best satisfy Agency requirements. In February 1999, Peleus, Inc. (later renamed In-Q-IT, Inc. and then finally In-Q-Tel, Inc.⁸) was born as a non-profit, non-stock, Delaware Corporation⁹ (for more on In-Q-Tel’s mission, structure, and organization, see section 4.1).

While In-Q-Tel had some support within the intelligence community itself, the idea of a CIA-operated venture capital firm was initially received with skepticism from much of the private sector, most notably private venture capital funds. The feeling is aptly described in the preface of the report published by the Independent Panel on CIA’s In-Q-Tel Venture Initiative and carried out under the auspices of the Business Executives for National Security (BENS) group. The preface notes that many members of the Panel approached In-Q-Tel with:

“...an initial reaction of skepticism and concern about the basic In-Q-Tel business model from a policy, legal and competitive perspective. Why should the US Government form a corporate nonprofit taxpayer funded entity to “compete” with private sector venture capital and investment banking organizations? What is wrong with existing government

Figure 2 Alternate Models Analyzed by the Agency Group

[Source: BENS, 2001]

“Does a model, which has never been tested, have any reasonable prospect of succeeding?... Can this possibly be legal?”

**—C. Lawrence Meador,
Chairman, Independent Panel on
CIA In-Q-Tel Venture**

technology procurement processes and why do we need to experiment with something that doesn't follow traditional approaches? Why can't the Central Intelligence Agency (CIA) and other components of the Intelligence Community get adequate access to the benefits of dealing with the significant number of highly innovative small to medium scale technology companies in the US by just approaching them directly?”

The preface continues:

“Does a model, which has never been tested, have any reasonable prospect of succeeding? Finally, how can this possibly be legal? We haven't seen anything like this before.”¹⁰

The media, after some initial skepticism, welcomed the idea and gave much publicity to it. The small entrepreneurial firms that In-Q-Tel was designed to tap into caught on with the media hype and, starting in September 1999, the company started receiving a “flurry of ideas from over 250 small ... pre-IPO firms.”¹¹ In-Q-Tel was deemed to be on its way to becoming a quick, overnight success.

In July 2001, the BENS Report gave a fairly positive evaluation of the In-Q-Tel model and progress to date when it noted that:

“The In-Q-Tel business model makes sense and its progress to date is impressive for a two-year-old venture ... In-Q-Tel's potential advantage to the CIA outweighs the risk. In-Q-Tel should continue as the CIA's entrepreneurial and innovative venture facilitating the delivery of new technology to the CIA.”¹²

This laid much of the skepticism to rest, at least for the immediate foreseeable future.

Following CIA's lead on this concept, but also somewhat independent of it, the RAND Corporation's Arroyo Center—a FFRDC for the US Army—released an issue paper in 2000 that proposed a similar arrangement for the Army. The problem that the proposed Army Innovation Investment Corporation (AIIC) was designed to address was twofold.

First, it would address Army's ability to tap into a commercial technology market that had shown a persistent reluctance to do business with the Army owing to the latter's traditional contracting methods and bureaucracy. The authors of the issue paper noted that:

“By using a venture capital model for some of its development needs, the Army could address one of its serious R&D shortcomings: its limited access to the commercial technology development sector. ... In this scheme, the Army venture capitalist acts as a middleman who understands the needs of the business and technology communities and who shapes agreements that solve Army technology problems while meeting those needs.

Since the venture capital organization would be outside of the Army, it should be better able to gain the trust of commercial clients and also act more quickly and flexibly than could the Army's current contracting organizations.”¹³

Second, going beyond the simple rationale of In-Q-Tel, the issue paper identified a more ambitious objective in that Army's involvement with the venture capital business would allow it to once again influence the shape of technological development—perhaps spawning entirely new industries—a kind of influence that military once exercised but had lost. The paper noted that:

“In the military, many of the transforming technologies also spawned new industries. Repeating rifles, radio, aircraft, and, today, the integrated circuit come readily to mind. Though these products eventually grew very large commercial markets, the first customer was the military, so to a great extent the military was able to guide the development of these industries and technologies. With most R&D today occurring in the commercial sector and with the change in markets, many of tomorrow's transforming technologies—e.g. biotechnology and networking—are being developed with little input from the military. By creating its own venture capital fund, the Army can regain some of its access and influence in emerging industries.”¹⁴

In June 2003, OnPoint Technologies was created under the authority of Section 8150 of Public Law 107-117 (the Department of Defense Appropriations Act for Fiscal Year 2002), which had set aside funding for a Venture Capital Initiative.¹⁵ OnPoint was created to meet the goal of the Venture Capital Initiative, with the aim of developing Army's “better collaborative ties with young, small, growth-oriented companies that take risks and push innovation.”¹⁶

Over the years, other government agencies such as the US Navy and NASA had also contemplated setting up their own venture capital vehicles.¹⁷ The third such fund that we look at is NASA's Red Planet Capital (RPC). NASA's goals in establishing the fund were not only to support emerging technologies but also to “help NASA gain access to partners that don't traditionally do business with the government and possibly influence product development.”¹⁸

The request for information¹⁹ issued by NASA identified three “management challenges” that RPC was specifically designed to address:

- To attract and motivate private sector innovators and investors who have not typically conducted business with NASA, including tapping more efficiently into the pool of small, leading-edge organizations which are responsible for much of the innovative hi-tech thinking and research in the US;
- To leverage existing external venture capital to encourage development of technologies and products likely to be of future use to NASA's mission; and
- To improve and expedite public/private partnership formation, through the redesign of administrative, management, and legal processes and procedures.

In September 2006, NASA announced the formation of a partnership with Red Planet Capital to establish a \$75 million (invested over five years) venture fund to help support the above objectives.²⁰

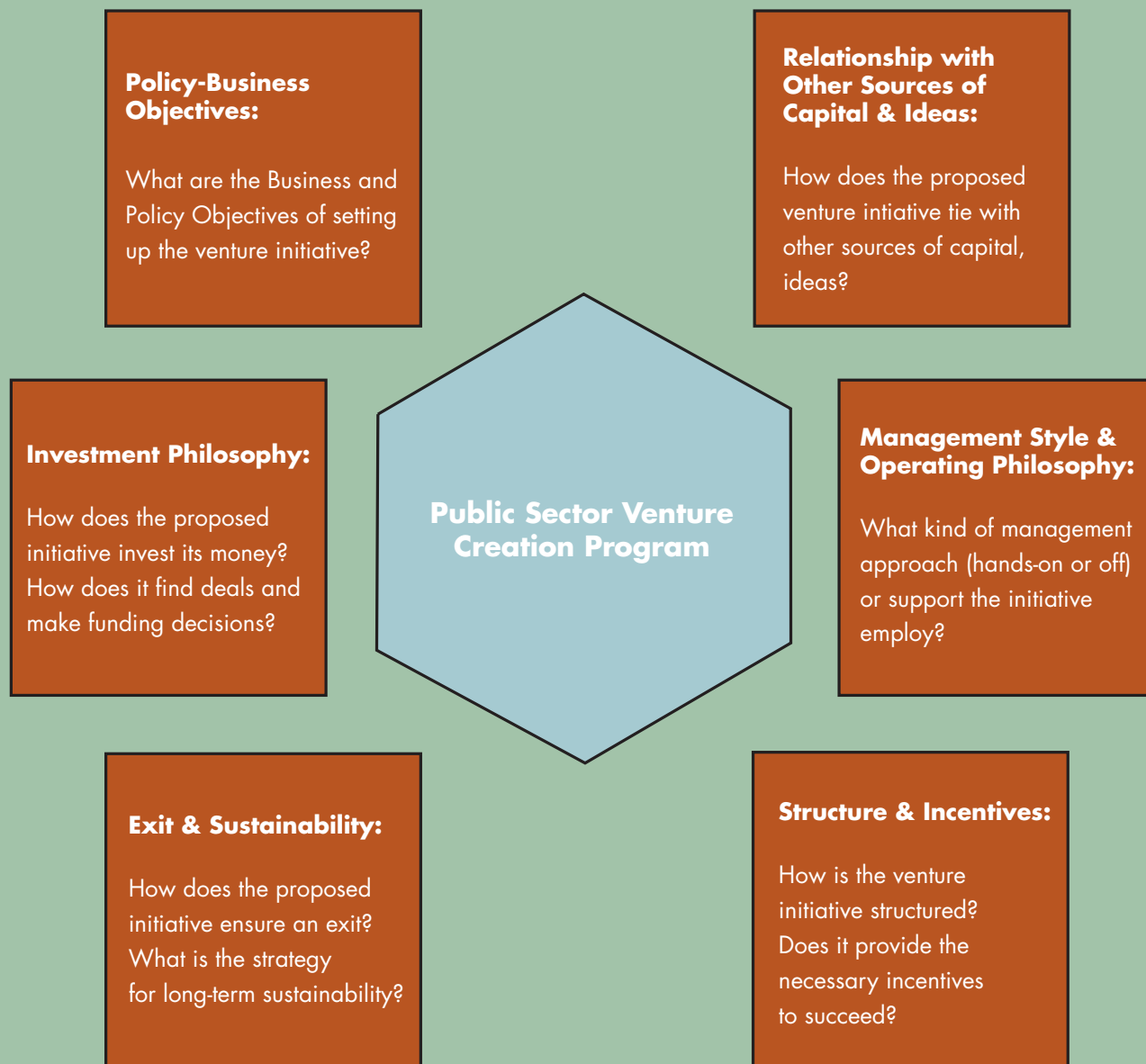
Having described the evolution of the idea of federal government's direct creation of venture funds and the rationale for its three most high-profile efforts, we now turn to the organizational arrangements of each of these three initiatives.

4. ORGANIZATIONAL DESIGN AND DEVELOPMENT OF FEDERAL VENTURE FUNDS

In this section, we look at the organizational design and development of three of the most popular federal government venture initiatives—In-Q-Tel, OnPoint, and Red Planet Capital. Before we do so, however, it would be useful to discuss an analytic framework that could be used to organize such a discussion. Figure 3 provides a six-part framework for looking at the objectives, organizational design, structure, and operation of a non-traditional (public sector) venture capital initiative. The six elements of the design are as follows:

- **Policy–Business Objectives:** While pure traditional venture capital firms focus solely on maximizing their rate of return, non-traditional venture-creation programs focus on multiple policy objectives, for example, targeting particular kinds of firms, commercializing a particular type of intellectual property, or meeting agency needs. Understanding and incorporating these diverse policy and business objectives is critical to developing a program that delivers on its stated objectives.
- **Relationship with Other Sources of Capital and Ideas:** Although a relationship with other sources of capital and ideas is important in traditional venture firms, it takes additional meaning in the context of non-traditional venture capital firms. Among the issues that arise are the following: Would public support supplement or crowd out private investment in entrepreneurship and R&D? Would it be a cost-effective use of taxpayer money?
- **Investment Philosophy—**For traditional venture creation, developing an investment philosophy is simply one—albeit non-trivial—way of differentiating among funds. For non-traditional programs, however, it is a critical design element. The investment philosophy of a venture-creation program flows directly from the policy and business objectives of the fund but requires certain additional creativity on the part of the designers. Questions such as “What, when, and how, would the program invest in new-firm-creation activity?” and “How would it pick potential investment targets?” are addressed at this phase of the design.
- **Management Style and Operating Philosophy—**Would the managers of the program adopt a hands-off or a hands-on approach? What sort of additional services (for example, skills, know-how, networking) would they provide to a portfolio company? In non-traditional environments, this becomes a key bottleneck because of organizational and institutional constraints such as availability of skill, time, and resources within traditional public sector bureaucracy.
- **Structure and Incentives—**More often than not, the managers of a non-traditional venture-creation program cannot be incentivized through financial rewards. This can considerably reduce their motivation to succeed. Understanding and accounting for how differences in incentive systems play into the venture-creation process is important for the design of a successful program.
- **Exit and Sustainability—**While exit and sustainability are straightforward issues in a traditional venture fund, they become more complicated in a non-traditional environment. When should a non-traditional fund “graduate” the company it is incubating? How should it ensure that portfolio companies do not become dependent on public money for their long-term sustainability? How should the fund attain sustainability? Issues such

Figure 3: A Framework for the Design of a Non-Traditional Public Sector Venture Initiative



as these must be addressed and resolved during the design phase of the program.

As we look at the organizational design of the three funds in question below, we will use the six elements as an organizing framework.

4.1 IN-Q-TEL

The founding objective of In-Q-Tel (and its predecessor, Peleus Inc.) was to help the intelligence community, most notably the CIA, tap into and influence the fast-changing IT market. The vision for the organization was described in its charter of incorporation as:

*“Invent the Agency of the future by raising its IT competence to that of the best practices of the private sector and then to explore new areas of research that equip it with capabilities that protect and advance our country’s national security well into the 21st century.”*²¹

The mission specified in that agreement was:

*“to exploit and develop new and emerging information technologies and pursue R&D that produce innovative solutions to the most difficult problems facing the CIA and Intelligence Community.”*²²

To accomplish this mission and vision, it was important to establish In-Q-Tel as an entity that could liaise with both the rather peculiar, conservative, and considerably secretive and closed culture of the intelligence community as well as the highly open atmosphere of the technology communities in Silicon Valley and elsewhere. Creating an entity with enough private sector “look-and-feel” to interact effectively with the industry, but not so much so as to jeopardize its ability to interact with the parent

agency, is a challenge repeatedly faced by the each of the three initiatives reviewed.

In-Q-Tel did it by creating a board of trustees comprising a mix of individuals with backgrounds in investment banking, academia, technology, defense, and intelligence to oversee the operations of the entity. An In-Q-Tel Interface Center (QIC)—comprising of 13 agency employees—was created as a liaison between CIA’s technology needs and In-Q-Tel’s investment philosophy. The QIC served as an advocate for the In-Q-Tel/CIA partnership.²³ QIC provides a two-way function that includes, on the hand, formulating the Problem Sets of the Agency’s needs and, on the other hand, finding and educating customers within the Agency for In-Q-Tel to serve.

In-Q-Tel’s role for the CIA has evolved over time, as described by the BENS Report:

*“The original concept of operations for In-Q-Tel was to be a type of technology systems integrator. That concept quickly evolved and In-Q-Tel became a buyer of products from long-standing Intelligence Community contractors. The model further evolved as In-Q-Tel started to receive good ideas and work plans from smaller start-up companies. Today, In-Q-Tel is a shopper in well-defined technology “spaces.” Each of In-Q-Tel’s evolutionary phases overlaps in time. While concurrency has presented some problems, it demonstrates the kind of agility In-Q-Tel needs to keep pace with the private sector and to meet Agency needs.”*²⁴

In-Q-Tel focuses on three broad technology areas: software, infrastructure, and materials sciences. Its investment philosophy is driven by an approach called the “Q Process.” The Q Process begins with the Agency defining its problems, continues as In-Q-Tel searches for a solution to the Agency’s needs and ends when In-Q-Tel returns solutions to the Agency for implementation. In-Q-Tel acts quite differently than a traditional venture capital firm

does, in a manner that has been described as a “venture accelerator.”

As of August 2006, In-Q-Tel had reviewed more than 5,800 business plans, invested some \$150 million in more than 90 companies—including Google Earth’s mapping technology for its intelligence applications—and delivered more than 130 technology solutions to the intelligence community.²⁵

4.2 ONPOINT TECHNOLOGIES/ ARMY VENTURE CAPITAL FUND

Following a one-time, \$25 million allocation by 2002 Defense Appropriations Bill, Army Venture Capital Corporation (AVCC) was formed with the following premises:

- AVCC will require support and involvement of very high-level Army staff;
- The day-to-day interface with the Army and AVCC must be managed by Agency staff that are committed to and enthusiastic about the idea; and
- The US Army must adopt a hands-off approach to the day-to-day management of AVCC.

In addition, it was resolved that AVCC, like In-Q-Tel, must be a 501(c)(3) non-profit corporation engaged in scientific pursuits and a venture capital corporation (per the authorizing legislation). The relationship between AVCC and the US Army is governed by “other transaction”—a highly flexible contracting instrument authorized under Section 2371 of Title 10, United States Code.

With a commitment for future funding not available at the time of the inception, it became impossible to design AVCC after the In-Q-Tel model. The lack of a commitment for future funding and its small size also made it more challenging for AVCC to recruit the right kind of staff (in right numbers)

and to provide them the financial incentives necessary for successful venture investing. After a careful analysis of a number of alternate models—namely, an In-Q-Tel-like model, an outsourcing model, and a passive-investor model—the outsourcing model was chosen for implementation.

This choice was primarily driven by the model’s ability to provide for the right kind of a for-profit organizational arrangement within the constraints of the non-profit structure of the fund. In essence, this model created a non-profit AVCC that then outsourced the management of the fund itself to a for-profit entity that could operate under the organizational structure and incentives of a traditional venture fund.

Once the decision to use the outsourcing model had been made, a regular request-for-information and request-for-proposals process was used to identify and select an entity to manage the for-profit fund.²⁶ The non-profit entity was also created—along with a board of advisors and an investment committee comprising individuals from public and private sectors—to guide the management entity. As a result of this process, MILCOM Technologies of Maitland, Florida was selected to create OnPoint Technologies as the Army’s venture capital arm.

Another important aspect of the setting-up process was the development of an investing strategy for the newly created fund. Given the unpredictability in future allocations,²⁷ it was decided to adopt a fairly narrow “problem set” for the fund so as to enable it to execute a considerably focused investing strategy and to deliver tangible outcomes. Through extensive consultations with Army leadership and members of scientific community, battery and power systems were chosen as the initial problem set. Another guiding principle for the fund was a requirement that it co-invest along with other private funds.²⁸ This allowed it not only to leverage private venture capital dollars but also to achieve an additional third-party validation for its investments.

“ Recognizing that with some investment money and a lot of universal goodwill, NASA could gain visibility (and influence)...., NASA leadership embarked upon creating Red Planet Capital.”

Since its creation, OnPoint technologies has generally made investments worth \$500,000 to \$2 million in companies focusing on mobile-power and energy technologies in areas such as generation (fuel cells and micro-turbines), storage (batteries and capacitors), management (semi-conductors and software), controls (control circuits and voltage sensors), distribution (conducting polymers and superconductors), and usage (low-power logic and components).²⁹ Portfolio companies include PowerPrecise (charge-measurement technology for portable batteries), UltraCell (high-power density fuel cell system), Zinc Matrix Power (advanced rechargeable batteries), and Nanosolar (thin-film solar).

4.3 RED PLANET CAPITAL

NASA's Red Planet Capital (RPC), while inspired by In-Q-Tel and OnPoint Technologies, has a somewhat different organizational philosophy designed to enable it to address a different problem and circumstances within its parent organization.

It was recognized from the onset³⁰ that while NASA had a fairly well-oiled machine for aerospace research and technologies, it lacked ability in other technology areas that may not directly relate to its mission but may still be relevant. In addition, due to the bureaucratic and logistical difficulties associated with government contracting, commercial technology providers that excelled in this kind of innovation generally tended to stay away from NASA.

Recognizing that with some investment money and a lot of universal goodwill, NASA could gain visibility (and influence) at the front end of the commercial technology development process (that is, in the start-up phase), NASA leadership embarked upon creating RPC.

The original idea was to design a small and nimble entity that “looked and smelled like venture capital”³¹ and was co-located with others around Sand Hill Road so that it could gain the trust of venture capital and entrepreneurial community in Silicon Valley.

The fund would be staffed by professionals who were not only well connected with the private venture community but also had firm grounding in NASA's needs and requirements. The fund was planned at an expected investment level of \$75 million over five years. It was started in November 2006 with an initial allocation of \$11 million.³² It was decided that the fund would invest \$200,000 to \$1 million in early-stage companies and may co-invest in later rounds with other funds for a maximum of \$5 million to \$10 million per company.

NASA created Red Planet Inc. through a Space Act Agreement as a not-for-profit entity designed to manage its relationship with RPC—a for-profit company that was supposed to act as the fund manager. The Board of Trustees of the new entity was selected by NASA and charged to track the deal-flow within the fund.

RPC would carry out extensive consultations with NASA's internal program and project managers and technology specialists to identify their needs and requirements. This activity would take place under the auspices of a Subject Matter Experts Committee. Once this committee had identified technology areas of interest, RPC staff would scour the private sector entrepreneurial and investment community and develop at least 75 Technology Notes per year detailing how technologies available outside NASA could fulfill the identified needs.

Another high-level committee, the NASA Interface Committee, comprising program directors inside NASA, was formed to facilitate the transition of the technologies back into the organization. Red Planet has received considerable support and enthusiasm from NASA leaders and program directors and managers for its efforts. In the first (partial) year of its operations, for instance, RPC principals produced 90 Technology Notes for NASA (as against the target of 75 per year). Thirty of the ninety opportunities thus identified were ultimately financed by private sector investors. NASA itself decided to invest in one of these opportunities.

5. FEDERAL VENTURE FUNDS: EVIDENCE-BASED POLICY OR AN IDEOLOGICAL DEBATE?

In February 2007, the federal government appears to have decided to pull the plug on the funding for venture investments. The step was taken as a pragmatic measure to cut support for certain types of discretionary funding programs and was justified by Rob Portman, OMB Director at that time, on the basis of an ideological argument. Answering a question at a press conference in February 2007, Portman noted the following vis-à-vis the funding request for RPC.³³

"We don't think the government ought to be investing in venture capital. So we propose eliminating that program, as an example [alongside 141 other programs]."

As a result of this directive, NASA's Red Planet Capital, dependent upon annual allocations from Congress, has begun wrapping up its operations as a federal venture capital fund and is looking to transform itself into an international venture fund network called Astrolabe Ventures.³⁴ While the venture framework, networks, and relationships it developed during its three-month-long operation might survive, the public funding component for it has not. Red Planet Capital Principal Graham Burnette is seeking private investment in a fund designed to leverage this know-how and organizational establishment.

Information provided at the above-cited press conference did not make it clear whether OMB had decided to cut all three of the federal venture capital programs. The Army's OnPoint Technologies, for instance, insists that it is still in operation and does not foresee a closure anytime soon.³⁵ OnPoint Technologies, however, may be a slightly different story in that it was not dependent upon annual funding by the Congress. The Army established the fund through the creation of a \$60 million endowment that provided the cushion to finance a multi-year investment stream.³⁶ This increases the likelihood that that OnPoint may survive, at least in a somewhat stronger position, and may be able to achieve sustainability by reinvesting the profits from its earlier investments. Similarly, it is difficult to precisely predict whether In-Q-Tel would survive these budgetary cuts primarily because of the rather unique nature of funding appropriations to the CIA and others in the intelligence community.

On the whole, though, it is fair to say that this abrupt decision to cut funding for federal venture capital programs merely a year after one such program was initiated by the Congress is probably due to more pragmatic reasons, such as the need for

budget cuts, than for deeper philosophical reasons. It is not based on a rigorous analysis of whether each of these programs had actually delivered the results expected of it in the short-to-medium term. While much can, and has been, said from an ideological or an economic standpoint about whether governments must intervene directly (or indirectly) in the technology commercialization or venture capital markets, it is not clear whether the three venture creation programs in question actually constituted a sufficiently substantial direct interference with the venture capital markets to cause resistance.

Indeed, a case can be made that governments have always interfered with the technology commercialization and venture markets. For example, the federal government continues to fund the SBIR, STTR, and ATP Programs; to support DARPA technology developments; and to provide vast R&D and other subsidies to technology firms.³⁷ In fact, much of today's commercial technology, from the computer and the Internet to Global Positioning Systems and mobile communication devices, would not have been possible without massive public sector support.

On the basis of latter, one can make an argument that the mission needs of the federal agencies today require a different, more finely tuned, intervention than broadly defined public subsidies for R&D, as these subsidies may only be partially effective in meeting an agency's peculiar technology needs. Such an argument, however, needs to be carefully constructed, analyzed, and validated, both before and after the venture fund is established. Evidence gleaned from several years of operation of In-Q-Tel and OnPoint Technologies can provide valuable insights into the validity of the argument presented above.

In particular, a thorough and rigorous analysis, conducted by an independent and objective third party, could inform this ongoing debate by making three important contributions:

Initiate a comprehensive analysis of the performance of the three federal venture capital funds in

question, including their contributions to the agencies' missions, the type of technologies supported and developed, and the role that this type of intervention played in comparison with other potential instruments of public policy.

Identify and highlight the challenges these venture funds have encountered, and continue to encounter, in carrying out their multiple missions of achieving technology innovation in their parent agencies while simultaneously creating a clear path toward commercialization and sustainability. This analysis must address critical questions such as:

- What are these funds really good at?
- What kind of problems do they solve?
- What kind of problems do they solve better than others?
- What are some other ways to achieve the same objectives, perhaps with a more market-based kind of policy intervention?

Finally, on the basis of the issues outlined above, develop a carefully constructed and fine-tuned economic argument for public policy intervention in this arena. This argument must take an impartial, broad view of the federal government's involvement in the technology commercialization and venture capital markets and, by doing so, exercise a degree of objectivity and independence that probably was not exercised at the time most of these initiatives were created.

The fate of federal venture programs—and for that matter any of public policy intervention—must be decided on the basis of rigorous economic and policy evidence regarding their effectiveness and utility rather than on a set of fuzzy ideological criteria of what a government should and should not do. This question of how, when, and why the federal government should become involved in the technology commercialization and venture capital markets is an ideal scenario to carry out such an analysis.

NOTES

1. For an in-depth discussion, see the work of Charles Wolf Jr., RAND Corporation.
2. For an in-depth discussion, see the work of James Q. Wilson, Pepperdine University.
3. SBIR was created by the Small Business Innovation Development Act of 1982 (P.L. 97-219) and later re-authorized until September 30, 2000, by the Small Business Research and Development Enhancement Act (P.L. 102-564), and again until September 30, 2008, by the Small Business Reauthorization Act of 2000 (P.L. 106-554).
4. National Institutes of Health, Office of Extramural Research, available at http://grants.nih.gov/grants/funding/sbirsttr_programs.htm, accessed October 23, 2007.
5. Figure adapted from Osama, Athar, "Transplanting Venture Capital in Developing Countries: A Critical Re-examination of Evidence." Santa Monica, CA: Frederick S. Pardee-RAND Graduate School; 2005.
6. BENS, 2001, Accelerating the Acquisition and Implementation of New Technologies for Intelligence: Report of the Independent Panel on Central Intelligence Agency In-Q-Tel Venture, Business Executives for National Security (BENS), p. 5
7. Ibid.
8. See <http://www.in-q-tel.org/>.
9. BENS, 2001, p. 6.
10. C. Lawrence Meador, Chairman, Independent Panel on CIA In-Q-Tel Venture, BENS, 2001.
11. BENS, 2001, p. 9.
12. BENS, 2001, p. v.
13. Held, Bruce; Chang, Ike. "Using Venture Capital to Improve Army Research and Development." Issue Paper IP 199. Santa Monica, CA: Rand Corporation; 2000, available at http://rand.org/pubs/issue_papers/IP199/index2.html, accessed October 23, 2007.
14. Ibid.
15. OnPoint Technologies was selected as a result of a competitive qualification process carried out under Broad Agency Announcement (BAA) DAAB07-02-R-B223.
16. OnPoint Technologies website, available at <http://www.onpoint.us/about-us/index.shtml>, accessed October 23, 2007.
17. Palmer, Kimberly. "NEWS+ANALYSIS Venture Capital." GovernmentExecutive.com, May 15, 2006, available at <http://www.govexec.com/features/0506-15/0506-15na1.htm>, accessed October 23, 2007.
18. Ibid.
19. NASA. 2006. Request for Information, Red Planet Capital, available at <http://www.spaceref.com/news/viewstr.html?pid=19532>, accessed October 23, 2007.
20. "NASA Enters Venture Capital Partnership." Physorg.com, September 20, 2006, available at <http://www.physorg.com/news77992241.html>, accessed October 23, 2007.
21. In-Q-Tel, Charter Agreement, July 2000.
22. Ibid.
23. BENS, 2001, p. 7.
24. Ibid.
25. Wikipedia. In-Q-Tel. October 2007, available at <http://en.wikipedia.org/wiki/In-Q-Tel>.
26. Several conversations with Bruce Held, RAND Corporation during 2005-2006.
27. This ultimately proved to be irrelevant as Army continued to fund AVCC until 2007, when the Bush Administration cut off funding for all federal venture initiatives.
28. OnPoint Technologies generally leverages \$8 of private money for every \$1 of its own investment. Source: <http://www.govexec.com/features/0506-15/0506-15na1.htm>
29. OnPoint. Investment Focus, 2007, available at <http://www.onpoint.us/our-focus/index.shtml>, accessed October 23, 2007.
30. Unless otherwise stated, this description is based on a conversation with Graham Burnette, Principal at Red Planet Capital.
31. Conversation with Graham Burnette, Principal, Red Planet Capital, August 28, 2007.
32. Scherzer, Lisa. "Fly Me to the Moon." *Smart Money*, November 16, 2006, available at <http://www.smartmoney.com/theproshop/index.cfm?story=20061116>, accessed October 23, 2007.
33. Primack, Dan. "Staying On Point." *Private Equity Week*, March 27, 2007, available at <http://www.pewnews.com/story.asp?sectioncode=44&storycode=41790>, accessed October 23, 2007.
34. See <http://www.astrolabeventures.com/>.
35. Primack, "Staying On Point."
36. Ibid.
37. Even companies such as Microsoft and Intel directly or indirectly benefited from these subsidies in the early days of their existence.

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