“C.I.A. Tries Foray Into Capitalism: 
Sets Up Venture Capital Fund Concern to Back High-Tech Projects”
—John Markoff
*The New York Times*
September 29, 1999

**CONTEXT**

Over the past decade, the amount of resources the Army devotes to research and technology development has stagnated. For example, in terms of total research, development, test, and engineering (RDT&E) (budget categories 6.1–6.7), the Army’s funding has declined from about $6.8 billion in 1993 to about $5.2 billion in 2001; in addition, funding for total S&T (6.1–6.3) has dropped from about $2 billion in 1993 to about $1.3 billion in 2001.¹

Despite this stagnation in research and technology development, the Army’s performance expectations for new and future equipment, and hence their technical content, continue to grow. Specifically, S&T capability is postulated as a central driver in the Army’s planned transformation. In particular, designing the core of the Army’s transformation Army—the Future Combat Systems (FCS)—will require implementing significant S&T advances.

¹Budget categories are defined as follows: 6.1, Basic Research; 6.2, Applied Research; 6.3, Advance Technology Development; 6.4, Demonstration and Validation; 6.5, Engineering and Manufacturing Development; 6.6, RDT&E Management; 6.7, Operational System Development.
Given this asymmetry between declining resources and increasing needs, developers of Army materiel are forced to look elsewhere for their technology. “Elsewhere” in this case is the commercial technology sector, upon which the Army greatly depends. Unlike the Army (or for that matter DoD), the commercial sector, spurred by competitive forces and a population that eagerly accepts new technologies, has seen its R&D spending quadruple in three decades and continues to grow at more than 4.5 percent per year.

Contrary to popular opinion, commercial R&D spending is not done solely at the product development stage. Private companies have outspent the federal government in applied research for a number of years now and are spending a large and growing percentage of the country’s basic research dollars. What this means for the Army is that a growing portion of the technical innovation occurring in the country is happening in the commercial sector, thus making Army access to that sector more important than ever.

In fact, going back to the FCS example mentioned earlier, many, if not most, of the required technologies are of commercial interest and are being actively pursued in the commercial technology sector. This is the finding of both a RAND study and other Army studies.

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2The Industrial Research Institute has concluded that $10.9 billion of industry’s $166 billion in R&D spending in 1999 was devoted to basic research—the “blue-sky” pursuit of products and services that might lie a decade in the future (Larson, 1999). Also see National Science Foundation (1999) for detailed statistics.

3One quantitative measure of innovation is patenting activity. Data available through the U.S. Patent and Trademark Office closely mirror the trends seen in resource allocation for R&D. The number of commercial patent applications has doubled in the last decade (U.S. Patent and Trademark Office, *TAF Special Report*, 1999), while the number of Army patent applications has stagnated (U.S. Patent and Trademark Office, *TAF Profile Report*, 1999).

4In the summer of 1998, the Army conducted a seminar war game at the Army War College. The purpose of the seminar was to map the future Army’s technology requirements. One of the seminar’s products was a listing of technologies that the Army considered necessary to “enable” the future doctrine and tactics then being experimented with (Lavine, 1999). We estimate that fully 75 percent of the listed technologies have significant commercial application and content. Likewise, the Army Science Board noted that many of the FCS technologies mature in time to meet the FCS fielding schedule because of the ability to leverage the commercial sector (Burger, 2000).
The fact that so many FCS technologies will be developed first in the commercial sector can be quite advantageous for the Army. But like most DoD organizations, the Army has difficulty gaining and maintaining access to the advanced technology being developed in the commercial sector. For a variety of legal and cultural reasons, the Army seems to prefer to rely on its traditional suppliers, and many of the companies working on advanced technology seem to avoid contracting with the DoD in general.

In this chapter we examine another option for the Army to pursue in gaining and maintaining access to the advanced technology being developed in the commercial sector: establishing a venture capital fund, beginning with a discussion of why the Army has difficulties accessing the commercial technology sector and what it has done to address these difficulties, then turning to why a venture capital fund makes sense, and concluding with an implementation strategy for such a fund.

WHY DOES THE ARMY HAVE DIFFICULTY ACCESSING THE COMMERCIAL TECHNOLOGY SECTOR?

There are a number of reasons the commercial technology sector has proved a difficult target for the Army. Some of the blame can be assigned to the consolidation of the defense industrial base that has occurred over the last decade. Many companies that had traditionally done business with the government, but also had significant commercial business, spun off their military businesses. These businesses were either acquired by the remaining military prime contractors or, in some cases, became independent companies that primarily focused on the military market.\(^5\) This consolidation tended to increase the isolated nature of military R&D. However, defense consolidation may be more symptomatic than causal.

In terms of the causal reasons, there are real and perceived obstacles that prevent more collaboration between the DoD and commercial

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\(^5\)General Electric, FMC, IBM, Dupont, and Honeywell are prominent examples of companies that have divested all, or most, of their defense businesses.
companies that perform research and product development. The most prominent barriers to greater collaboration are (1) intellectual property concerns, which combines with the fact that most companies do research for their own purposes, not as a service for hire; and (2) excessively bureaucratic requirements and the related distrust of government involvement and oversight in company affairs. When commercially oriented companies weigh these burdens against the relatively small size of the Army market, other limitations on profits, and the perceived fickleness of the government as a customer, the benefits of collaboration generally fail to overcome them.

As for intellectual property rights, innovation is almost by definition an intellectual endeavor. Making a profit on an innovative idea requires monopolizing it to a degree and getting it to market before or more successfully than competitors do. A company that relies on its intellectual property to gain a competitive advantage will thus be very reluctant to cede that property. There is concern among potential industry partners that the government just does not understand or sympathize with this (Chen, 1999). This means that contracting for R&D with most commercial firms will be difficult, since traditional government contracting precludes flexibility in the area of intellectual property.

The stigma of government bureaucratic “red tape” is also a problem. Because the government procurement system is so different, government contracting requirements often force companies to create positions and business units solely dedicated to dealing with it. Setting up separate business units or divesting defense business is also sometimes seen as a necessary shield against excessive government oversight of the entire company. The thought of granting government auditors/inspectors access to company records is a strong deterrent to working with the government, yet it is difficult for the

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6 Stan Z. Soloway, Deputy Under Secretary of Defense (Acquisition Reform), noted in a recent *Wall Street Journal* article that three-quarters of the top information-technology companies will just not do research for the DoD (Chen, 1999).

7 During a conference entitled “Perspectives on Other Transactions,” there was much discussion about why nontraditional military suppliers (NTMSs) continued to be reluctant to do business with the government, even when OT authority was available. The listed reasons were identified as the most important culprits (Held, 1999).
government to accept normal business relationships in the matter of oversight.  

The obstacles noted above are most relevant to the traditional tools used by the military to contract for research: grants and FAR-type contracts. Both of these are saddled with substantial regulations that limit their flexibility in many areas important to commercial businesses, such as accounting procedures, intellectual property rights, and oversight. Previous RAND research verified that these limitations have turned away many nontraditional military suppliers (NTMSs) (Horn et al., 1997). Additionally, since the DoD provides research grants only to educational and other nonprofit organizations, the utility of grants in accessing the commercial base is circumscribed.

WHAT HAS DoD DONE TO ADDRESS THESE DIFFICULTIES?

These difficulties are not unique to the Army—they are DoD-wide concerns. In this section, we discuss three of the solutions DoD has pursued to overcome these difficulties and illustrate the relative ineffectiveness of each.

New Tools Designed to Access the Commercial Technology Base

Recognizing the limitations inherent in its traditional contracting tools, DoD has gained a number of new contracting tools designed specifically to access the commercial technology R&D base. Unfortunately, their success in attracting NTMSs has been limited. The most important of the new tools is the Other Transaction (OT), codified in 10 U.S.C 2371. The statutory language authorizing this contracting method provides a great deal of flexibility, because it defines OTs in the negative by stating that they are not contracts, grants, or

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8For example, during a conference, one government auditor expressed an opinion that no company should fear opening its books to government auditors, provided they were doing everything correctly and legally. Another related a story about one company that had an OT agreement with the government. The agreement specifically limited the government’s oversight authority. The auditor expressed some surprise that when he showed up at the company’s door and asked to examine the company’s records, he was rebuffed (Held, 1999).
cooperative agreements (CAs). The practical result of this negative definition is that the regulations governing the traditional contracting tools do not apply to OTs. Intellectual property rights, government oversight, cost-sharing, and business arrangements are all negotiable. In fact, by a plain language reading, it would seem that OT legislation allows any kind of agreement to conduct research between the government and a contractor, provided the agreement is in the government’s interest. Thus, it would seem that the government should be routinely able to establish “business-like” arrangements with commercial businesses for research collaboration through the use of OTs.

Unfortunately, the Army’s record of using OTs is not impressive. Since getting the authority to use them, the Army has used OTs on less than one-quarter of 1 percent of its research contract actions. The DoD Inspector General has also noted that most of the OTs signed so far have been with traditional military suppliers, despite the fact that OTs were meant to facilitate agreements with NTMSs (Office of the Inspector General, 1999). It is unclear why the Army has been so reluctant to use the OT authority. Likely reasons include the Army procurement culture, lack of training, and a general difficulty on the part of the Army in finding and marketing to NTMSs who are willing to collaborate on research projects.

Like the OT, the CA was established, in part, to make R&D contracting more flexible and more attractive to the commercial sector. CAs have more restrictions than OTs; not surprisingly, they have not been

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9The Army signed 48 OTs for research and prototypes from 1996 through 1998 (Office of the Inspector General, 1999). The Defense Contract Action Data files indicate a total of over 21,000 Army contract actions for R&D during the same period. The DoD Inspector General’s report also provides a breakdown indicating that 13 of the OTs were for prototypes, while 35 were for research. Tellingly, 10 of the 13 prototype OTs are part of DoD’s Commercial Operations Support Savings Initiative (COSSI) program, which mandates the use of OTs (U.S. Department of Defense, Report on Other Transaction Awards for Prototype Projects, 1999).

10For example, an examination of the 24 OTs for research that the Army signed in 1998 indicates that they involved 30 non-Army participants. The companies’ Internet descriptions of themselves revealed that only 17 percent of participants were commercial companies that were NTMSs. These companies accounted for less than 10 percent of the Army OT for research contract dollars awarded.
particularly successful in attracting commercial-sector companies into collaborative or contractual R&D relationships with the Army.\textsuperscript{11}

The Small Business Innovative Research (SBIR) and the Small Business Technology Transfer (STTR) programs are relatively successful in terms of funding a large number of small businesses interested in conducting research for the Army.\textsuperscript{12} However, like most other government contracting programs, the SBIR and STTR programs tend to attract companies that are comfortable doing business with the government and that have the government as their most significant customer.\textsuperscript{13} While these programs do contract with a large number of start-ups and other small businesses that do not have experience with the government, limitations in the structure of the SBIR/STTR program curb its utility vis-à-vis these companies.\textsuperscript{14} As a result, commercial success has not been a hallmark of the technologies flowing out of the DoD’s SBIR program.\textsuperscript{15}

The “Fast Track” SBIR program offers additional incentives to small businesses that find additional funding sources. The companies

\textsuperscript{11}For example, the Army Research Laboratory’s heralded Federated Laboratory Concept used the CA as a funding mechanism to establish three consortia for different research areas. Traditional military contractors head all three consortia (Brown, 1998).

\textsuperscript{12}The SBIR and STTR programs funded about 300 programs and had a budget of $110 million in FY99 (Army Research Office, Business Opportunities Web site, http://www.aro.army.mil).

\textsuperscript{13}A random sampling of the Army’s FY99 and FY00 Phase 1 awardees indicates that 50–75 percent of the awardees are government contractors and at least 60 percent have received multiple awards. Likewise, the GAO found that two-thirds of the companies receiving awards had received earlier awards and that just 25 companies had received 11 percent of the total contract dollars from 1983 to 1987. During this time 45,000 SBIR contracts were awarded (U.S. GAO, 1999a).

\textsuperscript{14}By policy, the DoD SBIR program uses traditional government contracting as the agreement form. Though some of the contracting rules are relaxed for small businesses, many of the factors that make government contracting unappealing to commercial businesses remain. There are also significant funding limitations. (The maximum funding for SBIR is $850,000, though most programs receive less. The Fast Track program may provide some additional funding.)

\textsuperscript{15}A 1996 survey found that 75 percent of the commercial sales related to technologies developed under DoD’s SBIR program were developed in just 4 percent of the projects. Commercialization is becoming a more important evaluation criterion, but it is too early to tell whether the added emphasis will improve the commercialization of SBIR technologies (U.S. GAO, 1999a).
participating in the Fast Track program appear to be having greater commercialization success, which suggests potential opportunities to improve the SBIR program with the venture capital approach discussed in the next section.

**Funding Specifically Aimed at Commercial Technology**

Recognizing the potential of commercial technologies, the DoD has established a number of programs whose funding is specifically targeted toward increasing the commercial technical content of DoD research and equipment. Success in attracting commercially oriented firms is mixed. The Commercial Operations Support Savings Initiative (COSSI) is a funded program whose goal is to reduce operations and support costs by putting commercial technology into fielded systems. A briefing describing the Army’s program provided four program examples. In three of the four programs, the contractor was a traditional military supplier (Rohde, n.d.). The Dual Use Science and Technology (DUST) program funds R&D programs that have both military and commercial application. In 1999 the Army awarded 27 DUST contracts. Nineteen of the contracts went to traditional military suppliers, six went to NTMSs (although a traditional military supplier subsequently acquired one of them), and two went to educational institutions (Dual Use Science and Technology Program, 1999). The mix changed in FY00, with 7 out of 11 contracts going to NTMSs, indicating improvement, but funding remained limited despite previously anticipated increases. Importantly, both the COSSI and DUST programs are being terminated at the end of the current year.

**HOW DOES A VENTURE CAPITAL FUND WORK?**

There is certainly no lack of recognition among the Army leadership of the necessity of working with the commercial technology sector. As noted above, though, developing the collaborative ties between

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16Discussions with Robert S. Rohde, Deputy Director for Laboratory Management, Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology), October through December 2000.

17DUST and COSSI contracts are required to be either CAs or OTs.
the Army’s R&D community and commercial technology developers remains difficult. The old contracting tools are inappropriate, and Army contracting officers and the government oversight community, probably through a lack of training, resources, and authority to use it, appear reluctant to use the OT. As a result, Army penetration of the commercial technology sector proceeds at an indifferent pace. We suggest that one solution is to sidestep the barriers by establishing a venture capital fund for technology development. In this section, we describe how such a venture capital fund would work, while the next section describes the benefits such a fund would have for the Army.

Venture capital describes a broad category of investment that has two defining characteristics. First, venture capital investments are made in businesses that have a high risk of failure but also potentially high returns. Second, venture capital investments are accompanied by a fairly high degree of investor involvement in the investee firms (Gladstone, 1988, p. 3). Although venture capital is normally associated with equity capital in which funding is provided in exchange for an equity stake in the business, not all venture capital is equity capital. Other investment mechanisms, such as royalties on future profits or high-risk, high-interest loans, also fall into the category of venture capital.

Venture capital funds are organized in a number of ways: as limited and general partnerships; as public, private, and limited liability corporations; and as subsidiaries to larger companies. However, the traditional organizational structure is the limited partnership. This structure is organized around a general partner and one or more limited partners. The general partner runs the fund and is fiduciarily responsible to the limited partners. The general partner may invest some of his own capital into the fund but is generally compensated with a management fee and a percentage of the fund’s total return. The limited partners are passive investors with limited liability who place their investments in the hands of the general partner with the expectation that they will earn a good return. Importantly, they avoid active involvement in fund management.

Once funding has been raised, the management of a venture capital fund goes about the process of evaluating investment opportunities and selecting companies for funding. A primary function of the venture capitalist is to gather information about potential markets,
technical feasibility, competition, and other facts that will impact the probability that a new business will succeed. This knowledge comes from a number of sources, including past experience, contacts in the market segment, other venture capitalists, trade journals, and the business plans submitted by entrepreneurs looking for funding. Using a combination of experience, analysis, advice, and intuition the venture capitalist decides which ventures to fund and the extent to which they will be funded. As mentioned above, venture capital involves various funding mechanisms, though equity financing is the most common.

In general, venture capitalists fund relatively new and rapidly growing companies. There are a couple of reasons for this. First, newer companies tend to be more efficient in that they have much less overhead and a core staff more directly affected by the success of the company. Second, and perhaps more important, new and growing companies have a greater potential for the high rates of return that venture capitalists require.

Venture capitalists prefer to fund innovative services and products because they offer significant returns through developed markets in a relatively short time frame. Innovative products and services are developed from relatively mature but unexploited ideas and technologies. In other words, venture capitalists do not normally invest in basic research, although they often take the fruits of basic research and turn them into something useful and marketable. They also look for new uses or combination of existing technologies. For example, e-commerce combined Internet technology with electronic fund transfer and modern inventory and distribution practices to create a new industry.

Once funding is extended, the venture capitalist usually takes an active role in building the investee company. It is this role, along

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18 Traditionally, venture capitalists relied on requests for funding from entrepreneurs to identify potential investment opportunities. That may be changing now. Gilman Louie, the CEO of In-Q-Tel, told us in an interview that more venture capitalists are creating investment opportunities themselves by identifying potential market niches and creating companies from scratch to fill those niches. This model may be more appropriate for an Army venture capital fund.

19 Gladstone also discusses evolutionary and substitute products and services, but we omit these, since they are not germane to the discussion. (Gladstone, 1988, p. 3).
with the risky nature of the investment, that defines venture capital. Typically, the venture capitalist will provide a number of services. These include continued refinement of the business plan, help with putting together a management team, valuable business contacts, assistance in securing additional funding, management assistance, and help in marketing (Sargari, 1992, p. 7-8).

WHAT ARE THE BENEFITS TO THE ARMY OF ESTABLISHING A VENTURE CAPITAL FUND?

As mentioned above, we recommend that the Army bypass the obstacles it faces when accessing the commercial technology sector by setting up a venture capital fund like the model just described that invests in companies and technologies that are of interest to the Army and that have potential for significant commercial market penetration in the longer term. In this section, we examine some of the benefits that the Army would gain by establishing a venture capital fund.

Can Exploit Innovation

Though relatively young in its current forms, venture capital has been extremely successful in developing and exploiting innovation. Many of the most inventive companies in the world, including Intel, DEC, Apple, Microsoft, Sun Microsystems, FedEx, Genentech, and Netscape, used venture capital as a key resource and are examples of its success. Empirical evidence also supports the claim that venture capital spurs innovation. Although difficult to measure directly, several studies have noted the positive correlation between the use of venture capital as a funding tool and indirect measures of innovation. One examination found that venture-backed companies spend 45 percent of their equity on R&D in their first five years (PriceWaterhouseCoopers, 1998).20 Similarly, R&D expenditures in Europe represented, on average, 8.6 percent of total sales for venture capital–backed companies compared to 1.3 percent for the “blue chip” European companies (European Private Equity and Venture

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20By way of comparison, manufacturing industries in the United States spend just over 3 percent of sales on R&D (Wolfe, 1999).
Using patenting of inventions as an indicator of innovation, a significant study suggested that a dollar of venture capital was 5–14 times more effective than a corporate R&D dollar in terms of innovation (Kortum and Lerner, 1998).

The reasons for venture capital’s success are its inherent incentives and an organizational structure that facilitates the development of innovative ideas. Young, small, and growth-oriented companies typify the investee. Their potential products or services are new and intended to develop new markets or redefine older ones. The company founders are risk takers motivated by their vision. Investors are experienced businessmen and women who are also risk takers but who expect to be well rewarded for taking those risks. They are adept at managing young companies and commit, in addition to funding, significant intellectual capital, business experience, and time to the companies they back to maximize the opportunities for success.

**Can Be Used by Public and Large Private Organizations for Technology, Investment, and Nonfinancial Reasons**

Many large corporations, even those with substantial internal R&D capabilities, recognize how well venture capital exploits innovation and now use it to develop technologies for their businesses. In one example, Xerox Corp. put together a successful venture capital fund to turn Xerox-developed technologies, otherwise dormant, into marketable products (Gompers and Lerner, 1998). In addition, Microsoft has earned the reputation as an acquirer of new, venture-backed start-ups that can contribute to its key technologies, and Lucent Technologies has a $100 million venture capital fund that it uses to invest in new technologies, despite its in-house staff of 30,000 scientists (Taptich, 1998). These examples are important when considering whether a venture capital model will work for the Army. They suggest that large organizations, even those with organic R&D capabilities, have found venture capital to be an efficient use of limited R&D resources.

Beyond these private-sector examples, use of venture capital is also successfully spreading to the public sector. A number of state governments have set up successful venture capital funds for a variety of reasons, such as job growth, expansion of light industry, and the
development of companies that correct perceived problems (e.g., environmental).21 Financial return on investment (ROI) is typically a secondary motive for state funds. At the federal level, the Department of Energy’s Argonne National Laboratory, which is run by the University of Chicago, has had a special relationship through the ARCH Development Corporation with the ARCH Venture Fund. This relationship helps commercialize the discoveries made at Argonne’s laboratory facility, thus providing the public greater access to technologies funded with Department of Energy money (ARCH Development Corporation and the ARCH Venture Partner’s Web sites, 1999).

Perhaps the example closest to that envisioned for the Army is the CIA’s In-Q-Tel enterprise.22 The CIA recently established In-Q-Tel to solve some of its most difficult information technology problems, and venture capital is one of the tools In-Q-Tel uses to address the CIA’s technology needs. In-Q-Tel has been in existence for only about a year and a half, not long enough to determine its ultimate financial success, but it appears to have made a very promising start in terms of technology development. As of this writing, In-Q-Tel already has, or will have very shortly, product solutions to some of the requirements presented by its sponsor, the CIA.

**Can Better Access Commercial Technology**

A venture capital organization funded and chartered by the Army but run outside the government by a venture capital professional could circumvent many of the obstacles that prevent greater collaboration

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21 The Massachusetts Technology Development Corporation (MTDC) is a good example. It was established by state law in 1980. In its 20 years of existence the MTDC has invested nearly $40 million and is now self-sustaining, relying on returns from earlier investments to fund new investments. The MTDC Web site lists four primary objectives for the fund: (1) to help create primary employment in Massachusetts; (2) to attract and leverage private investment in Massachusetts companies; (3) to foster the application of technological innovations where Massachusetts companies are, or can be, market leaders; and (4) to nurture entrepreneurship among Massachusetts citizens, planting the seeds for long-term economic development in the Commonwealth.

22 The authors have interviewed both CIA and In-Q-Tel staff on several occasions. Many of the concepts presented in this section are borrowed from the CIA’s establishment and development of In-Q-Tel.
between the Army and the commercial technology sector. In this scheme, the Army venture capitalist would act as a middleman who understands the needs of the business and technology communities and who can shape agreements that meet those needs and that also solve Army technology problems. Since the venture capital organization would be outside 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.

Can Leverage Non-Army Resources

Another important reason for the Army to develop a venture capital fund is the way in which it can be used to leverage non-Army resources. Today, most Army research is conducted exclusively with Army resources. While some of the newer contracting tools allow cost sharing on research projects, there are practical and legal limitations to the amount of cost sharing available. In contrast, venture capitalists and the entrepreneurs they support freely seek funding from any number of sources. Assuming the Army’s fund invests in technologies that also have considerable commercial potential, significant outside co-investment is quite possible and likely. The advantages are obvious. Leveraging allows the Army to stretch its own R&D resources so it can accelerate the development of key technologies while continuing to invest in a diverse range of new ideas.

Can Provide a Return on Investment

Commercial venture capital’s reason for being is to earn a ROI. As mentioned earlier, venture capitalists expect large returns in compensation for the risks they place on their investments. Identifying an average return across the venture capital industry has proved difficult, and estimates vary considerably. Despite this, the success of the venture capital industry is clearly implied by the associated exponential growth in investment, as shown in Figure 3.1 (Gompers and Lerner, 1999, and VentureOne Corporation Web site, various years).

Most of the technologies appropriate for investment by an Army venture capital fund will be those that have a near-term Army requirement but a longer-term commercial potential. By using a venture
capital model to make the initial investments in new technologies, the Army will be able earn a ROI as the commercial market for these technologies grows. This return can then be used to strengthen Army R&D further through reinvestment by the Army’s venture capitalist.

Can Give Rise to Entire Industries

There is a general rule of thumb that radically new technologies are usually developed, marketed, and matured by new companies. With some exceptions, making bold technological and product line shifts is difficult for established companies, which usually prefer to evolve along the established lines that have been successful for them in the past. In its short history, venture capital has thus become the source of start-up money for many emerging industries. 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. Although these examples eventually grew very
large commercial markets, the military was generally the first cus-
tomer and, thus, was largely able to guide the development of the
industries and technologies involved. With most R&D occurring in
the commercial sector today 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.

POSSIBLE IMPLEMENTATION STRATEGY FOR AN ARMY
VENTURE CAPITAL FUND

In this section, we discuss how the Army might implement a venture
capital fund, starting with how such a fund might be established,
moving on to how it might be run and discussing what technologies
are appropriate for such a fund, and concluding with how such a
fund would be integrated with other Army technology programs.

Establishing an Army Venture Capital Fund

For this report, we name the Army venture capital fund the Army
Innovation Investment Corporation (AIIC). The AIIC could be
formed under two alternative scenarios. Under the first, the Army
would form an agreement with an existing organization, such as an
existing venture capital fund or a federally funded research and
development center. This agreement would be a research agreement
with a set of Army problems to be solved, rather than an agreement
to establish a venture capital fund. However, by using the existing,
and very flexible, authority of 10 U.S.C. 2371, the OT, the agreement
could be arranged such that a venture capital fund would be, at the
least, one of the tools used to solve the Army’s problems. The
agreement could also lay out various other details, such as how
returns on investments are handled, how assets are distributed in the
case of agreement termination, and how intellectual property rights
are handled. At some point, after the initial agreement, we envision
that the AIIC would be divested from the parent organization and
could be run independently along the lines we recommend below.
The advantage to this approach is that the Army has the authority to
do it now, provided that the funding is made available. The disad-
vantage is that the OT has never been used in this manner. Given the
Army’s hesitancy to use the OT at all, it is probable that without very high-level insistence, the Army’s procurement establishment will be extremely reluctant to endorse this kind of arrangement and use of the OT.

Under the second scenario, specific authorizing language and the funds to set up the corporation would be included in the DoD’s annual authorization and appropriations process. The advantage to this approach is that the establishment of AIIC would carry the unambiguous legal authority conferred on it by Congress and codified in public law. There are several potential disadvantages. The first one is the possibility that the Army could lose control of the process. What we mean is that once Congress begins the process of writing the laws allowing the formation of the company, it could do so in a way that is not aligned with Army concepts. In such a case, Congress, not the Army or the founders of AIIC, would control the formation of the company. Another disadvantage of this scenario is the time required and political capital needed to advance the concept through the appropriate congressional committees. The CIA was able to persuade Congress to fund In-Q-Tel very quickly (a matter of months), but In-Q-Tel was conceived of at the highest levels of the CIA, so the required high-level support and lobbying was ensured. The Army’s problem is more complicated because committed, high-level support for the idea must first be developed within the Army. Further complicating the Army’s task is that unlike the CIA, the Army has another layer of authority, the DoD, between it and Congress.

Perhaps the best way to establish AIIC would combine the two methods. Under a combined process, the Army would begin in a small way through the OT method described above. For a relatively modest amount of money, perhaps less than $10 million, the Army would partner through an OT agreement with an established organization to begin work on a limited set of problems. (The type of problem appropriate for an Army venture capital fund will be further described below.) The Army partner would organize and staff itself, if not already set up as such, to use venture capital as a tool for solving the problems in the partnership agreement. With an agreement in place and a small number of projects under way, the Army could then look for congressional endorsement and additional funding through the authorization and appropriations process. By putting its venture
together in this manner, the Army will retain significantly more control over the shape of AIIC, the structure of the Army's relationship with it, and the timing of its establishment. Also, more time will be available to build congressional support, and the lessons learned during the establishment of AIIC can be incorporated into any statutory language that might emerge.

**One Possible Model for an Army Venture Capital Fund**

The AIIC will, necessarily, be run as a nonprofit corporation. This means that any income generated through its investments will be reinvested to solve more Army problems or will be returned to the U.S. Treasury. Maintaining a nonprofit status eases tax issues that may surface but, more importantly, eliminates the appearance of impropriety that could arise in a government-sponsored, for-profit organization.

We recommend that the AIIC be managed by a board of directors made up of private citizens selected for staggered two- to three-year terms. Since the Army is the ultimate “stockholder” of AIIC, selection of board members should be at least partially controlled by the Secretary of the Army or his staff. For instance, selection of candidate board members could be done by a committee made up of board members not due for replacement or retention and senior Army staff at the Assistant Secretary level. Candidate board members would then be confirmed by the Secretary of the Army.

Having the right mix of the right people will be the most important factor in forming and subsequently maintaining AIIC. The staff must contain a mix of personnel with business, technology, and government experience.23 This eclectic group must then be integrated by a strong leader who not only understands the complexity of technology-oriented business deals but who can also navigate the political and bureaucratic terrain inherent in an organization of this type. We recommend that the board of directors select the chief executive officer (CEO), who becomes an automatic board member. The

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23In the case of In-Q-Tel, this requirement has been satisfied by mixing very bright young people, recently graduated with advanced degrees in business and science/engineering, with personnel experienced in venture capital, business, and government.
board, including the new CEO, then select other key members of the AIIC’s management staff, such as the chief financial officer and chief technology officer. This management team, in turn, fills out the lower tiers of the organization.

Getting the correct personnel for AIIC also means establishing adequate incentive packages. AIIC’s nonprofit status, the need to avoid conflicts of interest, and the potential for improper appearances imply that employees will probably not be able to accept stock options in their investee companies. Instead, the incentive package will need to be cash based and should carefully balance the requirement to solve Army problems with the potentially conflicting need for AIIC financial success. As an example, employee compensation could include a base salary and a bonus with a potential maximum that is some multiple of the base salary. That multiple would then be based on a combination of portfolio financial performance and the degree to which the AIIC investments solve Army problems.

An Army Advisory Committee composed of personnel from the Army Materiel Command (AMC), the Office of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA(ALT)), and the Training and Doctrine Command (TRADOC) could form the interface between the Army and the AIIC. The committee would be responsible for communicating the Army’s operational requirements and technical needs to the AIIC, which, however, would make all business decisions about investments.

The Advisory Committee would also be responsible for the transfer of technical information from the AIIC back to the Army. Technology transfer is likely to be a more involved process than just a sharing of information through the Advisory Committee. We expect that one of the major responsibilities of AIIC management will be to promote, within the Army, technologies and products being developed by AIIC investments. Successful promotion is critical for two reasons. Primarily, it ensures that Army investments are indeed solving Army problems. Secondarily, we expect that in many cases, the Army will be the first major market for many of the products, so successful promotion can help ensure the commercial and, hence, the ultimate financial success of AIIC investments.
Appropriate Technologies for an Army Venture Capital Fund

Clearly, not every military technology program would be appropriately funded through venture capital. The technology investments suitable for Army venture capital funding would have three prime characteristics. First, the technology must have clear military and commercial applicability. Second, the Army must be in a “power user” position. A power user is one who has a requirement for a new product or technology ahead of other potential users. Because of this position, the power user is normally willing to invest earlier and with a little more risk. Finally, the technology must be “mature enough” to develop into a product or proprietary technology in the limited time and with the limited dollars that venture capital investing implies.

Selecting the correct technology areas for investment will be one of the first and most critical responsibilities of a venture capital team funded by the Army. An example of the kind of technologies we envision as appropriate for Army venture capital are those required for the 21st Century Land Warrior program. For example, lightweight batteries with very long life are required as a power source. Technology that addresses this problem clearly has significant commercial application, while the Army’s ambitious requirements place it in a power user position relative to the technology. Whether there is a commercial base of research and development to support Army venture capital investment into one or more technical solutions for Land Warrior would still need to be addressed by the Army’s VC.

Integration with Other Army Technology Programs

Finally we note that an AIIC should not be developed in isolation, particularly in light of an Army R&D budget of about $5 billion a year, of which about a quarter is spent on S&T. An Army venture capital fund would need to be fully integrated into this already large effort.

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24 “Power user” is a term coined by Gilman Louie of In-Q-Tel.
25 The Army has in fact borrowed heavily from the commercial sector to address the issues raised by the GAO. Specifically, the weight and electromagnetic interference issues have used commercial technologies that alleviate many of the GAO’s concerns (Cox, 2000).
As mentioned already, finding “sponsors” and users for the venture-backed technologies will be critical. Additionally, we see other ways that venture capital could be integrated into existing programs to make them better. For example, the Army SBIR program spends over $100 million per year in what is essentially “seed” money. In other words, the SBIR program funds hundreds of technologies each year that are usually too immature for venture capitalists. While commercialization is a priority of the SBIR program, we believe the program’s structure does not support commercialization particularly well. An integrated venture capital approach could help solve this problem by providing the funding and support needed beyond that provided by the SBIR program. Likewise, the SBIR program could be a source of technologies for the venture capital fund, particularly if some of the SBIR awards are given with the AIIC’s problem set in mind. Other Army programs could similarly benefit from an Army venture capital if well integrated into a broad S&T program.