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***A Research Experiment on Facilitation and Formation
of Joint R&D Programs
between Government, Industry & Universities:
Overview, Preliminary Findings and Observations***

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A Research Experiment on Facilitation and Formation of Joint R&D Programs between Government, Industry & Universities: Overview, Preliminary Findings and Observations

There are numerous ideas being pursued today, both at the national and local levels, to build research programs and consortia to best leverage R&D resources across government, industry and academia. Some of these efforts employ mechanisms that would incorporate and promote a market-driven approach to public-private sector R&D collaboration, while others encourage traditional technology transfer and commercialization approaches. An approach or mechanism for R&D collaboration for the most part will be market-driven depending upon how close the process, pricing and implementation of the transaction or project resembles a free-market, risk-reward investment transaction, as is frequently found in the private sector. In a market-driven transaction for R&D collaboration the parties directly negotiate R&D plans, finances, in-kind resource contributions, intellectual property rights, commercialization commitments, and other terms and conditions.

The work in progress at American Technology Initiative (AmTech), a nonprofit, public benefit research corporation located in California, represents a unique research program aimed at learning from the facilitation and formation of market-driven research projects and consortia. AmTech has specifically chosen to focus on a joint-venture approach to study public-private R&D collaboration. The AmTech effort, which we call a research experiment, has been based on the following fundamental premises:

- U.S. competitiveness can be significantly enhanced by improving the productivity of the U.S. R&D sector.
- Enhancing public-private R&D collaboration is a critical need requiring research and experimentation to develop and implement innovative mechanisms for effective and accelerated transfer and commercialization of technology.
- A long term focus on institutionalizing market-driven mechanisms for public-private R&D collaboration is most appealing in the context of the free-market orientation of the U.S. economy.

Within the framework of these broad premises, one of AmTech's research experiments is dedicated specifically to the exploration of a free-market approach to public-private collaboration through the development and implementation of a joint venture mechanism to enable formation of R&D projects between government, industry and academia. Joint R&D projects are designed to:

- Leverage the mutual and concurrent, but independent goals of participants.

- Trade technology rights in return for R&D resources.
- Ensure mutual sharing of risks and rewards.

The R&D joint ventures are appropriate when public and private sector research goals overlap, but may often lead to distinct end uses of resulting technologies. The government aims to pursue mission objectives, while industry focuses on commercial products. Of the approximately \$140 billion annual U.S. R&D expenditure, the area of this overlap, represented by federal civilian R&D with a 3-5 year technology development timeframe, is estimated to be 10% of total federal civilian R&D--well over a billion dollar opportunity. If this segment of public-private R&D can be more effectively coordinated through joint ventures, it would go a long way towards enhancing the productivity of U.S. R&D, while also providing the following specific tangible benefits to participants in the joint venture:

i) for the government:

- Accomplish more mandated mission R&D objectives by leveraging R&D expenditures with industry.
- Ensure critically needed transfer of technology from the government and universities to industry.
- Gain access to manpower and state-of-the-art background technology residing in universities and industry.
- Generate royalties for government agencies and inventors by promoting the transfer and commercialization of technology.

ii) for industry:

- Reduce the cost of product development by leveraging R&D expenditures with the government.
- Obtain non-exclusive or exclusive commercial rights to technology developed in collaboration with the government and the research institution.
- Foster, negotiate, and incorporate, at the outset, specific industry concerns in the joint venture agreement.
- Provide access to R&D undertaken at universities, nonprofit research institutions, and government laboratories, and to specialized government equipment and facilities.

iii) for the university/research institution

- Utilize joint ventures to gain support for research programs at the cutting edge of technologies leading to commercialization.

- Capitalize on the opportunity for researchers, including students, to contribute to important new discoveries leading to commercial products/processes.
- Provide academic researchers, including students, access to state-of-the-art facilities in government and industry.
- Obtain intellectual property rights that will generate royalty income from resulting commercialization.

In order to capitalize on this opportunity, AmTech, under NASA sponsorship of research on legal, financial, business and management issues involving R&D collaboration between government, industry and academia, set out to a) design an innovative market-driven mechanism for entering into public-private joint ventures; b) provide facilitation services to identify, develop, negotiate and draft agreements for each specific joint R&D project; c) monitor, administer and facilitate the on-going relationship between the participants throughout the life of the joint R&D project; and d) create an organization dedicated to learning through research, experimentation and feedback resulting from real world experience with joint R&D projects.

AmTech has already assisted in pioneering a unique mechanism, called the "Joint Sponsored Research (JSR) Agreement" which is designed to involve four key institutional partners: government, industry, a university or nonprofit research institution and AmTech. Under the JSR Agreement, the research is carried out to ensure that:

- Federally funded R&D is undertaken at a university or nonprofit institution.
- The scope of joint R&D and the rights to resulting technology are pre-negotiated consistent with the needs of the parties.
- Technology transfer and commercialization objectives are incorporated into the R&D process and are implemented from the beginning of the R&D project.
- Participants share the co-management of the specific technical and administrative responsibilities of the R&D project.

AmTech, in collaboration with NASA, has successfully implemented two prototype joint ventures and is in the various stages of identification, development, negotiation and drafting of agreements for an additional ten JSR projects. The participants in the two prototype projects have appreciated the benefits of this unique arrangement and the success of these projects has already been demonstrated:

- The time to commercialization can be significantly reduced. In the first prototype JSR project, the technology is currently under license negotiation, less than 12 months after completion of R&D (the norm for commercialization of federal technology in the past has ranged from 6 to 10 years).

- A complex research relationship among multiple companies, the government and a university can lead to a direct identifiable advantage to U.S. economic competitiveness. A software development effort undertaken through a consortium under the second prototype JSR project is leading to a U.S. standard for aircraft design software. (Prior to this JSR project no one company had the incentive to pursue this research unilaterally).

While the AmTech research experiment on public-private R&D collaboration continues, the preliminary findings are as follows:

- The facilitation and formation of joint R&D projects is a labor intensive process. With further experimentation and experience, the efficiency of this process can be increased. However, at best it is likely to be no more efficient than perhaps the venture capital-investment-decision making process. This clearly demonstrates trade offs between effort and effectiveness and leads to a preliminary conclusion that increased effectiveness in the transfer and commercialization of technology would require increased investment in facilitation quality and efforts.
- A fair amount of experimentation will be necessary before the concept of a market-driven R&D arrangement with broad applicability will emerge. At this stage, public-private R&D collaboration appears to be generating one of a kind, specific customized relationships.
- The role of a neutral third party facilitator is critical to the success of R&D collaboration. Public and private institutions have developed a wide cultural void and distrust that cannot be easily or quickly remedied without offering a neutral playing field for the participants.
- At the policy level, incentives are needed to foster and reward innovation leading to development, experimentation and implementation of improved market-driven R&D programs.
- Formalization of knowledge, ideas and learning among and between many national organizations undertaking research and experimentation involving R&D collaboration and consortium building needs to be institutionalized as a research program, perhaps within business schools. In this regard IC² Institute already is leading the way.
- Finally, facilitation and formation of R&D collaboration at the earliest possible opportunity, even at the idea stage, is the wave of the future. The competitive advantage will be with those nations or institutions that can master and institutionalize an effective response to address this need for early collaboration.

In summation the following points can be made:

- Up-front collaboration by the government and the private sector on R&D accelerates technology transfer and commercialization. Traditional methods of transferring technology are passive and have had only limited success. Technology transfer is a direct contact, people-to-people activity. It cannot be achieved only by the government pushing its ready-made technology into the private sector. It is most successful when a private sector entity can pull the technology it needs out of the government laboratory, utilizing it in a cost effective manner to produce goods or promote services. This "pull" is more likely to occur when the company or industry directly collaborates with the government in the research that produces the technology and when industry is willing to put capital at risk.
- Joint sponsored research maximizes R&D efficiencies by leveraging R&D resources. Neither the federal government nor the private sector have the resources necessary to accomplish all R&D objectives. Combining resources and collaborating on mutually compatible R&D projects which the government has selected to pursue will maximize the usefulness of the resulting technology at a cost that is more affordable to the collaborating parties.
- Effective joint sponsored research and advanced technology development requires government/private sector collaboration on a neutral "playing field." In most traditional contracting and assistance relationships with the private sector, the government directs the work and specifies the results. Collaborative research requires negotiation and a much closer co-venturing relationship. The private sector can be distrustful of the government's intent and capabilities as a potential partner, and many companies will refuse to work with the government in any form. Because of this distrust, the use of a neutral facilitator becomes essential to the success of the joint venture, and provides each participant with a forum for negotiation.
- AmTech is cultivating the experience, capability and desire to facilitate collaborative research efforts between the government and the private sector. AmTech was founded for the sole purpose of facilitating collaboration between the public and private sectors in order to promote U.S. economic competitiveness. Research is an integral part of AmTech's function. The AmTech staff has examined numerous legal, financial, business, and public policy issues inherent in joint government/private sector collaboration. While other organizations may provide facilitation services for joint R&D efforts, no other organization has the background, knowledge, expertise or capability to provide specific joint R&D program facilitation services to its sponsors, including the government. The AmTech model is designed to use funds it generates only to attain self-sufficiency, to improve its own efficiency, and to maintain the neutrality necessary to continue serving its sponsors.