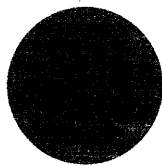


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**THE JAPANESE DEFENSE INDUSTRY'S VIEWS
OF U.S.-JAPAN
DEFENSE TECHNOLOGY COLLABORATION:
Findings of the MIT Japan Program Survey
January 1994**

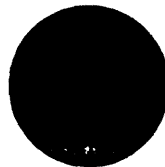
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FOREWORD

The Clinton Administration has proposed an ambitious plan for bringing reciprocity to the United States' defense technology relationship with Japan. Billed in the press as the "Perry Initiative", the plan would balance U.S. licensing of military-related technology to Japan with dual-use technology transfers from Japan. Successful implementation of the policy depends upon a number of important questions. Does Japan have dual use technology that would interest the DoD or U.S. industry? Do appropriate mechanisms exist for implementing and monitoring technology transfer from Japan? What are the legal, technical and political barriers in Japan to greater bilateral defense technology collaboration? Who in Japan controls the technology, and what are their views on collaborating with the U.S. defense establishment?

The MIT-Japan Program began examining these issues in a workshop held in Cambridge on June 18, 1992. Experts on the U.S.-Japan defense technology relationship were invited from industry, government, the military services and academia to explore new strategies for increasing defense-related technology flowback from Japan. Participants took as their starting point the 1989 Defense Science Board Task Force Report on Defense Industrial Relations with Pacific Rim Nations, which had already identified many of the policy problems the group wanted to discuss. A consensus emerged from the meeting that future attempts to expand bilateral defense technology collaboration would have to overcome the huge gap in communication and understanding that exists between the potential users of dual-use technology in the U.S. (the military services, labs and defense contractors) and the potential providers of that technology in Japan (hi tech companies).

In order to help close this gap, the MIT-Japan Program designed and distributed three surveys: one for Japanese industry; one for U.S. industry; and one for the directors of international programs in the U.S. Departments of Defense and Energy.

This report analyzes the findings of the first of these surveys, which was aimed at Japanese industry. The Japanese industry survey had four goals:

- 1) to illuminate Japanese industry's views on trends in the licensed production, indigenization, and overall competitiveness of Japanese defense systems and technology;
- 2) to assess Japanese industry attitudes towards the current state of defense technology cooperation with the United States;
- 3) to elicit suggestions from Japanese industry on the bureaucratic, technical and commercial obstacles to greater bilateral collaboration;
- 4) to identify areas where Japanese industry officials see the most potential for bilateral technology collaboration.

The survey was prepared and translated into Japanese by research associates of the MIT-Japan Program. The Defense Production Committee of Keidanren (The Federation of Economic

Organizations) then generously offered its full cooperation in the testing, distribution, and follow-up analysis of the survey. Six trial surveys were conducted by Keidanren in April, 1993 and the full survey was distributed to the Defense Production Committee membership in May and June of the same year. Fifty of the Defense Production Committee's seventy one members responded (a rate of 70.4%), and approximately ten companies agreed to follow-up interviews which were conducted in July and October. All responses were anonymous.

This report is limited to analysis of the Japanese responses to the MIT-Japan Program survey. We hope that it provides a useful snapshot of the capabilities, intentions and aspirations of Japanese companies as they contemplate a new chapter in defense technology relations with the United States. The MIT-Japan Program will fold this analysis into a larger report later this year that incorporates the survey data on the U.S. side. We invite experts in the field to send their comments or alternate interpretations of the data presented here.

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PRINCIPAL FINDINGS

- 1) THE JAPANESE DEFENSE INDUSTRY EXPECTS THAT DEFENSE DEMAND IN JAPAN WILL DECREASE AND AS A RESULT, THE MAJORITY OF COMPANIES CLAIM TO BE LESS MOTIVATED BY PROFIT AND INSTEAD ARE FOCUSING ON MAINTAINING MARKET SHARE AND INCREASING CORPORATE TECHNOLOGY LEVELS.
- 2) THE JAPANESE DEFENSE INDUSTRY SEES ITSELF AS 5 TO 10 YEARS BEHIND THE U.S. IN SYSTEMS INTEGRATION, WITH LITTLE CHANCE OF CLOSING THE GAP OVER THE NEXT DECADE. HOWEVER, IN COMPONENTS AND BASIC TECHNOLOGY, THE JAPANESE DEFENSE INDUSTRY SEES ITSELF AS ONLY SLIGHTLY BEHIND THE U.S. TODAY WITH A GOOD CHANCE OF SURPASSING U.S. INDUSTRY IN MANY DUAL-USE TECHNOLOGIES OVER THE NEXT DECADE.
- 3) GIVEN THE U.S. STRENGTH AT THE SYSTEMS LEVEL AND JAPANESE STRENGTH AT THE SUBSYSTEMS LEVEL (DERIVED FROM COMMERCIAL TECHNOLOGY), JAPANESE INDUSTRY VIEWS A COMBINATION OF CONTINUED LICENSED PRODUCTION OF SYSTEMS AND SOME JOINT COLLABORATION ON SUBSYSTEMS AS THE MOST APPROPRIATE FORM OF DEFENSE TECHNOLOGY COLLABORATION FOR THE FUTURE.
- 4) INDUSTRY CITES THEATER MISSILE DEFENSE AND DEFENSE ELECTRONICS AS THE MOST PROMISING AREAS FOR TECHNOLOGY COLLABORATION.
- 5) JAPANESE INDUSTRY SEES LITTLE POTENTIAL FOR EXPANDING TECHNOLOGY TRANSFER TO THE U.S. THROUGH THE JOINT MILITARY TECHNOLOGY COMMISSION (JMTC) OR FLOWBACK PROVISIONS IN MEMORANDA OF UNDERSTANDING (MOU).
- 6) JAPANESE INDUSTRY IDENTIFIES THE JAPANESE GOVERNMENT'S ARMS EXPORT BAN AS THE MAJOR OBSTACLE TO GREATER BILATERAL DEFENSE TECHNOLOGY COLLABORATION (THOUGH FEW ADVOCATE AN OUTRIGHT END TO THE BAN). ADDITIONAL OBSTACLES CITED ARE: THE SMALL SCALE OF JAPANESE DEFENSE PRODUCTION, MUTUAL DISTRUST, UNSATISFACTORY TERMS OFFERED BY THE U.S. SIDE, AND INSUFFICIENT U.S. UNDERSTANDING OF THE JAPANESE SYSTEM.
- 7) JAPANESE INDUSTRY IS SUSPICIOUS OF U.S. MOTIVES FOR BILATERAL DEFENSE TECHNOLOGY COLLABORATION. BY A LARGE MAJORITY, THEY LIST "ACQUIRING JAPANESE COMMERCIAL TECHNOLOGY" OR "CULTIVATING THE JAPANESE MARKET" AS THE U.S. SIDE'S PRIMARY GOALS. FEW ATTRIBUTE U.S. MOTIVES TO THE TRADITIONAL COLD WAR GOALS OF

INTEROPERABILITY OR DEMONSTRATING ALLIANCE SOLIDARITY.

8) THE MAJORITY OF JAPAN'S DEFENSE INDUSTRY EXPECTS THAT BILATERAL TECHNOLOGY COLLABORATION WOULD BE ENHANCED BY: RELAXING THE JAPANESE GOVERNMENT'S ARMS EXPORT BAN; RELAXING DOD PRESSURE TO WORK THROUGH THE FMS SYSTEM; AND INCREASING INDUSTRY TO INDUSTRY CONTACTS --IN SHORT, REDUCING BOTH GOVERNMENTS' ROLES AND CREATING MORE OPPORTUNITIES FOR INDUSTRY INTERACTION.

9) THERE IS A CLEAR BREAK IN JAPANESE INDUSTRY VIEWS ON DEFENSE TECHNOLOGY COLLABORATION BETWEEN THE HEAVY INDUSTRIES AND THE ELECTRONIC INDUSTRIES. IN GENERAL, THE HEAVY INDUSTRIES EXPRESS LESS CONFIDENCE IN THEIR OWN TECHNOLOGICAL AND MARKET POSITIONS (ESPECIALLY AT THE SYSTEMS LEVEL), ARE MORE DEPENDENT ON DEFENSE DEMAND, AND TAKE A MORE POSITIVE VIEW OF COLLABORATION ON DEFENSE SYSTEMS AND TECHNOLOGY WITH THE U.S.. THE ELECTRONICS COMPANIES, IN CONTRAST, EXPECT GROWING COMPETITIVENESS OVER THEIR U.S. COUNTERPARTS IN DEFENSE-RELATED TECHNOLOGY (ESPECIALLY AT THE SUBSYSTEMS LEVEL), ARE LESS DEPENDENT ON DEFENSE DEMAND, AND HAVE MANY MORE RESERVATIONS ABOUT INCREASING DEFENSE TECHNOLOGY COLLABORATION WITH THE U.S. THIS DIVISION COULD COMPLICATE ANY COMPREHENSIVE GOVERNMENT-TO-GOVERNMENT AGREEMENTS ON BROAD EXCHANGES OF TECHNOLOGY.

10) DESPITE RESERVATIONS, HOWEVER, JAPANESE FIRMS OVERWHELMINGLY STATE THAT BILATERAL DEFENSE TECHNOLOGY COLLABORATION IS BENEFICIAL TO BOTH THE U.S. AND JAPAN.

11) COMPANIES MENTIONED MORE THAN 20 SPECIFIC POTENTIAL AREAS OF JOINT DEVELOPMENT, INCLUDING: MISSILES, DEFENSE ELECTRONICS, JET ENGINES AND SHIPBUILDING.

JAPAN'S TOP DEFENSE CONTRACTORS (FY 91)

Mitsubishi Heavy Industries, Ltd.
Kawasaki Heavy Industries, Ltd.
Ishikawajima-Harima Heavy Industries, Ltd.
Mitsubishi Electric Corporation
Toshiba Corporation
NEC Corporation
Fuji Heavy Industries, Ltd.
Japan Steel Works, Ltd.
Komatsu, Ltd.
Oki Electric Industry Co. Ltd.
Daikin Industries, Ltd.
Fujitsu Limited
Nissan Motor Corporation

I. A SNAPSHOT OF JAPAN'S DEFENSE INDUSTRY IN TRANSITION

For the four decades since Japanese defense production was reawakened by the Korean War, the goal of industry has been kokusanka --the indigenization of research, development and production. The ratio of domestic procurement of weapons rose from zero to 90% between 1955 and 1987. Despite political complications, defense production has offered numerous incentives for Japanese industry. In the 1960's and 70's it provided a springboard for heavy industries to enter into commercial aerospace production or guard against a recessed shipbuilding market. When defense spending increased by more than 6% a year in the 1980's, the large consumer electronic industries were drawn by the potential for gaining government support for "spinning-on" their technologies to military applications. (For more on the history of Japan's defense industry and its relationship with the U.S., see: M. Green, Kokusanka: FSX and Japan's Search for Autonomous Defense Production, or David Friedman and Richard Samuels, How to Succeed without Really Flying: The Japanese Aircraft Industry and Japan's Technology Ideology, both available from the MIT-Japan Program.)

In the 1990's, however, Japanese companies engaged in defense production face a new reality. Despite growing skill at the subsystems level, systems integration has eluded the heavy industries and the end of the Cold War has led to the first steady decreases in spending on military equipment in Japan in decades. The MIT-Japan Program survey results provide a snapshot of industries scrambling to adjust to this new environment.

As a general rule, Japanese companies are less dependent on defense demand than their U.S. counterparts. The MIT-Japan Program survey found that 31 of the 50 responding companies had less than 10% exposure to defense:

(Question 4) Percentage of defense related sales:

- 10%	31 companies
10 - 30%	9 companies
30 - 50%	4 companies
50 - 70%	2 companies
70 - 90%	3 companies
90% -	0

However, it is important to make a distinction between the heavy industries and the large electronic companies that together constitute the top 12 contractors and command 95% of the JDA's acquisition budget. For the purposes of this report, nine companies are identified as heavy industries because they sell more than 20 billion yen per year to the JDA and are prime contractors for aircraft, ships, vehicles and missiles. According to the survey, these companies have an average 18% exposure to defense. At the opposite end of the spectrum are three of the electronics companies that also sold more than 20 billion yen to the JDA but have an average exposure to defense demand of only 2%. For the purposes of this report, these three companies are identified as large consumer electronics companies.

The prospects for these two types of companies are somewhat different. Overall, Japanese industry expects decreasing demand for defense production:

(Question 6) Prospects for production under the next five year defense plan:

Drastic decrease (25% or more):	13 companies (26%)
Slight decrease:	26 companies (52%)
No change:	3 companies (06%)
Increase:	2 companies (04%)
Don't know:	4 companies (08%)

However, while the three consumer electronics companies expect little change in demand, six of the heavy industries expect significant decreases and the other three expect at least some decreases.

The heavies and the electronics companies also have different expectations about their potential for indigenizing defense production and their level of technological advancement vis-a-vis U.S. corporations. Taken as a whole, Japanese industry sees little room for catching-up to the U.S. in systems integration, but much room for hope at the level of subsystems and basic technologies:

(Question 13) How do you assess your company's defense technological level compared to U.S. firms and labs in the same field today?

	Systems/	Components/	Basic technology
More than 10 years behind	17 (34%)	8 (16%)	8 (16%)
5 years behind	16 (32%)	9 (18%)	12 (24%)
Slightly behind	6 (12%)	20 (40%)	15 (30%)
Equal	5 (10%)	7 (14%)	9 (18%)
Ahead of the U.S.	1 (02%)	3 (06%)	5 (10%)
Don't know	2 (04%)	1 (02%)	1 (02%)

(Question 14) Where do you expect your company's defense technology level to be in 10 years?

	Systems/	Components/	Basic technology
Ahead of the U.S.	3 (06%)	14 (28%)	14 (28%)
Behind the U.S.	30 (60%)	14 (28%)	17 (34%)
Don't know	14 (28%)	19 (38%)	19 (38%)

Even within the area of components and basic technologies, however, Japan's heavy industries do not expect to dramatically increase their competitiveness. While two of the three

electronic companies responded that they do expect to surpass the U.S. in components and basic technologies in their fields, only one of the nine heavy industries expect to surpass the U.S. in components technology in their fields (3 expected to remain behind, one to catch-up, and the rest did not answer).

The weakness of Japanese industry in systems integration is reflected in views expressed on the future of licensed production from the U.S.. Since attaining indigenous rates of production of 90% in 1987, Japanese industry has stalled in its efforts to develop major new autonomous systems. As the fate of FSX demonstrated, technological and political imperatives have brought indigenization to the point of diminishing returns. All of the JDA's major programs in the current defense play are being either licensed, imported or jointly developed with the United States. These include: MLRS, AWACS, Aegis and FSX. As a result, industry as a whole sees mixed prospects for reducing dependence on the U.S., with a general expectation that licensed production will decrease only slightly:

(Question 10) Percentage of production under license from the U.S.:

None	11 (22%)
-25%	17 (34%)
-50%	11 (22%)
-75%	8 (16%)
-95%	2 (04%)

(Question 11) Trends in licensed production from the U.S. over the past 5 years:

Increased	10 (20%)
Slightly decreased	11 (22%)
Dramatically decreased	2 (04%)
Mostly unchanged	21 (22%)
Don't know	1 (02%)

(Question 12) Future prospects for licensed production from the U.S.

Slightly increase	2 (04%)
Dramatically increase	1 (02%)
No change	21 (42%)
Slightly decrease	17 (34%)
Dramatically decrease	2 (04%)
Don't know	3 (06%)

Once again, the electronics companies are more sanguine than the heavies. The electronics

companies average 25-50% licensed production and all three expect this ratio to decrease in the future. The heavies, in contrast, have an average of 50 - 75% licensed production. Five of the heavies expect this ratio to decrease slightly.

Taken together --the decrease in defense demand, continuing lethargy in systems integration, growing strength at the components and basic technology level, and mixed prospects for reducing reliance on the U.S.-- have all led Japanese industry to rethink the basic rationale for engaging in defense production in the first place:

(Question 5) Reasons for producing defense-related equipment:

(Top number indicates today, bottom number indicates 10 years ago.)

Reason	Total	Prime Contractors	Secondary Contractors	Sub- Contractors
a. Profitability	12 (24%)	7 (14%)	4 (08%)	1 (02%)
	22 (44%)	13 (26%)	5 (16%)	4 (08%)
b. To maintain defense market share	25 (50%)	16 (32%)	5 (10%)	4 (08%)
	17 (34%)	9 (18%)	5 (10%)	3 (06%)
c. To maintain aerospace market share	14 (28%)	5 (10%)	5 (10%)	4 (08%)
	13 (26%)	6 (12%)	4 (08%)	3 (06%)
d. To contribute to Japan's defense	40 (80%)	27 (54%)	6 (12%)	7 (14%)
	42 (84%)	28 (56%)	7 (14%)	7 (14%)
e. To improve Japan's level of technology	11 (22%)	8 (16%)	3 (06%)	0
	8 (16%)	6 (12%)	2 (04%)	0
f. For spin off's to the commercial side	7 (14%)	3 (06%)	2 (04%)	2 (04%)
	1 (02%)	0	1 (02%)	0
g. To interact with top U.S. & E.C. companies	2 (04%)	1 (02%)	1 (02%)	0
	5 (10%)	3 (06%)	1 (02%)	1 (02%)
h. To best utilize productive capacity	19 (38%)	14 (28%)	4 (08%)	1 (02%)
	16 (32%)	11 (22%)	4 (08%)	1 (02%)
i. To improve corporate technology	31 (62%)	10 (20%)	6 (12%)	5 (10%)
	30 (60%)	18 (36%)	7 (14%)	5 (10%)
j. To improve				

technological	7 (14%)	5 (10%)	2 (04%)	0
credibility	6 (12%)	5 (10%)	1 (02%)	0
abroad				
k. As an anti-				
recession "shock	5 (10%)	3 (06%)	2 (04%)	0
absorber"	6 (12%)	4 (08%)	1 (02%)	1 (02%)
l. other	0	0	0	0

Particularly striking is the fact that corporations see significantly less advantage to defense production in terms of profits and seem relatively more concerned with maintaining market share in a period of budget cutbacks and growing pressure to import U.S. systems.

It is also worth noting that in spite of this period of flux, Japanese corporations retain their focus on "improving corporate technology". Reflecting the expected decreases in defense spending overall, a number of companies anticipate lower spending on defense R&D. However, almost as many expect to actually increase their defense R&D, despite shrinking budgets:

(Question 8) Expected trends for future defense R&D

Drastic decrease	Slight decrease	No change	Increase	Don't know
3 (06%)	13 (26%)	20 (40%)	11 (22%)	3 (06%)

Defense related R&D remains attractive, both as a source of spin-off technology (note question 10.f.) and as an avenue for "spinning-on" commercial technology to military purposes. Not all companies have a clear strategy for spin-on's, however:

(Question 9) Can civilian technology be applied effectively to defense production?

Yes	8	(16%)
Somewhat	14	(28%)
Don't know	0	
Not much	24	(48%)
In the future	1	(02%)

Commercial technologies where companies report successful application to defense are:

- New materials
- Semiconductors
- Fiber optics
- Shipbuilding
- Computers

A number of companies report that they are more successful at integrating defense and non-

defense R&D in work at the level of basic technologies.

Despite the relative importance of defense-related R&D, however, most companies do expend far more effort on the commercial side:

(Question 7) Percentage of defense-related R&D expenditures to total corporate R&D:

--10%	26 (52%)
10-30%	8 (16%)
30-50%	3 (06%)
50-70%	4 (08%)
90% -	0

The large consumer electronics companies all report success in spinning on commercial technologies to defense applications, but defense-related R&D accounts for 1% or less of their total R&D and in most cases it does not form a core part of their corporate technology development program. In fact, only one of the three electronics companies claims to be engaged in defense production in order to "increase the company's technology level." Contributing to the defense of Japan, maintaining market share and interacting with top U.S. and E.C. firms all figure more prominently as their rationale.

For the heavy industries, defense R&D tends to be closer to 10% of total R&D, and contributes significantly more to the company's overall technology level, according to the survey results and follow-up interviews.

In comparison, then, the electronics companies report more confidence in their competitiveness in defense-related technology, but less interest in linking defense production to their core technology agenda. The heavy industries, in contrast, are less confident in their technology level, but are still more exposed and committed to defense production. This division is reflected in industry perspectives on the bilateral defense technology relationship as well.

II. ON COLLABORATION WITH THE U.S.

U.S.-Japan defense industrial collaboration began formally with the signing of the 1954 Mutual Defense Security Assistance Agreement. Through the middle of the 1960's the U.S. provided a massive flow of technology and financial assistance to rebuild Japan's defense industrial base. Even after U.S. financial support decreased for defense production in Japan, the majority of Japanese companies continued producing 25 - 50 % of their military systems under license from the U.S.

The DoD has had two mechanisms to reverse this one way flow of technology. The "flowback" provisions in MOU's (memorandum of understanding) covering license production

require Japanese companies to report any alterations, modifications or improvements made on U.S. systems. In addition, the U.S. and Japan established the Systems & Technology Forum (S&TF) in 1980 and the Joint Military Technology Committee (JMTC) in 1983 to negotiate the acquisition of Japanese technology. There is no mechanism that encourages Japanese licensing of dual-use or military technology directly to U.S. firms on a commercial basis.

Most Japanese hi tech companies have experienced licensed production or FMS (foreign military sales). Many have also been involved with joint development of FSX (the fighter support experimental). Only a handful have transferred technology to the U.S. or engaged in collaborative research at the subsystems level through the JMTC or S&TF. Based on these experiences, industry has developed strong dislikes for certain aspects of the current technology transfer regimes-- but the majority continue to see bilateral defense technology collaboration as in their interests.

All of the companies surveyed but 11 continue producing systems or subsystems under license from the U.S.. 10 companies have participated in joint development projects for defense equipment and 23 have participated in joint development projects with U.S. firms that were non-defense (of these, most were in aerospace).

Despite the high percentage of companies engaged in licensed production, the majority claim to have never provided flowback to the U.S. side:

(Question 16) How many times have you reported to the U.S. about improvement of systems and changes in design under license according to the flowback clause of MOU's?

Never	25 (50%)
Once	0
Twice	1 (02%)
More than 3 times	5 (10%)
Several times	1 (02%)
50 times	1 (02%)
160 times	1 (02%)

Even when flowback was reported, Japanese companies claim few significant outcomes:

(Question 17) What was the U.S. reaction (when providing flowback)?

There was no answer	2 (04%)
The DoD requested further information	1 (02%)
U.S. companies requested further information	1 (02%)
Technical data was	

eventually transferred
to the U.S. side 1 (02%)
The U.S. company followed-
up on our transfer 1 (02%)

These numbers are at odds with the vast amount of flowback technical data held by the Departments of Commerce and Defense. In interviews a number of companies questioned their obligations to provide flowback under MOU. Others explained that while they report regularly to the U.S. side, they had made no modifications that they considered "substantive" enough to constitute flowback. Those companies that had followed through to the point of responding to requests for further technical data complained that in the end the U.S. lacked either the funds or the interest to take advantage of the technology. On the whole, from the Japanese industry perspective, flowback does not appear to be remedying the imbalance in bilateral defense technology transfers.

Regarding joint development, Japanese industry claims to have had more negative experiences than positive. Predictably, most dissatisfaction focuses on the FSX:

(Question 24) How do you assess current U.S.-Japan joint development projects?

In a positive way 10 companies (20%)

Reasons given: "Japan needs to internationalize more"

"They are effective for developing future partnerships"

"They are necessary to develop technology in untested areas"

In a negative way 16 companies (32%)

Reasons given: "MOU flowback clauses are unfairly advantageous to the U.S. side"

"FSX left both sides dissatisfied"

"Development costs are rising due to delays"

"There is a big gap in thinking about budgeting and development"

"It is more beneficial to increase mutual trade"

"Not effective under the current legal framework"

"Mutual trust is lacking"

"The U.S. side is too aggressive and lacks flexibility"

No view/don't know 7 companies (14%)

However, in spite of the negative views expressed regarding current joint development projects, Japanese industry remains overwhelmingly positive about bilateral defense technological cooperation with the U.S.:

(Question 18) Is U.S.-Japan defense technology collaboration beneficial to both sides?

Yes	30	(60%)
No	9	(18%)
Don't know	6	(12%)

The reasons for this apparent contradiction are clear in the written comments provided by survey respondents. Many focus their negative comments specifically on FSX and add that other areas of defense technology relations are positive, or that the potential for mutual benefit remains significant.

Interestingly, those companies that have direct experience with defense-related joint development projects are the most positive about defense technology collaboration with the U.S.:

Companies that have direct experience with joint development projects (defense):	10 (20%)
Those that claim defense technology collaboration is not mutually beneficial:	1 (02%)

Companies that have no direct experience with joint development projects:	20 (40%)
Those that claim defense technology collaboration is not mutually beneficial:	9 (18%)

It may be that the negative experiences of projects such as FSX linger longest with those companies that are least involved. It is also worth noting that 25% of all electronic companies claim that bilateral defense collaboration is not mutually beneficial, compared with 10% of the heavy industries.

What is it about defense technology collaboration that Japanese companies find in their interests? The survey respondents see only modest advantage to their commercial competitiveness, but significant advantage for defense R&D:

(Question 21) Does U.S.-Japan defense technology cooperation play an important role in your company's R&D on the commercial side?

<u>Area of production</u>	<u>Yes</u>	<u>No</u>
Aircraft	2 (04%)	18 (36%)
Helicopters	1 (02%)	15 (30%)
Shipbuilding	3 (06%)	16 (32%)
Ammunition	1 (02%)	11 (22%)
Software/communications	4 (08%)	9 (18%)
Missiles	1 (02%)	16 (32%)

Tanks/artillery	0	4 (08%)
Avionics	2 (04%)	10 (20%)

(note that companies may engage in production in more than one area leading to multiple answers)

(Question 22) Does U.S.-Japan defense technology cooperation play an important role in your company's R&D on the defense side?

<u>Area of production</u>	<u>Yes</u>	<u>No</u>
Aircraft	8 (16%)	6 (12%)
Helicopters	7 (14%)	9 (18%)
Tanks/artillery	4 (08%)	9 (18%)
Shipbuilding	7 (14%)	12 (24%)
Ammunition	6 (12%)	4 (08%)
Software/communications	8 (16%)	5 (10%)
Missiles	8 (16%)	6 (12%)
Tanks/artillery	3 (06%)	2 (04%)
Avionics	7 (14%)	6 (12%)

It is important to note that these responses cover both licensed production and joint development. Some respondents refer specifically in written answers to either one or the other. In short, many Japanese companies continue to view "defense technology cooperation" as meaning the transfer of U.S. technology to Japan, a view captured in the following question:

(Question 28) What is the most appropriate form of U.S.-Japan defense technology collaboration for the future?

Licensed production	19 (38%)
Joint development of systems	5 (10%)
Joint development of subsystems	18 (36%)
Tech transfers to U.S. companies	3 (06%)
Sales to the USG	3 (06%)

Those companies most interested in transferring technology to U.S. companies are all heavy industries. The companies least interested (none even mention it) are the electronics companies. However, all three of the major consumer electronics companies do mention joint development at the subsystems or basic technology level as appropriate. This perspective is consistent with the fact that the same companies listed "interaction with top U.S. and E.C. companies" as an important incentive for engaging in defense production in the first place.

On the whole, joint development at the subsystems level stands out in this survey of Japanese industry as the most attractive avenue for expanding defense technology collaboration beyond the current pattern of licensed production and flowback:

(Question 27) What are the most promising areas for bilateral defense technology collaboration?

Missile-related technology	(13 companies) (26%)
(target acquisition and AD systems mentioned specifically)	
Electronics, broadly defined	(10 companies) (20%)
including: avionics	
C3I	
semiconductor components	
logistics software	
information systems	
signal processing	
Helicopters	(2 companies)
New materials	(2 companies)
Fighter engines	(2 companies)
Satellites	(2 companies)
Aircraft components	(3 companies)
Lasers	(2 companies)
Artillery & ammunition	
Space equipment	
HSST	
Simulators	

The focus on missile-related technology reflects a cautious, but long-standing interest that many Japanese defense industries have in theatre missile defense (TMD). Bilateral collaboration on surface-to-air missiles emerged in the wake of the FSX controversy as the JDA began exploring a successor for the NIKE HAWK. In follow-up interviews as well, air defense and missile defense emerged as frequent themes in the context of bilateral technology collaboration. Japanese reticence in bilateral discussion on TMD can be traced to the many obstacles and threats that industry perceives to its commercial interests.

III. OBSTACLES AND AVENUES TO SUCCESS

Despite a guarded optimism that bilateral defense technology collaboration can be mutual beneficial, Japanese industry sees a variety of significant bureaucratic, technical, legal and attitudinal obstacles to expanded cooperation. When asked about solutions to these specific problems, industry answers focus on relaxing government regulations on both sides and increasing industry-to-industry contacts. In follow-up interviews, however, most companies expressed doubt that such reforms could come about, or that they would lead to anything more than a moderate expansion of collaboration. Many companies expressed the opinion that "symbolic" joint projects were the best that government policies could achieve, but that such efforts would go a long way towards broadening mutual understanding and technology sharing between U.S. and Japanese companies, based on commercial rather than political imperatives.

(Question 25) What are the obstacles to improved U.S.-Japan

Defense technological and industrial collaboration?

	Major obstacle	Minor obstacle	Not relevant	Don't know
a. Japan's three arms export principles	40 (80%)	8 (16%)	0	1 (02%)
b. Weakness of JDA in domestic politics	8 (16%)	14 (28%)	13 (26%)	14 (28%)
c. Language barriers	1 (02%)	23 (26%)	23 (26%)	1 (02%)
d. Different fiscal years	2 (04%)	12 (24%)	26 (38%)	7 (14%)
e. Japan's strength is in manufacturing technology which is difficult to transfer	7 (14%)	13 (26%)	19 (38%)	11 (22%)
f. Difficulties finding U.S. partners	3 (06%)	5 (10%)	29 (58%)	10 (20%)
g. Lack of successful precedents	2 (04%)	10 (20%)	15 (30%)	20 (40%)
h. Small scale of Japan's defense production	21 (22%)	16 (32%)	6 (12%)	4 (08%)
i. Terms of contract proposed by the U.S. side are not satisfactory	13 (26%)	6 (12%)	3 (06%)	25 (50%)
j. Lack of coordination between Japanese govt. and industry	5 (10%)	6 (12%)	23 (46%)	12 (24%)
k. Japanese industry afraid of losing important technologies	8 (16%)	12 (24%)	14 (28%)	12 (24%)
l. MITI uninterested	5 (10%)	5 (10%)	13 (26%)	23 (46%)

m. Negative image of defense production in Japan	10 (20%)	21 (22%)	11 (22%)	4 (08%)
n. Lack of U.S. understanding of Japan's system regarding dual use tech transfer	13 (26%)	11 (22%)	8 (16%)	15 (30%)
o. DoD pressure to buy through FMS	11 (22%)	10 (20%)	5 (10%)	21 (42%)
p. DoD imposes too many restrictions on Japanese companies in joint projects	12 (24%)	9 (18%)	2 (04%)	23 (46%)
q. U.S. still undervalues foreign technology (NIH)	3 (06%)	11 (22%)	11 (22%)	23 (46%)
r. Lack of govt.-business coordination on the U.S. side	4 (08%)	7 (14%)	7 (14%)	29 (58%)
s. Senior DoD and JDA officials are not paying enough attention to defense technology cooperation	2 (04%)	4 (08%)	12 (24%)	30 (60%)
t. Mutual distrust between U.S. & Japan	11 (22%)	9 (18%)	13 (26%)	14 (28%)
u. Lack of prior	3 (06%)	17 (34%)	18 (36%)	10 (20%)
v. Lack of interest from U.S. industry	2 (04%)	12 (24%)	16 (32%)	16 (32%)
w. Lack of common needs in JDA and DoD participation by top Japanese companies	15 (30%)	8 (16%)	5 (10%)	17 (34%)

the opinion that Japanese industry was not ready for such a shift in policy. It is not clear whether the ambiguity of the arms export rules is more of a hindrance or a smokescreen for industry, particularly given the large number of respondents that claim government-industry coordination on the Japanese side is **not** an obstacle to greater bilateral technology transfer (25.j --note also 25.1 in which only 5 companies complain that MITI is a major obstacle).

Industry has two complaints about U.S. Government policies: DoD puts too much pressure on Japan to procure weapons through the FMS process (cited by 11 companies as a major obstacle); and DoD imposes too many restrictions on Japanese companies participating in joint projects (cited by 12 companies as a major obstacle). However, these complaints should be put in the proper context. Japanese industry has been focusing on FMS as an obstacle to Japan's ability to access U.S. technology for almost three decades. The question of whether DoD regulations obstruct **reciprocity** in technology flows is less clear. Nevertheless, Japanese companies do maintain that FMS is a legacy of the years of coproduction, and that **codevelopment** (presumably with greater reciprocity in technology flows) will only be attractive when they are given commercial incentives to bring their non-defense technology to the table. 33 respondents claim that a more flexible policy in regard to FMS versus license technology would significantly improve bilateral defense technology cooperation. In the same theme, 16 companies call for increased industry-to-industry contacts.

The respondents to the survey also admonish the U.S. government to learn more about Japanese technology and the Japanese system for technology transfer. 24 companies cite a lack of U.S. understanding of the Japanese rules regarding dual-use technology transfer as an obstacle (25.n) and 31 claim that improved knowledge about Japanese technology by the DoD and the U.S. embassy would help (26.i). However, industry points to little advantage in establishing a greater technology monitoring presence in Tokyo for ARPA or the U.S. military services (perhaps reflecting a lack of understanding of the role of these organizations).

Industry points to two attitudinal obstacles to bilateral defense technology collaboration, which may ultimately prove the most difficult to overcome. 10 companies cite the negative image of defense production in Japan as a major obstacle (25.m), but significantly all of the consumer electronics companies were of this view. For this same reason, only one of the consumer electronic companies responded that a relaxation of the Three Arms Export Principles would improve cooperation with the U.S..

In addition, 11 companies cite mutual mistrust as a major obstacle. The reasons become clear in the explanations Japanese industry give for U.S. interest in expanding defense technology collaboration:

(Question 23) What do you see as the U.S. motivations for bilateral defense technology cooperation?

Main reason	Secondary reason	Not important
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a. Acquire Japanese technologies	6 (12%)	15 (30%)	10 (20%)
b. Acquire Japanese commercial technologies	13 (26%)	7 (14%)	11 (22%)
c. Incorporate Japanese technologies in U.S. weapons	9 (18%)	14 (28%)	8 (16%)
d. Jointly develop weapons with high interoperability	4 (08%)	15 (30%)	13 (26%)
e. Contain the Japanese defense industry	6 (12%)	7 (14%)	17 (34%)
f. Set a good example of U.S.-Japan cooperation	0	15 (30%)	18 (36%)
g. Cut down on development costs	8 (16%)	14 (28%)	7 (14%)
h. Cultivate the Japanese market	16 (32%)	12 (24%)	4 (08%)

Responses to this question appear to reflect each company's specific insecurity about DoD policy. All three of the large electronics companies cite acquiring Japanese commercial technology (23.b) as the major motive of the U.S. side and all three mention incorporating Japanese technology in U.S. weapons (23.c) as only a secondary reason. In contrast, only three of the nine heavy industries mention acquiring Japanese commercial technology as a major motive, while five cite expanding market share (the area where they are most vulnerable according to earlier answers) as a major motive.

The political rationale given for bilateral defense technology cooperation in the 1980's was often alliance solidarity or interoperability: neither of which Japanese industry cites as a significant U.S. motive today (23.d and f). The fact that more companies point to U.S. desires to "cultivate the Japanese market" or "access Japanese commercial technology" rather than "to incorporate Japanese technologies in U.S. weapons"; "jointly develop weapons with high interoperability", or "set a good example of U.S.-Japan cooperation" suggests that Japanese companies see a strong element of industrial policy in U.S. actions.

The commercial impact of defense technology collaboration is not lost on Japanese industry, of course. For that reason, most companies' suggestions for improving the system focus on moving the corporate sector to center stage and pulling both governments back to the role of "guarantor" rather than "regulator" (although this always presents obvious policy problems for defense trade):

(Question 26) Which of the following policies would improve U.S.-Japan defense technology cooperation?

	Very important	Somewhat important	Not important	Counter-productive
a. More flexible U.S. policy in regard to FMS vs. license production	33 (66%)	9 (18%)	2 (04%)	0
b. Easing U.S. anti-trust laws	6 (12%)	11 (22%)	21 (22%)	0
c. Abolishing the commission paid to USG with FMS	4 (08%)	17 (34%)	15 (30%)	0
d. An ARPA office in Tokyo	0	18 (36%)	19 (38%)	0
e. More frequent S&TF meetings	7 (14%)	23 (46%)	11 (22%)	0
f. Pressure from the USG and MITI or JDA	3 (06%)	14 (28%)	18 (36%)	12 (24%)
g. Increase requests from the U.S. side through JMTC	3 (06%)	18 (36%)	11 (22%)	12 (24%)
h. Improved coordination within DoD	9 (18%)	17 (34%)	6 (12%)	0
i. Improved knowledge about Japanese technology by the DoD and U.S. embassy	7 (14%)	24 (48%)	7 (14%)	0
j. Improved knowlege about U.S. military				

technology by MITI	7 (14%)	22 (44%)	10 (20%)	0
k. Increased budget and personnel for research institutions in Japan such as AMC, ONR, AFOSR, etc.	1 (02%)	13 (26%)	20 (40%)	0
l. Easing the Three Export Principles on Arms Exports	31 (62%)	8 (16%)	2 (04%)	0
m. Promoting cooperation on subsystems with government support	5 (10%)	10 (20%)	10 (20%)	0
n. Increased industry to industry contacts	16 (32%)	17 (34%)	8 (16%)	0

Other specific industry proposals for promoting bilateral defense technology collaboration focused on the following themes (written in as comments or expressed in follow-up interviews):

- 1) **Exchanging R&D personnel.** Several companies noted that transferring data packages is ineffective if engineers are not given a chance to interact.
- 2) **Government tax cuts or rebates for companies that participate in joint research.** This comment was specifically directed at the Japanese Government.
- 3) **U.S. Government contracting of Japanese companies to conduct defense-related R&D work.**
- 4) **Japanese Government contracting of Japanese companies to conduct defense-related R&D work for DoD.**
- 5) **A MITI decision to define dual-use technology as purely commercial.**
- 6) **Japanese Government guarantees that Japanese companies will not be held accountable if U.S. companies transfer military -related technology to third countries (in violation of the Three Arms Export Principles).**
- 7) **Clear U.S. Congressional support for DoD policies (particularly mentioned in the context of FSX).**

8) Parallel development of distinct U.S. and Japanese TMD systems, with joint R&D work at subsystems level, but no explicit Japanese exports to the U.S..

CONCLUSION

The MIT Japan Program survey of Keidanren Defense Production Committee members should provide researchers and policymakers with at least a partial understanding of the capabilities, motivations and concerns of the holders of critical dual-use technology in Japan. Final conclusions and policy recommendations must wait until the U.S. half of this project is complete, but certain issues are worth considering at this point.

First and foremost is the fact that Japanese firms have determined views on how far they can and will go towards meeting U.S. requests for reciprocity in defense-related technology. With the proper commercial incentives and government guarantees (particularly with regard to the three arms export principles and FMS), industry seems willing to expand bilateral collaboration. Joint development at the subsystems level holds the greatest attraction and the fewest bureaucratic and technical difficulties. Unilateral transfers of technology to the U.S. or joint development at the systems level appear more problematic. From industry's perspective, flowback provisions of MOU do not seem to offer significant potential for correcting the bilateral imbalance in technology flows either.

The key point, however, is that the opportunity costs associated with bilateral defense technology collaboration vary widely from company to company. Japanese industry is not a black box. By their own reckoning, those companies with a heavy exposure to defense have the most to gain from the U.S. in terms of systems integration skills and the least dual-use technology to offer in terms of components and basic technology. In contrast, the electronics companies --and particularly the three companies identified as large consumer electronics companies-- appear to have a great deal to offer in terms of critical dual-use technologies, but express the least enthusiasm about changing the current system to expand technology reciprocity. And precisely because these electronics companies are least exposed to defense production, the U.S. and Japanese Government's can bring few points of pressure to bear (a fact stressed by several Japanese business executives in recent press statements). If U.S. policy seeks a broad exchange of U.S. military systems technology for Japanese dual-use technology, this dichotomy within the ranks of Japanese industry could become a significant obstacle.

There is room for optimism, however. The very fact that the Keidanren Defense Production Committee cooperated fully with this survey, together with the numerous suggestions by respondents for specific technologies that would be appropriate for joint development, indicate that an expansion of bilateral defense technology cooperation is possible. The challenge for policymakers will be to meet both the concerns of Japanese industry and the needs of corporations and DoD labs in the U.S.. These latter points are the focus of two related MIT-Japan Program survey reports that will be released soon.