JAPANESE POLICYMAKING FOR THE INTERNATIONAL SPACE STATION[1]

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1. INTRODUCTION

The polygamic marriage of policy network analysts is going through rather a rough patch. Pioneers of the approach such as Maurice Wright, while not renouncing their vows, have found themselves drawn to the more tactile charms of extended case studies around the world. Those who remain at home, as RAAB (1992: 69–70) observes, are not a happy family: their euphoria at finding a common, all-embracing approach to policy processes now evaporated, they find that their old methodological flames, be they Marxian, corporatist or pluralist, are the cause of constant rows over definitions and assumptions.

Amidst the flying conceptual crockery, this article briefly addresses the strengths and weaknesses of policy network analysis as a means to understanding Japanese policymaking for the international space station project. In doing so, it raises the question of whether and how policy networks function across national borders. While space does not allow a thorough exploration of the problem, *ideas* emerge as an important but elusive concept. This paper draws on policy network analysis, the literature on epistemic communities and two-level theory to draw up hypotheses to be tested, before presenting the case study of the space station.

2. THEORETICAL ISSUES

2.1 Policy Network Analysis

Policy network analysis is a framework for systematically describing the way in which actors interact to make policies. All those involved in the making of, and directly or indirectly affected by, the implementation of a particular policy form a *policy universe.* A policy universe can in some cases – for example, macro-economic or taxation policy – comprise the

[1] I would like to thank the following for their comments on earlier drafts of this article: Daniel Dirks, Robert Horres, Edzard Janssen, David Leheny, Morris Low, Richard Samuels, David Williams and Maurice Wright.

entire population of a country, and even include the populations of other countries. Such a huge number of players is of little use as a unit of analysis. Within a policy universe, therefore, WILKS and WRIGHT (1987) propose that we can distinguish "policy communities", whose members share a direct concern with or interest in policy for a particular industrial sector, market, technology, or other "policy focus". Just as policy focuses vary widely in breadth, so policy communities differ widely in the number and institutional characteristics of groups and individuals of which they are composed. A policy community, in other words, establishes itself wherever a set of problems arises for which policies must be made.

Within, or between, these policy communities, the actors (whether groups or individuals) formally and informally exchange resources as they decide and implement policies. Resources take a variety of forms, such as information, expertise, manpower, legal authority, legitimacy, votes, and of course all forms of financial resources including budget approval, low-interest finance, government procurements, subsidies, tax exemptions and even bribes. These exchanges and the dependencies they create, rather than simply the institutional or financial muscle of the actors engaged in making them, delineate the networks and determine what policies are decided and implemented. Policy network analysis attempts to impose some analytical order on this complex of exchanges by defining the key variables in the operations of policy networks, in order to hypothesize about the relationships between these variables and the outcomes of policymaking.

Although RHODES and MARSH (1992a: 182–183) and WILKS and WRIGHT (1987 and 1991) disagree on the use of the term "policy community", they agree that "degree of integration" is the main variable by which policy networks can be distinguished. "Degree of integration" is itself a basket of variables, chief among them the number of network members, the freedom with which new members can enter networks, the professionalization of a network, and the extent to which members are dependent on each other for resources. This paper does not attempt a sophisticated typology of policy networks, partly for space reasons, partly because, as described below, such typologies have a tendency to get bogged down in unreadable neologism, but mostly because the main purpose here is to explore possible links between policy network analysis and international relations approaches.

2.2 Policy Networks and Institutions

Policy network analysis has entered the mainstream of European political science, and acquired academic respectability in North America and Japan, because of its perceived appropriateness to the analysis of contem-

porary policy processes. As KOIKE (1995: 28) notes in his review of the policy network literature, the increasing role of private, semi-private and semi-governmental bodies in policymaking and policy implementation in all industrialized countries undermines narrowly institutional studies of policymaking. In such an environment, neither KATZENSTEIN's (1978) generalizations of "strong states" and "weak states" nor the minimalist vigor of RAMSEYER and ROSENBLUTH's (1993) application to Japan of principal-agent theory can offer systematic descriptions of particular policy processes in a way that will allow them to be compared to processes in other sectors, countries and times.

Defined as they are by the scope of actual policy issues rather than institutional areas of jurisdiction (which can be referred to as *policy areas)*, policy communities frequently include several government agencies. It goes without saying that these institutional complications greatly affect policy processes and hence outcomes. The work of historical institutionalists such as STEINMO, THELEN and LONGSTRETH (1992) suggests that current patterns of resource exchange in policy communities are greatly influenced by previous patterns, a disarmingly obvious point which nevertheless deserves greater attention in the policy network literature. Policy network analysis neglects institutions at its peril; despite the blurring of institutional lines and the informalization and professionalization of many areas of policymaking, the shape of policymaking institutions is still one of the decisive factors in determining policy outcomes.

Incorporating this institutionalist perspective into our policy network framework, we can hypothesize:

- Membership and modes of operation of policy networks tend to follow those which applied for previous issues, and only change radically in response to an external shock and/or massive failure. In this sense even informal networks are loosely institutionalized.

2.3 Multiplying Metaphors

The methodological claims made by policy network analysis are relatively modest. Unlike rational choice theory, it is not a theory of political behavior. DOWDING (1995: 137) notes that the policy network approach is essentially metaphorical, a point well illustrated by the proliferation of more or less colourful terms to describe policy networks. Policy network analysts are accordingly exposed to the temptation of reaching for a new metaphor whenever those already on the pallette are inadequate to describe the policy process under investigation.[2]

[2] An example of such proliferation is YISHAI (1992).

Those (most notably, WAARDEN 1992) who try to fit these multiplying metaphors into an overall scheme, expose themselves to criticism as 'lepidopterists' (DOWDING 1995: 141). Clearly we risk, on the one hand becoming caught up in a web of neologisms which defeats the original comparative purpose of the approach, and on the other hand wasting time in the hopeless task of trying to impose a standard, manageable typology. But the seriousness of this dilemma should not be exaggerated: once we get past the introductory chapters and paragraphs where authors make their bids for theoretical credibility, the differing vocabularies employed in policy network studies are not insurmountable obstacles to comparative study.

The second problem is that there is still insufficient literature available on the all-important question of how policy networks change. DUNN and PERL (1994), building on ATKINSON and COLEMAN's (1988) typology of industrial policy networks, suggest that certain types of networks tend to produce certain types of outcomes, and that certain types of outcomes in turn tend to change networks in certain directions. ATKINSON and COLEMAN (1992) identify three sets of factors affecting the way in which networks change: changes in who is included in and who is excluded from policy networks; use of new ideas to change the structures of networks; and the effects on processes of changes either in related networks or in the broader political economy. As if to support their first point, SCHOPPA (1993) demonstrates how bringing in previously passive members of policy communities can change the shape of domestic policymaking, and hence the outcome of international negotiations. Schoppa thus suggests that policy communities do not simply or only "evolve" accidentally, but that political actors can exert some influence on the shape of policy communities and therefore policy networks and outcomes.

The third shortcoming of the existing policy network literature is its lack of exploration of international networks. This does not mean that policy network analysts are indifferent to international problems or even policy coordination. Policy network analysis was developed to provide systematic explanation of domestic policy processes to enable comparison across countries, sectors and times. As a result, the main thrust of case studies has been either to compare several sectors in one country (e.g., RHODES and MARSH 1992b, WILKS and WRIGHT 1991) or to compare the same sector in different countries (e.g., DUNN and PERL 1994). A policy issue such as an international research project, however, at the very least raises the possibility that policy networks straddle national borders. The policy networks literature has hitherto paid little attention to the problems of international, i. e. cross-border policy networks, perhaps because introducing *national* factors to the analysis goes against the approach's sectoral bias. In the case

examined below, should we study Japanese, US, Canadian and European (or the dozen different countries contained therein) policy processes in isolation from each other and then compare them at the end? To some extent, the fact that one can distinguish *Japanese policymaking* for the space station suggests that policy networks do indeed tend to observe national boundaries. On the other hand, the regularity of formal and informal international contacts between policymakers in such cases – and the observer can see only the tip of the iceberg – increases the possibility of resource dependencies arising between actors in different countries.

Rather than adding to the welter of metaphors by suggesting new terms to describe international networks, this paper turns to two existing approaches to the question of how domestic policy processes interact with international and overseas processes: the two-level game approach and the epistemic communities approach.

2.4 Two-Level Games

The starting point of PUTNAM's (1988) theoretical work on the interaction between domestic policy and international relations is the impossibility of explaining the outcomes of international negotiations by studying international and domestic politics in isolation from each other. International and domestic policy processes are entangled and affect each other continually. PUTNAM's "two-level game" metaphor attempts not only to recognize this continual interaction, but to provide "a conceptual framework for understanding how diplomacy and domestic policy interact" (PUTNAM 1988: 430). In doing so, Putnam and later SCHOPPA (1993) move beyond the previously favored state-centric and domestic-only approaches.

The "two-level game" metaphor depicts a national representative simultaneously negotiating at the international table with representatives of other nations and, at the domestic table, with those who must ratify and implement any agreement reached. Each representative has a *win-set*, the range of possible international agreements which would be acceptable to domestic constituents. If the two sides can agree on an outcome which lies within both sides' win-sets, the negotiations are successful. If the win-sets do not overlap, the negotiations break down.

Putnam observes that his metaphor can be "married to" analyses of domestic policy processes from various perspectives. These domestic analyses establish domestic preferences and coalitions, the first determinant of a negotiating side's win-set. The two-level approach dovetails particularly neatly with policy network analysis in that both approaches distance themselves from the strong state/weak state model, which can be seen either in domestic terms, where states are strong or weak with regard to

other domestic players, or in terms of realist international relations, where states are either strong or weak relative to each other. As both Putnam (1988: 431–432) and Wilks and Wright (1987) point out, the unitary strong state/weak state is too blunt an instrument with which to dissect policy outcomes in particular policy areas, which vary greatly from sector to sector as well as from country to country. Furthermore, the strong state/weak state model often resorts to circular logic to explain cases, in other words "the state is able to intervene in markets/get its way in international negotiations because the state is strong; and the state is strong because it is able to intervene in markets/get its way in international negotiations".

Atkinson and Coleman (1992) argue that a combination of the two-level game approach and policy network analysis has great potential, but only for analysis of exclusively "high politics" issues in which the only international contacts are between appointed national representatives. Where interest associations and multinational companies engage in policy networks (e.g., by lobbying) in more than one country, however, international negotiators have less control over bilateral exchanges. Similarly, in professionalized networks, such as we would expect to find in the science and technology policy area, not only the official negotiators but most members of the policy communities in negotiating countries have many contacts with their opposite numbers overseas. While senior diplomats put the finishing touches to technical agreements, the actual negotiations are carried out by technical experts with rather different perspectives on the issues than those of their political masters.

At the same time, there is always the possibility that technical negotiations will be overtaken or undermined by more general political (both domestic and international) considerations at "higher" levels. The more countries participating in negotiations, the greater the possibility of such multi-level processes taking place. Therefore, to theorize about international relations and policy networks we need a "multiple-level" approach able to cope with both the enduring national divisions between policy areas and the proliferation of international ties between policymakers. Even in state-funded areas we find many cases of informal, often professionalized, policy networks bypassing international negotiations. Putnam himself (1988: 450) points out this need for greater sophistication, but adds that "at some point in this analytic regress the complexity of further decomposition would outweigh the advantages".

Taking the two-level approach into account, the following hypothesis can be proposed:

- International agreement is more likely to be reached, the greater the role of transnational epistemic communities (see below) in policymaking in

their respective countries. In other words, transnational epistemic communities tend to expand the win-sets of both sides.

2.5 Epistemic Communities

The literature on epistemic communities approaches the problem of domestic-international linkage from the opposite direction to Putnam's two-level game approach. The two-level metaphor is deductive, abstracting international contacts down to one negotiator for each country. The epistemic communities approach, on the other hand, is inductive; its starting point is the increasing technical complexity and geographical reach of many policy issues. In order to cope with this trend, growing numbers of professional experts have been employed to advise political decision-makers. These experts often share a common way of understanding the problems they are dealing with, and a common set of ideas as to how to solve those problems. In such cases they form an epistemic community, which is defined by HAAS (1992: 3) as "a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area". The networks frequently cross national borders and are maintained by personal contacts, conferences, and other forms of exchange.

Epistemic communities differ from professional associations in that they share not only a common set of causal (i. e., analytic) beliefs, but also a common set of principled (i. e., normative) beliefs, and furthermore they share not only a consensual knowledge base but also interests. Bureaucratic agencies, by contrast, share neither causal beliefs, principled beliefs, a consensual knowledge base, nor interests (for a graphic representation of these differences, see HAAS 1992: 18). Whereas bureaucracies act "largely to preserve their missions and budgets" (HAAS 1992: 19), epistemic communities operate to achieve their normative objectives. Of course, in order to achieve their objectives epistemic communities require budgets, which makes their behavior potentially difficult to distinguish from that of bureaucratic bodies, especially during the early phases of a project.

From the above, we can draw the following hypothesis:

- Epistemic communities will have a greater role in policymaking, the smaller the number of bureaucratic bodies participating in the policy process. This is because the interests of bureaucratic bodies diverge as a matter of definition.

The main function of epistemic communities is to reduce decision-makers' uncertainty by filling the *knowledge vacuum* with several policy alternatives, or ideas. Even in highly technical policy areas, however, de-

cision-making has not been delegated entirely to epistemic communities, and where experts disagree decisions are likely to be based on political rather than technical considerations.

How useful is the epistemic communities approach? Its chief claim to greater utility than the policy networks approach is that it addresses not only the exchange of resources between actors, but also the *socially constructed* nature of policy alternatives, i. e. ideas. Its simple contention that "ideas matter" is intuitively true, and does not contradict the policy networks approach; a hypothetical actor with massive budgetary or personnel resources but without ideas would quickly be excluded from policy processes. Experience suggests, however, that policymakers are well aware of the importance of ideas, and employ a large proportion of their resources in keeping track of and producing ideas.

More ambitiously, the epistemic communities approach asks why some ideas become policy while others do not, and furthermore, why similar ideas tend to become policy in countries with very different political economic complexions. Here too, resources and interests matter as much as ideas; different countries are unlikely to put resources into the pursuit of radically different policies from other countries without a compelling domestic reason to do so. In order to minimize uncertainty and capitalize on experience gained elsewhere, we would expect countries to pursue similar ideas.

Finally, as KOHNO Masaru (1995) has pointed out in a recent article on technonationalism, we still lack a clear understanding of what ideas are. The moment an idea is communicated by its inventor to someone else, it takes on a life of its own. KOHNO (1995: 207–210) suggests three dynamic phases in the life of a successful idea (i. e., one that does not die along the way): popularization, internalization, and formalization. In the first phase, popularization, the idea is taken up by other people for their own gain; the idea becomes a shared "norm". In the second phase, internalization, the norm becomes identified with the interests of a particular group in opposition to the interests of other groups. In the third phase, formalization, the norms are turned into codified rules and institutions in order to reduce conflicting interpretations of their meaning and application.

Although Kohno employs a principle-agent approach in his analysis of political processes, his proposal raises interesting questions for policy network analysts. Are ideas resources, or policy issues, or policy areas (i. e., institutional boundaries)? Kohno's answer is: all three, at different times. We could draw up various hypotheses from this answer, but one will suffice here:

- New ideas become policy (i. e., policy issues) if they are employed as a resource by key actors in exchange for other resources.

What happens if ideas develop at different speeds in different countries, or if an idea makes it to the policy stage in one country but not in others? Returning to the two-level metaphor, we might hypothesize that an idea must be popularized in both countries in order for them to agree to cooperate on it.

2.6 Hypotheses

Our discussion of international policy networks has thus brought us full circle, back to the question of how policy networks change. It is now time to focus on Japanese policymaking for the international space station, to test the four hypotheses proposed above:

- Membership and modes of operation of policy networks tend to follow those which applied for previous issues, and only change radically in response to an external shock and/or massive failure. In this sense even informal networks are loosely institutionalized.
- International agreement is more likely to be reached, the greater the role of transnational epistemic communities in policymaking in the respective countries. In other words, transnational epistemic communities tend to expand the win-sets of both sides.
- Epistemic communities will have a greater role in policymaking, the smaller the number of bureaucratic bodies participating in the policy process. This is because the interests of bureaucratic bodies diverge as a matter of definition.
- New ideas become policy (i. e., policy issues) if they are employed as a resource by key actors in exchange for other resources.

3. Technonationalism versus Technoglobalism: A Simplistic Dichotomy

Any study of an international science and technology project started during the 1980s must take some position with regard to what was perceived as the growing tension between technonationalism and technoglobalism (or internationalization in Japan's case). This paper finds the concepts, with their oversimplistic distinction between cooperative and non-cooperative behavior, of little use in the analysis of policy processes.

Technoglobalism denotes a trend to growing interdependence of public and especially private sector actors in science and technology policy. High

technology companies catering to global markets were less and less dependent on national governments for information and new scientific ideas, and government researchers became less and less able to keep up with massively funded technology developments in the private sector. Companies developed and acquired new technologies through networks of research centers, joint research agreements and private-academic links across many countries. In the still mostly state-funded sciences, international links between academic and private sector scientists also proliferated, and national research teams increasingly gave way to international ones. At the same time, the costs of major scientific projects became too expensive for individual governments to bear, leading to an increase in international cooperation in big science (POSNER 1992). These trends, and the policies implemented to cope with them, together constitute "technoglobalism" (see, for example, DE LA MOTHE and DUFOUR 1995).

In opposition to this trend, several trends combined to incite countries to *technonationalism*. First was the growing importance of high technology industries in maintaining economic growth, which meant that national governments had an interest in nurturing and attracting high technology industries, and in improving their "national systems of innovation" (FORAY and FREEMAN 1991). The achievement of high levels of scientific and engineering capability became increasingly linked to economic security. Second was the continued increase in the importance of high technology in weapons systems. Whereas advanced defence technologies had previously been developed specifically for military applications in the US and Soviet Union, the pressures and rewards of the commercial markets for electronics, software, new materials, fine chemicals and other products meant that manufacturers producing mainly for those markets were now in a position to *spin-on* their technologies to military applications. The possession of competitive civilian high technology industries therefore also came to be seen as a vital component of national security.

The emergence of technonationalism in US-Japan relations requires no long recapitulation here. As Japanese companies achieved competitiveness in important industrial sectors such as semiconductors and computers, they were accused of having achieved their appreciable market shares by unfair use of foreign, especially US technologies. In addition, several Japanese acquisitions of US high technology businesses with military products were blocked either by protests from rival US bidders or by US politicians, even though in most cases the acquisition had been proposed by the US businesses themselves and in some cases the businesses were already controlled by other foreign businesses (KOHNO 1995: 210–219).

In addition to trade friction over high technology products, many Western nations increasingly criticized what they called Japan's "free ride" on

the basic scientific research efforts of other industrialized nations. This criticism was prompted by the relatively low proportion of public funds in overall Japanese spending on research and development, coupled with the emphasis placed by many Japanese companies and government laboratories on adopting and improving existing technologies rather than on the pursuit of basic science without the prospect of commercial dividends.

This two-pronged foreign criticism of Japanese science and technology policy, and especially the furor accompanying the discovery of industrial espionage by Japanese computer companies in the United States in the early 1980s, prompted a shift in the rhetoric used by MITI, Ministry of Education and Science and Technology Agency (STA) bureaucrats. Instead of technonationalism *(gijutsu rikkoku)* they started to emphasize internationalization *(kokusaika)*. Internationalization became, and remains, a budget-getting buzz-word in many policy areas. However, as NAKAYAMA (1995: 133–140) makes clear, no attempt was ever made to resolve the contradiction between technonationalism and internationalization into clear policy targets.

What NAKAYAMA (1995) sees as the contradiction between technonationalism, i. e., non-cooperative behavior, and technoglobalism/internationalization, i. e., cooperative behavior, presents difficulties both for empirical studies of Japan's foreign relations and for international relations theory. KOHNO (1995) argues that neither realist nor liberal theories can account for the inconsistencies in either the United States or Japan's behavior in different cases of military technology policy diplomacy in the 1980s. A diagnosis of schizophrenia may, however, be premature. As KOHNO (1995) points out, the idea of technonationalism in the United States only emerged in the context of unprecedented bilateral cooperation in all areas of science and technology. Furthermore, both SAMUELS (1994: 328–329) – on the subject of the Japanese aircraft industry – and SAITO (1992 and 1995) – addressing the Japanese space program – bear witness to an holistic rather than dualistic approach in Japanese science and technology policy; development of domestic technologies is Japan's entry ticket to international collaborative projects, which in turn stimulates domestic technologies, which in turn enables Japan to play a bigger role in international projects. To argue whether this is liberalism in realist clothing or vice versa is a sterile debate. A more fruitful line of inquiry is to investigate particular cases in order to assess how the issue of international cooperation was reflected in domestic actors' aims and resource dependencies, and how overseas developments and international negotiations changed these aims and dependencies.

4. The International Space Station Project

4.1 Outline of the Space Station Project

> Tonight, I am directing NASA to develop a permanently manned space station and to do it within a decade. A space station will permit quantum leaps in our research in science, communications, in metals, and in lifesaving medicines which could be manufactured only in space. We want our friends to help us meet these challenges and share in their benefits. NASA will invite other countries to participate so we can strengthen peace, build prosperity, and expand freedom for all who share our goals.
>
> (President Ronald Reagan, State of the Union Address, 25 January 1984; Launius 1994: 248)

Space stations have many potential uses, three of the most obvious being: a base for observation of the universe and the earth; a platform for scientific experiments and manufacturing of products using the lack of gravity and atmosphere; a starting-point for missions to other planets. Manned space stations, along with hypersonic aircraft and manned exploration of Mars, were the main themes of the industrialized countries' space policy planning in the 1980s. The main problem in realizing these goals was shortage of funds rather than technical difficulty; as a result, realization of the latter two themes was pushed far back into the twenty-first century. In the case of the International Space Station, the technical approaches, commercial and scientific benefits and military potential of the station were also the subject of vigorous debate. Furthermore, domestic US political support for the space station was shaky, not least because the program coincided with an expanding US budget deficit.[3]

More than a year before President Reagan's announcement of the space station program, the US National Aeronautics and Space Administration (NASA) approached its opposite numbers in Japan, the European Community and Canada regarding participation in the project. The design of the international space station changed many times both before and after the international partners (IPs) were officially invited to participate in 1984, but the modular concept endured. Several pressurized modules with different functions would be attached to each other or to a central truss or frame. One module would provide accommodation for the crew members, who would number either four or six depending on the design, and at least three other modules would function as workrooms or laboratories in which the station's activities would take place. Electric power would be

[3] For a detailed account of policymaking for the space station program in the United States, see McCurdy 1990.

supplied from a central generating system, and communications between the modules, earth, and other satellites would also be carried out centrally. The station would also have an "exposed platform" on which operations could be carried out in a raw space environment, while unmanned satellites known as "free flyers" would fly alongside the station, visited periodically to remove experimental results or manufactured products and to replenish supplies.

NASA's basic policy for international cooperation was that money would not change hands; instead, each participant would have rights to station facilities proportional to its burden in the project. Although doubts about European participation in the project continued, the shape of international participation emerged early: Japan and the European Space Agency (ESA) would each build one module to be attached to the station, and Canada would build a remote manipulator arm (McCurdy 1990: 176).

Three main policy issues arose in Japan regarding the space station:

- Deciding to participate, and building the Japanese module – apportionment of costs and contracts.
- Establishing priorities in deciding Japanese use of the space station.
- Japan's position regarding military use of the station by the United States.

The multipurpose nature of the space station and the international dimensions of the project meant that these policy issues fell across the turf of several ministries and government agencies, and affected the interests of several industries and other interest groups.

4.2 Japanese Space Policymaking Institutions

The highest body in Japanese space policymaking is the Space Activities Commission (SAC), which is attached to the Prime Minister's Office. It produces overall plans for the nation's space development, and officially coordinates all space-related activities. Two government-funded institutions are in charge of developing and launching space hardware: the National Space Development Agency of Japan (NASDA), which is under the jurisdiction and budget of the Science and Technology Agency (STA), and the Institute of Space and Aeronautical Science (ISAS), formerly part of the University of Tōkyō but now administrated directly by the Japanese Ministry of Education (Monbushō). ISAS is responsible for space science, for which purpose it also develops small rockets. NASDA, according to its establishing law, is responsible for "the development, launching, and tracking of satellites, and for pursuing the development and use of space for peaceful purposes only" (Kuribayashi 1995: 408).

Table 1: **Phases of Space Station Development**

Phase A	concept selection (US only)
Phase B	preliminary design
Phase C	detailed design
Phase D	development (i. e., building)
Phase E	operation and utilization

Table 2: **Milestones in Space Station Policy Processes**

October 83	Phase A concept planning (US only) completed
January 84	Reagan announces space station
April–June 85	Bilateral Memoranda of Understanding (MOU) on Phase B signed
September 88	Multilateral Intergovernmental Agreement (IGA) on Phase C & D signed; bilateral MOUs on Phase C & D also signed
July 89	Japanese Diet ratifies IGA
August 89	Japanese Phase C/D contractors decided

NASDA is a relatively small organization and relies heavily on Japanese aerospace companies for the design and construction of equipment. The Japanese aerospace industry, not unusually, forms a pyramid of contractors and subcontractors. The relatively small number of contractors at the top of the pyramid – most notably Mitsubishi Heavy Industries (MHI), Kawasaki Heavy Industries (KHI), Ishikawajima-Harima Heavy Industries (IHI), NEC, Nissan, Mitsubishi Electric (MELCO), Tōshiba, Hitachi, and Fujitsu – have all developed close long-term relationships with NASDA and ISAS.

The above organizations represent the core of a highly professionalized, highly integrated space policy network, which has succeeded technically in producing satellites and launch systems at least as sophisticated as comparable systems in the United States and Europe, and bureaucratically in obtaining modest but steadily increasing budgets.[4]

4.3 Issue 1: Deciding to Participate and Organizing to Build the Japanese Module

For NASA, Japanese and other international participation was important for two main reasons: first, as a source of funding for part of the station; second, to strengthen the project politically in the US by linking it with

[4] For a general comparison of US and Japanese technological strengths in space, see WELLS and HASTINGS (1991).

wider foreign policy issues such as trade and national security. For Japan, participation in the space station project offered a first chance to build a manned spacecraft, albeit one totally dependent on the American station. Although Japanese space technologies had made great advances since the early 1960s, the Japanese space industry was still far from capable of building its own manned spacecraft. Building and operating the proposed Japanese Experimental Module (JEM) would require new technologies to be developed, including new light composite materials and robotics, technologies which could in turn be keys to competitiveness in other high technology sectors. Japanese trading companies were particularly excited about the space station: the H-II rocket, development of which had started in 1982, relied almost entirely on domestic technologies, but the JEM offered the prospect of many technology imports, the organization of which is a speciality of trading companies.

In response to NASA's approach, in September 1982 the Space Activities Commission established a committee to consider building a Japanese module. From the start, contacts between senior US and Japanese technical officials were close; for example, in November 1982 the space station was discussed at a liaison meeting at the NASA headquarters attended by, among others, Saito Shigebumi of the SAC and NASA Administrator James Beggs (*Aerospace Japan* December 1982: 26).

In January 1984 President Reagan gave NASA the go-ahead to start design work on the space station and invited Canada, the member states of the European Space Agency and Japan to participate in the program. The following month, the SAC approved an amendment to Japan's Space Development Plan (*uchū kaihatsu taikō*), which envisaged Japanese participation in the space station program.

On 4 June 1984, the Science and Technology Agency announced its decision to allocate between one and 1.5 billion yen of its 1985 budget to Phase B preliminary design work on the Japanese module for the space station. STA had examined the possibility of having part of the preliminary design work privately funded, but retreated in the face of heavy aerospace industry – Keidanren, and the *keiretsu* space station research groups described in the next section – lobbying, and resigned itself to funding all development up until completion of the module (*Nikkei Sangyō Shinbun* 4.6.1984: 11).

In December 1984 STA Minister Takeuchi and Finance Minister Takeshita agreed on 1.488 billion yen for preliminary design work on the space station. This agreement made it certain that Japan would participate in Phase B of the project, the preliminary design stage, which was scheduled by NASA to run for two years from April 1985. The Japanese government expected to spend about 5.5 billion yen on the project over the two years

of Phase B work. Phases C and D – development and construction – would require a new agreement. The total estimate for development and construction of the station was about 2 trillion yen, of which Japan would be expected to contribute 3 hundred billion i.e., 15 % (*Nihon Keizai Shinbun* 29.12.1984: 3).

On 13 April 1985 NASDA announced its choice of the companies to undertake the Phase B (preliminary design) work on the Japanese module. NASDA itself would be the overall design coordinator, while MHI and IHI would design various parts of the body and eight other companies would design subsystems. At the end of April 1985 NASDA set up the space station preliminary design team, a large public-private body of 70 people, 10 from NASDA and 60 from ten space equipment makers: Mitsubishi Heavy Industries (MHI), Ishikawajima-Harima Heavy Industries (IHI), NEC, Nissan, Kawasaki Heavy, Mitsubishi Electric (MELCO), Tōshiba, Hitachi, Fujitsu and Nippon SDC. All these companies had been participating since June 1984 in outline concept design for the Japanese module (*Nihon Keizai Shinbun* 13.4.1985: 1).

After several rounds of bilateral negotiations, on 8 May 1985 NASA Administrator James Beggs came to Tōkyō to sign an 18-point Memorandum of Understanding (MOU) on Phase B development between NASA and STA. For Japan, the most important element of the Memorandum of Understanding was that NASA agreed to provide basic information to enable Japan to design its own module. Article 9 of the agreement committed NASA and STA to exchanging all the technical information, data and materials necessary to complete the plans. Prior to the agreement NASA had protected information about manned space equipment, and had discouraged US companies from cooperating with Japanese companies on space station development. The agreement gave the green light to a proliferation of public and private sector links between Japan and the US (*Nihon Keizai Shinbun* 9.5.1985: 1).

During 1985 and 1986 preliminary design work on the JEM proceeded smoothly, progress not matched by bilateral negotiations between the US and Japan and Europe. Finally, because the multinational negotiations got bogged down on the question of military use of the space station (see later), space-station related spending in Japan was halted in summer 1987. NASDA continued with preliminary design of the JEM, but was not able to start detailed design work.

In 1988 a dispute flamed up between STA and the Japanese Foreign Ministry (MOFA) over which institution would be in charge of negotiating the details of the Japan-US Memorandum of Understanding on Phase C and D development. After the four participants agreed the framework of an agreement in late 1987, Canada (in December 1987) and the ESA (in

February 1988) restarted design coordination with NASA, but the Japan-US Memorandum had still not been finalized by March 1988, so design work in Japan came to a standstill. STA was insisting on playing a central role in drafting the memorandum, as the body which had overseen the preliminary design stage. However, MOFA's position was that a project with a budget of 300 billion yen was more a matter of politics than of technology cooperation, and therefore could not be left in the hands of researchers. MOFA also emphasized that the unresolved question of the US Defense Department (DoD) use of the station (see the next-but-one section) meant that examination of the national security implications of the station was also necessary (*Nihon Keizai Shinbun* 1.3.1988: 13).

Kawasaki Masahiro, Head of the STA's Research and Development Division, was reported to be impatient with MOFA. "I am currently talking with MOFA so that Japan can get on with coordinating design of the space station [...] if things stay as they are Japan will fall behind the other participants [...] it's ridiculous that international work is held up by domestic problems. Negotiating the main cooperation agreement is diplomacy, and I can understand that MOFA would be in charge of it, but should MOFA be negotiating technological problems?" (*Nikkei Sangyō* 7.3.1988: 16) NASA had no appetite for negotiating with a non-expert ministry – the Canadian and European bodies negotiating the space station agreement were both space agencies.

On 29 September 1988 the US and the three international partners signed the multilateral Intergovernmental Agreement (IGA) and also bilateral MOUs on design and development of the space station at a ceremony in Washington. Notably absent from the IGA, which specified NASA for the US, ESA for Europe and the Canadian Space Agency MOSST for Canada, was the name of the Japanese institution which would be responsible for Japanese cooperation on the space station.

Shortly after the signing of the IGA, Japanese manufacturers were worried that Japan would be unable to resist the expected NASA demands for common equipment, which would effectively prevent Japan from developing its own technologies. US manufacturers were expected to bid keenly for orders for equipment for the JEM, to the extent that attention to the judgment whether to import products or buy Japanese was expected to loom larger than that of competition between Japanese manufacturers. Imported products would keep down the cost of JEM; on the other hand, manned space capability was seen as necessary for the future, and Japanese companies wanted the government to ensure that they would gradually acquire the capability to build manned spacecraft (*Nikkei Sangyō Shinbun* 3.10.1988: 5).

As NASDA was deliberating its choice of contractors for the design and development of the JEM in the spring and summer of 1989, some aerospace executives threatened to pull their companies out of the project if MHI alone was awarded the main contract. NASDA therefore tried to seek a balance between the four leading aerospace manufacturers, giving "main contracts" to all four for different parts of the JEM design. One month after the Diet approved the Space Station Agreement, in July 1989, NASDA unofficially decided the division of work on the JEM between MHI, IHI, Nissan and Tōshiba. MHI would build the main body system, the pressurizer and the pressurizing area of the supply pod; IHI would build the exposed platform; Nissan would build the exposed area of the supply pod; and Tōshiba would develop and build the manipulator. NASDA's target date for completion was 1996, ready for launching in 1997. The four companies would in turn sign contracts with other companies with whom they would build the different parts of the module. This division of labor was formally decided by NASDA in January 1990 (*Nihon Keizai Shinbun* 5.3.1990: 45).

4.4 Issue 2: Use of the Space Station

Access to a microgravity, vacuous environment could allow the development of important new materials and technologies which could give companies advantages in terrestrial markets. Semiconductors, superconductors and pharmaceutical products were seen as particularly promising areas for microgravity manufacturing in the early 1980s. By 1984 the Japanese general trading companies *(sōgō shōsha)* had come to see space services as a key future business. These space services were not limited to the facilities of the prospective space station but also included use of the space shuttle, sounding rockets, aircraft and drop-shaft facilities belonging to a number of countries. Once the prospect of the US building an industry-biased permanent microgravity manufacturing and experimentation facility became real, therefore, many Japanese companies hitherto unconcerned with space began to see access to space as vital for maintaining global competitiveness (TAKAGI 1990).

In May 1984 Mitsui Bussan, Ishikawajima-Harima Heavy Industries (IHI) and Tōshiba established a research group to assess the prospects and problems of commercial use of the space station. The group was the first of five such private sector research groups to be established in 1984. Each group was centered on a trading company and drew a substantial proportion of its membership from the *keiretsu* to which that trading company belonged. The other groups established were around Mitsubishi Shōji (Mitsubishi *keiretsu)*, Sumitomo Shōji (Sumitomo *keiretsu)*, Marubeni (Fu-

yō *keiretsu)*, and Nisshō Iwai (Dai-ichi Kangin *keiretsu)*. Member companies came from the car, pharmaceuticals, chemicals, steel, textiles, precision machinery, banking and other sectors. Companies of all sizes from within and outside the *keiretsu* were also invited to join the groups, as were university, government and other research institutions. After establishment, all the groups organized specialist sub-groups concerned with problem areas such as materials manufacturing, biotechnology manufacturing, and production equipment, with the aim of drafting interim and final reports which would also be submitted to Keidanren and STA *(Aerospace Japan* August 1984: 27).

May and June 1984 saw an outbreak of *space fever* among Japanese companies, who rushed to join one or more of the keiretsu research groups although many companies were motivated to join more out of fear of being left behind in the event of space manufacturing leading to advances in new materials, biotechnology and computers, than out of a strong conviction of the profitability of the space station project itself (KOJIMA 1984).

In addition to the establishment and rapid expansion of the Mitsubishi and Mitsui research groups, the number of member companies of the Keidanren Space Development Promotion Committee, chaired by NEC President Kobayashi Kōji, increased by 8 to 64 between 1st and 4th June. New members included Nissei Seifun and Asahi Glass, evidence of a burgeoning interest in space in sectors previously unconcerned with space.

A survey of leading companies in early October 1984 reported that 20% were interested and would like to be actively involved in use of the space station, while 65% were watching developments with interest. Companies replied that the greatest impediment to the profitable commercialization of space was not technology but investment difficulties; companies wanted government support and reduced charges for use of the station *(Nihon Keizai Shinbun* 8.10.1984: 6).

The summer of 1984 found both STA and MITI busy drawing up plans for commercial use of the space station. MITI wanted to start research on space use from April 1985, tying the research in with its Next Generation and Large-Scale projects on compound semiconductors and biotechnology. Meanwhile, STA made known its intention of coordinating the other ministries' and private sector research groups' proposals for designing and using the JEM, and supervising the detailed design and eventual construction of the Japanese module. STA had been the first agency to respond to the private sector's enthusiasm for the space station, an enthusiasm tempered by fear of the investment costs. Aiming to extend its jurisdiction to cover the commercial use of space, from summer 1984 STA put pressure on Japan's eight major aerospace manufacturers, including MHI and NEC, to establish a single private sector point of contact *(mado-*

guchi) for industrial use of the station. STA proposed setting up an incorporated foundation *(zaidan hōjin)*, to bring private actors together and strengthen its budget demands. But MITI strongly opposed the idea of an incorporated foundation on the grounds that commercial space use was an industrial policy issue and therefore outside the jurisdiction of a "development agency" *(kaihatsu kanchō)* such as STA. An incorporated foundation, MITI stressed, would have to be under the jurisdiction of a particular government agency, and MITI would not accept that STA should have charge over a body formed whose aim was to promote the commercial use of space *(Nihon Keizai Shinbun* 21.11.1984: 3).

As the disagreement between MITI and STA intensified during the summer of 1984, companies began to hesitate about forming an incorporated foundation. A second proposal emerged: to avoid the problem of ministerial jurisdiction by forming a *nin i dantai* [voluntary group]. But this idea was also opposed, this time by elements of the private sector, which was unable to agree which companies or *keiretsu* should play central roles in the voluntary group. While the Mitsubishi group's clearly superior record in supplying NASDA with space equipment gave it a claim to leadership, the other groups were very reluctant to hand Mitsubishi an opportunity to extend its lead. Finally, at the end of October 1984, the four *keiretsu* research groups so far established – the Mitsui, Mitsubishi, Sumitomo and Fuyō groups – agreed that Keidanren should provide a common point of contact for Japanese private sector involvement in the space station project. The arrangement was officially decided at a meeting of Keidanren directors in early November 1984, and the Ad Hoc Subcommittee for the Promotion of Participation in the Space Station Project was established under the existing Keidanren Space Development Promotion Committee on the 19th of that month *(Aerospace Japan* January 1985: 29).

Establishing a body under the auspices of Keidanren had two advantages. First, it gave the impression of a united body set up by the whole of Japanese industry. Second, the existence of the Keidanren Space Development Promotion Committee would make establishing and running the new Committee relatively simple. The Ad Hoc Subcommittee was a rather fragile alliance between the *keiretsu* space research groups, at the center of each of which was a trading company keen to steal a march on its rivals. The establishment of the Subcommittee also did little to abate the ill-concealed antagonism between STA and MITI in their struggle for jurisdiction over commercial space activities *(Nihon Keizai Shinbun* 21.11.1984: 3).

In mid-September 1984 MITI announced that it was setting up a committee to examine new materials manufacturing and production technologies in space. The committee, called the Committee to Examine Use of the Space Environment, was to be a private advisory organ to the head of the

MITI Machinery and Information Bureau. Four general trading companies, Mitsubishi Shōji, Mitsui Bussan, C. Itoh Shōji and Sumitomo Shōji would be represented on the committee, whose functions would be to hear private companies' opinions on the construction and management plans of the space station, and to discuss what kind of experiments should be carried out in the Japanese module and what kind of equipment would be needed. MITI planned to have the committee complete its report by March 1985 in time for it to start preliminary design work on experimental equipment in April 1985, to which end it submitted a budget request to MOF. Hitachi, NEC, MHI, Nissan and public and private laboratories engaged in biotechnology research also agreed to join the committee (*Aerospace Japan* December 1984: 28).

The establishment of the Committee to Examine Use of the Space Environment by MITI was seen by the *Nikkei* as an attempt to establish MITI's own position on space use, distinct from those of STA and the trading companies' research groups. The Committee's unstated purpose, in other words, was to give MITI mastery of the *big picture* of commercial space use. The MITI Committee also represented an opportunity to influence government policy for the Mitsui, Mitsubishi and Sumitomo trading companies (*Nihon Keizai Shinbun* 21.11.1984: 3).

In late 1984 the SAC Space Station Ad Hoc Subcommittee, which had been established in 1982, published its interim report on use of the space station, in which it specified six categories of potential use:

1) Scientific observation
2) Earth observation
3) Communications
4) Materials experiments
5) Biotechnology experiments
6) Science and engineering experiments.

Of these, materials and biotechnology experiments had by far the top priority, despite their lowly position on the list; they were to be further developed in the First Materials Processing Test space shuttle mission, planned for 1988 before being delayed by the Challenger explosion.

While NASDA and STA forged ahead with international negotiations and domestic organization of the preliminary design work, other ministries were regrouping in order to exert some influence over the process. At the end of April 1985 MITI started another committee on space use, its aim to organize potential users of the space station. The following month, the Ministry of Posts and Telecommunications established a research group on use of the space station. The Ministry of Education, which had previously abandoned its consideration of the space station project, was

reported to be moving towards restarting its deliberations (*Nihon Keizai Shinbun* 15.4.1985: 3). Despite these efforts, use of the space station remained firmly under the control of NASDA and the STA.

4.5 Issue 3: Military Use of the Space Station

The May 1985 Japan-US Memorandum of Understanding on the space station provided against Japanese technology being used for clearly military purposes: in the event of STA judging such use to be taking place, prompt consultations would be held to determine appropriate protection measures. The MOU also stated that cooperation would be carried out in accordance with the laws of all the international partners. This meant that Japanese law with regard to the peaceful use of space could not be easily ignored.

Following the signing of the May 1985 agreement, NASA Administrator Beggs said that the NASA-STA agreement only mentioned peaceful use, and that NASA was working on the principle of peaceful use. The US military was not participating in the design of the station, and therefore the station would not be used for SDI research. Beggs added that the station would have to be redesigned in order to be used for military purposes.

In September 1986 the Japanese press carried reports of US plans to use part of the space station for SDI research, and the Department of Defense's (DoD) interest in the space station was reported in the US aerospace media (COVAULT 1986). Until that point DoD had not expressed any intention of using the station, but the prospect of reduced shuttle missions since the Challenger explosion had changed its thinking, and it started to explore ways of using the station for SDI development.

In his talks with Fletcher in January 1987, STA Minister Mitsubayashi stressed that the Japanese space program was only for peaceful purposes. But in the press conference afterwards Mitsubayashi said that use of the space station by military organizations for "general purposes" *(banyō mokuteki)* could not really be described as "military purposes"; DoD use of the space station, in other words, might not necessarily constitute military use (SHIMIZU 1987a).

On 5 February 1987 NASA Administrator Fletcher, giving evidence before the Congressional Science and Technology Committee, said that the US government's basic position on DoD participation in the space station project had been decided and communicated to the international partners. Fletcher said that the space station was designed for peaceful purposes such as scientific research and commercial use of space, and that the DoD would not put weapons on the space station but could use it for e.g. developing semiconductors. Burns, head of NASA's International Bureau,

added that Beggs (former NASA Administrator) had said from the start of the space station program that the DoD might participate, so there was no change of US policy.

The Japanese government seemed confused by Fletcher's statement to the Congressional Committee that DoD would use the space station. Kawasaki Masahiro, a director *(shingikan)* in the STA General Secretariat and Japan's chief negotiator at the multilateral negotiations in Washington in February 1987, said that Japan would not depart from the original principle that the space station was to be used for peaceful purposes only, stressing that this was an item in the existing cooperation agreement. The international partners had a narrower understanding of "peaceful use" than the US, which saw no reason why DoD should not do basic research on the space station (SHIMIZU 1987b).

At the Washington negotiations in February 1987, the US reemphasized that DoD might use the station in future, but also stressed that the station would be used for peaceful purposes. The problem of military use was thereby postponed. Kawasaki said on his return to Tōkyō that he expected a draft agreement by the end of 1987. Regarding military use, he said that future negotiations would cover the questions of how to implement concrete checks that use was indeed peaceful and whether participants should have a veto on usage plans *(Nihon Keizai Shinbun* 17.2.1987: 11).

In April 1987 US Defence Secretary Caspar Weinberger sent a memo to Secretary of State George Schulz saying that if the space station could not be used for military purposes then its value to the US would be considerably reduced. Weinberger said the US should not compromise in order to suit the wishes of the international partners, and that if the partners didn't agree then the US should pursue the project alone. The memo was seen as a preemptive attack to ensure the US did not compromise under pressure from the three partners. Fletcher, asked to comment on the memo by a Senate Committee on 9 April, said that there was no basic change of policy, and that the US would not accept foreign interference on the matter (SHIMIZU 1987c).

Fletcher told a press conference on 4 June 1987 that he was optimistic of reaching an agreement with Japan and ESA on the space station. The problem, he said, was simply a matter of how to word the agreement. Fletcher also repeated NASA Vice-Administrator Meyer's recent statement that if DoD wanted to use a space station it should build its own (SHIMIZU 1987d).

Talks about what would constitute acceptable use of the space station continued throughout 1987, with the US insisting on express provision for DoD use of the station and Japan maintaining its position that the JEM could only be used for peaceful purposes. Beneath the surface, however, a compromise was emerging: in late 1987 a senior STA official said "It's

enough if the principle of peaceful use is in the agreement. Japan's interest lies in participating in the project rather than wrecking the project by rejecting DoD involvement" *(Nihon Keizai Shinbun* 18.12.1987: 2).

The Europeans were also unhappy about the ambiguity of US statements regarding DoD use of the station. European misgivings were underpinned by the body of European opinion in favor of an independent European space station. On a visit to Tōkyō in March 1988 at the invitation of the Space Activities Commission, J. B. Menecken, Head of the Aerospace Division of the West German Bundesforschungsministerium, said that Japan and Europe should join forces to prevent the DoD from using the space station. He stressed that West German involvement in the space station had the long-term aim of developing its own manned space capability, and stated West Germany's willingness to cooperate in building a space shuttle *(Nihon Keizai Shinbun* 8.3.1988: 13).

On 13 August 1988 the final draft of the parts of the intergovernmental agreement relating to peaceful use of the station were reported. Each country's space agency or other institutions using the station would submit proposals for use of its own module or modules, and that country's government would judge whether or not the proposals constituted peaceful use. Countries would not check each others' proposals. This meant that DoD use of the station would be entirely a matter for the US government to decide. The draft worked on the premise of joint use of the station, and was based on the principle of peaceful use of space agreed by the UN Space Treaty Conference, and as such did go some way to hindering military use of the station. However, institutions were bound only to submit outlines of the experiments they proposed to carry out, and not details of the end use of the results or the protection of research results; this would make it difficult to forbid research which was not clearly military in content. International space law, notably the UN Space Treaty of 1967, gave no definition of "peaceful use".

The decision to leave the judgment over use of the station to each module's owner country was reached at the strong insistence of the US. However, the US conceded that rules should be established to prevent use of the JEM for military purposes similar to rules for domestic space research.

On 19 June 1989 the Upper House of the Diet approved the Space Station Agreement. On 22 June 1989 the LDP and Minshatō forced a vote of approval for the Space Station Agreement through the Foreign Affairs Committee *(gaimu iinkai)* of the Lower House. The Committee then voted to present the bill to the main assembly of the Lower House as a matter of urgency. The Socialist Party, Clean Government Party, the Communists and the Shaminren all opposed the agreement on the grounds that it in-

fringed the principle that Japanese space policy be pursued for peaceful purposes only.

4.6 Postscript: The Space Station Today

The space station project continues at the time of writing. The assembly of Space Station components in orbit is to begin in 1997, and the station is due to be completed in 2002. Following a major redesign, about one-third of the station will be provided by the US, another one-third by Russia, and the remaining third by Japan, Canada and the nations of the European Space Agency (*NASA Space Station This Week:* 30.1.1995). NASA and ESA managed to protect their space station budgets in 1995, and the Japanese space establishment continues to pride itself on the relatively trouble-free development and funding of the JEM (BALTER 1995: 571; SAITO 1995: 210).

5. CONCLUSIONS

The Japanese space policy community responded immediately and enthusiastically to the US proposals. While Japanese participation was by no means the only factor in the survival of the space station project, the positive Japanese response and subsequent unflinching commitment to the project significantly improved the station's political situation in the US.

The speed and enthusiasm of the Japanese response to US approaches regarding participation in the project contrasts with the long debate in the US about the virtues of a permanently manned space station. Opponents of the space station in the US argued that, apart from the expense and danger of maintaining a manned space station, many of the functions of the space station could be carried out more reliably by robots. Furthermore, different activities could be better carried out in different orbits. The relative absence of such a debate in Japan can be attributed mostly to budgetary factors: unlike the US parts of the station, the Japanese module would not be funded at the expense of existing activities.

The space station represents the industrialization of space. In order to widen support for the space station, NASA emphasized its commercial applications, in tune with the prevailing ideology of the Reagan administration. As it sought to increase political support for the station by inviting Canada, Japan and the ESA to participate, NASA again strongly emphasized commercial uses of the station, and its approaches found ready ears in the Japanese private sector. Japanese aerospace manufacturers already played a major role in making Japanese space policy; NASDA was very short-staffed, and much more dependent on the private sector than NASA

in the early to mid-1980s. The practice of sharing out limited contracts for space equipment among all the major Japanese aerospace manufacturers, thereby keeping them in the space business and developing long-term links between them and NASDA, also meant that the *idea* of a Japanese module for the space station fell into a highly integrated policy network. Space science, whose poor relation status is reflected in the smallness of the ISAS budget compared to that of NASDA, was given the usual high status and minimal funding.

MITI attempted to disrupt this continuity by pointing out that the space station was clearly for commercial use, and that it rather than the STA should therefore have jurisdiction over it because the STA's founding law did not include commercial use of space. MITI failed to dislodge the STA's *de facto* control over use of the space station, but it prevented the STA from institutionalizing its control (it also won the consolation prize of the bulk of funding for a Space Flyer Unit which would fly alongside the space station). The Foreign Ministry's attempt to oust the STA from the position of chief negotiator with the US also failed. In both cases bureaucratic bodies with conflicting interests tried to gain access to the policy network but were repulsed by the existing network players whose mutual dependency and shared interests gave them no incentive to widen the networks. The STA's efforts to widen the space policy community by offering contracts to companies without experience in aerospace had the political side-effect of strengthening its position with regard to MITI.

These findings confirm our first hypothesis regarding the tendency of policy networks to follow previously established patterns. Moreover, this seems to hold true even when issues change with the result that new players become legally entitled to a role in policy networks.

Did an epistemic community of space professionals play a role in policymaking? Saito's accounts of international participation in the redesign of the space station in 1993 shows the close personal, academic and professional ties between space professionals in Europe, Japan and North America (SAITO 1992 and 1995). This closeness was undoubtedly a product of the dependence of Japan and to a lesser extent of Europe on the United States for space technologies. The existence of these ties was undoubtedly important in gaining the swift agreement of the three international partners, and in keeping the program alive despite considerable differences between the countries' interests. The aims of the space station and how to set about building it were not the subject of dispute between the space agencies; the disputes arose from management issues and wider political and constitutional problems. Therefore we can say that the transnational epistemic space community expanded the win-sets of all sides. Nevertheless, these professionals also clearly pursued their agencies' and countries'

interests first, and used their formal and informal ties to achieve these ends.

As described above, the Japanese space policy community was highly integrated, and tried to repel attempts by MITI, MOFA, and other ministries to play greater roles in the policy process. In other words, it attempted to limit the number of bureaucratic actors. By contrast, it attempted to increase the number of private actors, through the *keiretsu* groups and STA/NASDA procurements. This would seem to support our third hypothesis, that epistemic communities will have a greater role in policymaking, the smaller the number of bureaucratic players.

Finally, what of the role of ideas? The space station is an example of international cooperation and competition that is neither technonationalism nor technoglobalism: countries bolting their modules together, and depending on each other for the very air their astronauts breathe, in order to give their companies, scientists and armed forces access to an important new resource. The US proposal for the station fitted not only into a Japanese space program whose limited budget made the prospect of its ever developing its own manned spacecraft remote, but also into Japan's political and economic situation in the 1980s. The Japanese space policy community seized upon the idea of building a module and set about consolidating its dense web of resource dependencies. Other ideas, such as an absolute insistence on the peaceful or scientific use of space, served nobody's interests, and the institutions representing them were already excluded from policymaking.

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