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External Shocks, Conflict and Learning as Interactive Sources of Change in U.S. Security Policy

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ABSTRACT

Scholars studying the processes that lead to significant alterations in public policies have identified two major sources of change: policy-oriented conflict and policy-oriented learning. Many investigations of specific cases of consequential policy change also suggest that "shocks" from outside the policy subsystem, (that is, the specific political arena where a policy issue is formulated and implemented) are often necessary for significant policy change to occur. Rather than being competing explanations of policy change, this paper argues that external shocks, conflict, and learning often interact to generate windows of opportunity which enable policies to be significantly altered. These perspectives on policy change are then qualitatively applied to recent changes in U.S. national security policy which have allowed formerly secret spy satellite technology to be used in commercial data gathering systems. The final part discusses the implications of this research for the theory of policy change and for U.S. national security policy.

Introduction

In 1999, an American company plans to launch the first of what will probably be a long series of domestic and foreign high-resolution commercial observation satellites. For the first time in history, timely, very high-resolution satellite imagery will be available for purchase on the open market.[1] The changes in government policy that have taken us from the Cold War era, when spy satellite technology was one of the most highly classified areas within the security establishment, to the

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present day, when at least eight major U.S. commercial remote sensing systems are in various stages of development (Ball 1996), have indeed been consequential.

Scholars studying the processes that lead to significant alterations in public policies have identified two major sources of change: policy-oriented conflict and policy-oriented learning. Many investigations of specific cases of consequential policy change also suggest that "shocks" from outside the "policy subsystem" (i.e., the specialized political arena within which a policy is formulated and implemented) may also be necessary in order for significant policy change to occur. Rather than offering competing explanations of why policies change over time, this paper argues that external shocks, conflict, and learning often interact to generate windows of opportunity that enable public policies to be significantly altered. This perspective on policy change is then qualitatively applied to the changes in U.S. national security policy involving high-resolution satellite technology.

The Theory of Public Policy Change

While scholars have long recognized the importance of change in the policymaking process (Rose 1976), explicit theoretical studies of public policy change have only recently appeared in the literature. In general, scholars recognize two major sources of change: policy-oriented conflict and policy-oriented learning.[2]

Conflict and power-based theories of policymaking have, of course, been widely recognized and discussed by political scientists since the earliest days of policy studies. This approach forms the theoretical foundations of the pluralist, neo-pluralist, corporatist, and Marxist perspectives on policymaking (Bennett and Howlett 1992: 275). Theoretically speaking, conflict-based approaches to policymaking provide several important insights into the processes and conditions related to policy change. First, their focus on the role of participatory dynamics suggests that significant change often requires consequential alterations in the order and organization of the policy arena where an issue is debated and implemented. These alterations can involve changing the actors involved (Schattschneider 1960), changing the institutional venues where issues are discussed or implemented (Baumgartner and Jones 1993), or changing the decision rules under which policymakers operate. Second, conflict-based approaches alert us to the importance of advocacy and intentions in policy change. Simply put, policies do not change themselves: in order for policies or programs to be changed significantly there must be a politically viable actor (e.g., a powerful policy entrepreneur or a coalition of like-minded individuals and/or

organizations) to initiate and promote the specific change in question (Castles 1990).

Learning-based theories of policy change began to appear in the literature only after the seminal work by Heclo (1974) on the evolution of British and Swedish social policy. In probably the most widely quoted passage in the study of policy change, Heclo writes:

> Tradition teaches that politics is about conflict and power. . . . This is a blinkered view of politics and particularly blinding when applied to social policy. Politics finds its sources not only in power but also in uncertainty – men collectively wondering what to do. . . . Policymaking is [often] a form of collective puzzlement on society's behalf; it entails both deciding and knowing (Heclo 1974: 305).

In his original conceptualization, Heclo quite generically suggested that "political learning" could be viewed as "a relatively enduring alteration in behavior that results from experience" (p. 306). Heclo saw policy learning as a relatively unconscious activity whereby elites drew policy relevant lessons from the larger social and political environments within which they operated, and then adjusted their behaviors accordingly to achieve their goals in the face of changes in these conditions. In this way, policy changes were said to result from policymakers incorporating new perspectives or information into their preferences and actions rather than from conflict between actors with divergent interests and perspectives.

One of the most important observations found in the literature on policy change is that rather than offering competing explanations of change, conflict and learning often interact to enable episodes of consequential policy change (Capano 1996, Hall 1993, Bennett and Howlett 1992, Heclo 1974). Several important connections can be identified between these two sources of change. First, it has long been recognized that learning, whether at the social or individual level, is often facilitated by conflict. On this point, Capano (1996: 274) suggests that consequential policy-oriented learning may be dependent upon the existence of some minimum level of conflict within a given policy arena. The idea is that closed and consensual policymaking environments are not amenable to significant learning-based alterations because the actors involved share a core understanding of the problem and, therefore, promote similar policies for addressing it. In order for "deep learning to occur, an alternative perspective must be brought into the system which forces the relevant policymakers to "stretch" their understanding of the problem beyond the conceptualization which currently dominates the issue. In such cases, conflict becomes an integral part of learning-based policy change.

A second connection between conflict and learning as sources of policy change relates to the role that learning could play in the generation of policy-oriented conflict. A scenario can be imagined where a subset of the actors in a policy subsystem accumulates knowledge or information which alters their basic perception of a policy issue sufficiently to cause them to challenge existing policies. In cases where these actors are able to muster enough resources (and allies) to displace the dominant coalition's preferred policy, or to exact a compromise from that coalition, significant policy changes can be the result. Thus cases of "asymmetrical" learning (i.e., learning by a subset of actors within the subsystem) can lead to policy-oriented conflict and, eventually, to significant policy change.

Given these important interdependencies between conflict and learning as potential sources of policy change, it is obvious that any generalizable perspective attempting to explain these phenomena must explicitly account for both conflict-based and learning-based sources of change if it is to be a reasonably accurate explanation of reality.[3] Further, it is possible to integrate another key theoretical aspect from the policy change literature into this relationship. Several scholars of public policy change have suggested that external "shocks" (i.e., events that occur outside the arena where a specific policy is formulated and implemented) are often necessary for significant change to occur. Scenarios can be imagined where episodes of significant policy-oriented conflict or policy-oriented learning could be initiated by some event that originates outside the policy subsystem. If these policy conflicts and episodes of policy-oriented learning are significant enough, then they could lead to consequential alterations in policies designed to address the issue at hand. From this perspective, external shocks, policy-oriented learning, and policy-oriented conflict become interdependent sources of policy change. The following section relates this perspective on policy change to the case of changes in U.S. remote sensing policy.

The Case of High-Resolution Satellite Technology

Early U.S. Land Remote Sensing Policy

Official U.S. government policy on observation satellites reaches back to the earliest days of the space program. The oldest and most important policy is that of "open skies." This policy, which was promulgated during the Eisenhower Administration to promote arms control verification through aerial surveillance, advocated the free and open collection of information through remote sensing. As the first spy-satellites were developed and operated under intense secrecy in the 1960's and

1970's, the U.S. sought to apply the open skies principle to space-based observations in order to protect the legality of satellite overflight and data collection. Over time, the use of "national technical means" of spying became one of the most important aspects of U.S. intelligence efforts, especially in the area of arms control verification. By the time the first civilian land remote sensing satellite was flown in 1972 (Landsat 1), the open skies and non-discriminatory data access policies had become cornerstones of U.S. space policy.[4]

During the 1970's, Landsat existed primarily as an experimental program at National Aeronautic and Space Administration designed to demonstrate the potential of using space-based remote sensing for public and private land resource management. Three satellites were flown during this period and each carried the "multi-spectral scanner" (MSS) which sensed the Earth in four color bands at a maximum ground resolution of 80 meters. The application of the open skies/non-discriminatory access policies meant that data from the Landsat satellites were shared openly with the rest of the world. Indeed, several countries eventually purchased licenses from the U.S. government which allowed them to build their own dedicated ground stations and downlink Landsat data directly from space.

As the number and variety of Landsat data users expanded, there were increasing calls for the government to "upgrade" the system to operational status so that data collection and dissemination could become more regularized and efficient. During the late 1970's, NASA began work on a second generation Landsat sensor, called the "Thematic Mapper" (TM). In the discussions of the technical requirements of this improved sensor, it became apparent that some users were interested in data with much higher spatial resolution than was available from the MSS.[5] However, some segments of the government (i.e., the CIA and DOD) were hesitant to allow for significant increases in Landsat's spatial resolution fearing that it may negatively impact the national security of the U.S. and its allies (Mack, 1990).[6] In an attempt to rationalize U.S. land remote sensing policy concerning these matters, President Carter issued two presidential directives in 1978 and 1979 which, among other things, set the maximum resolution of civilian satellites at 10 meters, and officially upgraded the Landsat system to operational status. Carter's policy also stated that the "long-term" (i.e., 10-year) goal for Landsat was commercialization, and that the U.S. government would commit to constructing four new satellites after Landsat 3 (launched in 1978) so as to assure data continuity through the 1980's.

The 1984 Landsat Law

The election of Ronald Reagan in 1980 brought with it important changes in U.S. land remote sensing policy. Soon after taking office, Reagan notified Congress that he intended to accelerate the commercialization of Landsat by six years in order to remove the program's fiscal requirements from the federal budget. Reagan felt that Landsat had received enough public support during its first decade of operation, and that is was time for civilian land remote sensing to prove its worth in the market place or be discontinued. In 1984, after three years of intense political activity which included an abortive attempt by the Reagan Administration to commercialize the nation's meteorological satellite program with Landsat, Congress passed a compromise law, The Land Remote Sensing Commercialization Act of 1984 (P.L. 98–365), which set out the provisions under which Landsat would be commercialized. In 1985, EOSAT, a joint venture between RCA and Hughes Aircraft, won the 10-year contract to operate the Landsat satellites and market un-enhanced (i.e., "raw") data.

During the numerous hearings that were held for the drafting of the 1984 Landsat law, a member of the President's Private Sector Survey on Cost Control (The Grace Commission) testified that, in his opinion, the correct way to commercialize land remote sensing was not to transfer Landsat to the private sector, but to create a favorable climate for private interests to enter into the business of satellite remote sensing (U.S. Congress 1984: 378–407). Partly in response to this suggestion, Congress included Title 4 in the 1984 Law which set out a procedure by which interested companies could apply to the Department of Commerce for a license to operate private satellite systems. While Title 4 represented an important step toward the creation of a regulatory regime conducive to the development of a commercial remote sensing industry, it also included several conditions that acted to constrain private remote sensing endeavors. The most important of these was a requirement for non-discriminatory access to data (meaning that the companies could not make their data proprietary). In addition, the 10-meter resolution restriction that Carter set out in 1978 was also still in effect. In hindsight, many observers now agree that the 10-meter restriction on resolution and the non-discriminatory access requirement served to significantly detracted from the commercial potential of land remote sensing, and probably explain why only two licenses (one for Landsat 6 and one for the Large Format Camera flown on the Space Shuttle) were issued under the auspices of the 1984 Law (U.S. Congress 1994: 45).

Foreign Land Remote Sensing Programs and Reagan's 1988 NSP Directive

While the U.S. government allowed its land remote sensing program to languish in political uncertainty during the 1980's, several other countries, including France, India, and Japan, were steadily building their own quasi-commercial remote sensing programs. In 1986 France orbited its first SPOT satellite and initiated an aggressive, well-organized marketing strategy that allowed it to capture a significant share of the world remote sensing data market within only a few short years. The first SPOT satellite produced 10–20 meter stereo images from a four channel sensor and by the late-1980's, the French government was already talking about flying an upgraded satellite capable of producing images with 5-meter resolution. Further, in 1987 the Soviets began limited marketing of 6-meter data from its KFA-1000 ("Resource") satellites (Umberger 1990:9).

Following the loss of the Space Shuttle Challenger in 1986, which had wide ranging effects on the launch schedules and general priorities within both the military and civilian segments of the U.S. space program, the Reagan Administration initiated a major review of U.S. national space policy which culminated in a secret Presidential Directive issued on January 5, 1988. Although the text of this document is still classified, a "Fact Sheet" released on February 11th disclosed that one of the main intents of the Directive was to foster the development of commercial space endeavors, including private remote sensing initiatives. Among other things, the Fact Sheet states that: "The United States Government will . . . encourage the development of commercial systems which image the Earth from space competitive with or superior to foreign-operated civil or commercial systems [and i]dentify, and eliminate or propose for elimination, applicable portions of US laws and regulations that unnecessarily impede commercial space sector activities" (White House 1988: 3). In an effort to follow through with the intent of these proclamations, and in light of the 10-meter SPOT satellite and the availability of 6-meter Soviet data, it is widely believed that Reagan removed the 10-meter resolution restriction on U.S. commercial land remote sensing systems soon after the signing of his 1988 National Space Policy (Gupta 1994). Thus, one of the major impediments to the development of a commercial observation satellite systems in the U.S. was quietly removed via a secret Presidential Directive.

The End of the Cold War and Changes within the U.S. National Security Establishment

Given the central importance of the East-West politico-military competition during the Cold War, it is not surprising that the unexpected demise of the Soviet Union in 1989–90 sent shock waves through the U.S. military/security establishment which are still being felt today. Some of the most sweeping changes involved the opening up of areas and activities that were at one time so classified, no open discussion about them was allowed in either the public or private sectors. In 1993, for example, the existence of the multi-billion dollar National Reconnaissance Office, which oversees most of the satellite intelligence activities of the U.S. Government, was revealed for the first time. As the ramifications of the end of the Cold War reverberated within the "secluded" environments of the security establishment, it is not surprising that attitudes, and the policies associated with them, began to change dramatically.

One such change involved the position that the security establishment took on commercial remote sensing activities. Prior to the end of the Cold War, state-of-the-art satellite reconnaissance technology and interpretation techniques were considered highly sensitive by the security establishment and, therefore, were handled with the utmost secrecy. Immediately following the break-up of the Soviet Union, however, these preferences began to change significantly.

According to personal correspondence from Jimmy Hill, a retired employee of the National Reconnaissance Office, in mid-1991 he circulated a classified memo which made the following observations and policy recommendations. The memo pointed out intelligence estimates which suggested that several countries (France, Japan, India, etc.) would be capable of building and launching commercial high-resolution observation satellites within the next few years, and that if one of these foreign nations launched such a system before a U.S. company, it could conceivably dominate the world market and keep U.S. companies out of the market.[7] The memo went on to suggest that it was in the interest of the U.S. Government to make sure that the first entrant into the high-resolution satellite market was an American company so that it could dominate the industry and give the U.S. Government some control over the collection and distribution of data. In addition, the Hill memo also mentioned a second national security benefit of the development of a commercial high-resolution satellite industry: the maintenance of critical high-technology production techniques and capabilities. In the era of reduced defense-related contracts, exploiting the "dual-use" potential

of high-resolution satellite technology would ensure that the U.S. would have the industrial know-how to continue the production and advancement of such assets into the next century.

The Hill memo and its recommendations were well received by some key elements within the intelligence and defense communities, and soon after its circulation influential actors within the security establishment began to actively promote the development of high-resolution commercial satellite programs by U.S. commercial interests. Over time, these shifts in preferences were propagated and institutionalized across most of the security establishment as official policy. In fact, by late-1993, support for commercial high resolution satellite systems was clearly articulated by several high-ranking defense and intelligence personnel who testified at a set of Congressional hearings on this topic (U.S. Congress 1994, 1995). For example, Frank B. "Barry" Horton III, the Principle Deputy Assistant Secretary of Defense for Command, Control, Communications, and Intelligence testified to the Senate Select Committee on Intelligence in November 1993 that:

> Remote sensing space capabilities are increasingly available in the international commercial marketplace. Foreign acquisition of, or access to, such capabilities cannot be denied solely through U.S. export controls. Furthermore, there are substantial potential benefits for the U.S. in supporting foreign sales or other transfers of capabilities produced in the U.S.: there are obvious benefits for U.S. industry, where the DOD is particularly concerned that the major industry involved here is a key part of the defense industrial base; if the U.S. establishes a strong presence in this market, we can take the lead in guiding and shaping the market's evolution, allowing us to understand the development of foreign capabilities better and help us avoid the most significant potential problems. . . . After weighing these various factors, we have concluded that the U.S. should support carefully managed exports and other measures to transfer remote sensing space capabilities produced in the U.S. to foreign recipients (U.S. Congress 1995:180).

As this quote demonstrates, within two short years the recommendations contained in the Hill memo, which represented nothing less than an about face regarding the desirability of commercial high-resolution satellites in the U.S., had gained ascendancy within the security establishment. Although this shift occurred fairly quickly (especially by historic national security policy change standards) it did not come about without some serious debate between more conservative "hardliners" and those progressives wishing to loosen control of this technology to further "economic security." This topic will be revisited in the Discussion section below.

The Gulf War and Foreign Interest in High-resolution Satellite Programs

Although the break-up of the Soviet Union was by far the most significant external shock affecting U.S. remote sensing policy in the early 1990's, the Gulf Crisis, which lasted from August 1990 until March 1991, was another event that had important ramifications for U.S. policy in this area.

Partly as a result of changes in secrecy resulting from the end of the East-West military stand-off, the Gulf War was the first major engagement where images and information gathered from U.S. Government spy satellites were used for tactical planning by commanders in the field (Steinberg 1998:27). The in-theatre use of this data meant that, for the first time, allies of the U.S. like Saudi Arabia, Israel, and France gained some understanding of the technical sophistication and remarkable utility of U.S. spy satellite data. These revelations, in turn, led several countries to initiate or accelerate the development of their own high-resolution satellites systems (i.e., the HELIOS system for France launched in 1995, and the OFEQ-3 satellite launched by Israel in 1995), and for others (i.e., Saudi Arabia) to search for dedicated sources of high-resolution imagery (see the discussion of the "Saudi Affair" below).

The importance of these events for U.S. remote sensing policy relates to the fact that they galvanized international interest in the acquisition of high-resolution satellite technology and imagery reinforcing for U.S. strategists (in both the public and private sectors) that a market for high-resolution data could emerge to support a commercial system, and that several countries were interested in building such systems.

The 1992 Landsat Law

In the early 1990's, the Bush Administration and Congress attempted to deal with the "non-discriminatory access" provision in the 1984 Landsat Law that tended to discourage the development of commercial remote sensing projects.[8] At issue was the Law's lack of distinction between publicly and privately funded projects: both were subject to the requirements of non-discriminatory data access. This policy, which was included in the first Landsat Law to ensure equitable and widespread use of civilian remote sensing data during the commercial era of Landsat, made it difficult for private remote sensing companies to make data proprietary and maximize revenue from data sales. In the words of James L. Frelk, Director of the Office of Space Commerce in the Department of Commerce (DOC), testifying at a 1991 hearing on

the issue, "In the past, when a U.S. oil company and a major news organization asked the DOC about getting licenses for operating private remote sensing satellites, they were told that [the 1984 Landsat Law] would require them to sell their data to anyone who asked at the same price – even their competitors. This was certainly a deterrent to those potential private investments . . . " (U.S. Congress 1992:17).

In order to address this problem, the second Landsat Law, which was eventually passed as the Land Remote Sensing Policy Act of 1992 (P.L. 102–555), made an explicit distinction between those systems that were funded by public sources and those that were funded by private sources. In particular, the Law required that the non-discriminatory data access policy only apply to public remote sensing systems. Within weeks of the signing of the 1992 Landsat law, the first serious application to operate a commercial high-resolution satellite system (3-meter) was submitted by the World View Imaging Corporation. A few months later, in January 1993, the World View license was issued by the exiting Bush Administration.

1-Meter Data, Clinton's 1994 Presidential Decision Directive, and the Saudi Affair

In the summer of 1993, two more applications to operate private remote sensing satellites were received by the Department of Commerce: one from the Lockeed, Inc. and one from a partnership of Orbital Sciences Corporation, GDE Systems, and Itek, Inc. Both of these proposed systems intended to improve upon the Worldview system by generating images with 1-meter resolution. This increase in performance, which some in the security arena felt could adversely impact U.S. interests, caused the Clinton Administration to reconsider the entire licensing process and to revisit U.S. policy on commercial remote sensing.

After 8-months of high-level review involving representatives from the military, the security establishment, and industry, Clinton issued Presidential Decision Directive 23 in March 1994. The major goal of this Directive was to rationalize U.S. policy in this area by allowing for the simultaneous realization of economic and national security goals. In order to protect U.S. security interests, the Directive required system operators to maintain satellite tasking and orbit parameter records, and to make them available for government review if necessary. In addition, Clinton's policy authorized the government to cut-off or restrict the flow of data during times of crisis to protect national security. Finally, in an effort to address the desire of some U.S. companies to export remote sensing satellite technology to our allies, the Directive

stated that the government would consider applications for the sale of "turn key" high-resolution systems to foreign governments on a case-by-case basis (White House 1994). Judging from the rash of proposals that have been submitted, reviewed, and accepted for U.S. companies to operate high-resolution satellites since the release of Clinton's policy, the Presidential Directive seems to have achieved its goal of rationalizing government policy in order to promote the expansion of a domestic high-resolution satellite industry.

The first real-world test of Clinton's new policy on commercial remote sensing occurred in late-1994 when Eyeglass (now known as Orbview), the Orbital Sciences, GDE, and Itek joint venture, announced that it was planning to allow Saudi Arabian interests to purchase equity shares in the Eyeglass project and to build a ground station in Riyadh which would allow for the direct downlink of high-resolution imagery of the entire region – including Israel – from its upcoming satellite. Within hours of the announcement, the Israeli Government protested saying that it considered the ground station to be a direct threat to its national security. In May 1995, after several months of high-level political maneuvering, executives from Eyeglass "voluntarily" agreed that Israel would not be imaged by its satellites. On the basis of this arrangement, the DOC approved the Saudi ground station a few weeks later.

This "voluntary limitation" on sensing Israeli territory did not stop the government of Israel from pressing the U.S. government for a more formal policy protecting its national security interests. On June 17, 1996, the *Wall Street Journal* reported that Israeli interests were lobbying the Clinton Administration to place a legally binding 3-meter restriction applicable only to Israeli territory on the three U.S. companies planning to orbit high-resolution satellites i.e., Space Imaging, Earthwatch, and Orbview (Steinberg 1998). Representatives from the companies responded by stating that any restriction on U.S. companies would simply cause interested parties to go to foreign systems for their data, thereby unfairly handicapping U.S. commercial interests.

A few days later, the U.S. Senate passed an amendment to the 1997 Defense Authorization Bill that prohibited "any agency or department of the U.S. government from licensing the collection or dissemination, declassification or release by any non-Federal entity of satellite imagery with respect to Israel . . . unless the imagery is no more detailed or precise than imagery produced by that country's indigenous satellites" (Steinberg 1998). This issue was eventually taken up by the conference committee that set out the final version of the Defense Authorization Bill. In that version, which became law, data can be collected over Israeli territory only if comparable data is available from foreign

sources. As of this writing, this means that U.S. companies are not allowed to sense Israel at a resolution below 2-meters (the Russian SPIN-2 system is capable of collecting data at that level).[9]

The Earlybird Failure and Competition Between the Departments of State and Commerce

On December 24, 1997, Earthwatch launched the first commercial high-resolution (3-meter) observation satellite aboard a Russian booster. The spacecraft achieved the correct orbit but over the next few days ground controllers were unable to establish communication with the satellite. A technical analysis of the incident pointed to a short in the power supply for the satellite's GPS unit as the source of the failure. In response to this incident, Space Imaging postponed the launch of its IKONOS-1 (0.83 meter system) to conduct further testing. As of this writing, the world is still waiting for commercially available, near real-time, sub-2 meter satellite imagery. Space Imaging is now indicating mid to late-1999 launch date.

One interesting and recent policy development in this area involves the looming battle between Congress and the White House over U.S. export controls on satellite-related technology. In 1996, the Clinton administration moved the management of export control policy from the Department of State to the Department of Commerce. According to many observers, this move, which was undertaken largely at the behest of several large U.S. satellite makers (Schmitt 1998), was a signal that Clinton is more interested in promoting the growth of commercial satellite programs than keeping sensitive technology out of the hands of potential enemies since the Commerce Department is likely to be less strict than the State Department on decisions involving export controls.

Although the Democratically controlled 103rd Congress mostly supported Clinton's efforts to loosen export controls on dual-use technology, the Republican victory in 1995 altered significantly Congress' position on these issues. As of this writing, no less than 10 House and Senate Committees are investigating potential lapses in U.S. export control policies.[10] An amendment to put the Department of State back in control of these issues has been added to the FY1999 Defense Expenditures Bill. Largely because of this amendment, the Clinton Administration has threatened to veto this Bill initiating what is likely to be a protracted battle with lawmakers. Although the budget amendment is directed more toward communications satellites and launch capabilities rather than remote sensing satellites, its major goal is to tighten control over so-called "dual-use" technologies – those that have

military as well as commercial applications. According to one influential Senator: "This change reflects the sentiment that the Clinton Administration has fallen down on the job, and we need to do a more effective job of controlling dual-use technologies" (Senator Thad Cochran, R-Miss., quoted in Schmitt, 1998). This issue reaffirms the continued importance of policy-oriented conflict in affecting policy choices in this issue area.

Discussion

This review of the evolution of U.S. policy on commercial high-resolution satellites reveals the extended and punctuated nature of policy change in this area. Table 1 summarizes the most important events that have affected the development of U.S. remote sensing policy along with their theoretical significance.

As depicted in column three of Table 1, external shocks, conflict, and learning have all influenced the evolution of U.S. commercial remote sensing policy. In several instances, these processes have acted independent of one another. For example, in the 1978–79 period, Carter's remote sensing policy changes were largely driven by the conflict between the government's desire to transform Landsat into an operational program and its desire to protect the national security interests of the United States. Similarly, the compromise policy change institutionalized in the 1984 Landsat Law was driven largely by the conflict between goals associated with operationalization (Carter's policies) and goals associated with commercialization (Reagan's policies).

In two cases of significant change in U.S. policy, however, the interaction of external events, conflict, and learning are apparent. The 1988 decision by President Reagan to relax the 10-meter resolution restriction imposed by Carter in 1978, for example, resulted from a high-level policy review that was brought on by the emergence of foreign competitors – a significant external shock. In attempting to resolve the ensuing conflict between national security goals (protection from external military threats) and economic goals (commercialization of remote sensing), elements within the Reagan Administration learned that, because high-resolution data was commercially available from French and Soviet satellites, existing resolution restrictions unnecessarily disadvantaged U.S. companies in the global marketplace. Therefore, the 10-meter resolution restriction was removed via a secret Presidential Directive.

Another example of how external events, learning, and conflict interacted to enable U.S. remote sensing policy change involves the events that took place immediately after the end of the Cold War (a significant

TABLE 1: *Chronology of Significant Events in the Development of U.S. Remote Sensing Policy, 1955–1998*

Dates	Event	Theoretical Significance
1955	Eisenhower proposes the "open skies" doctrine.	
1960–present	U.S. develops increasingly sophisticated secret space-based intelligence gathering capabilities and formally promotes the "open skies" principle while informally fashioning a "gentleman's agreement" with Soviets on satellite overflight and data collection.	
1972	Landsat 1 launched.	
1978–79	Landsat goes operational. Carter sets 10-meter resolution restriction on U.S. civilian satellites.	**Conflict** between operational goals (regularized and efficient collection of useful land remote sensing data) and national security goals (protection from external military threats) leads to restriction on resolution.
1982	Landsat 4 launched. The beginning of the Thematic Mapper (TM) era.	
1984	Land Remote Sensing Commercialization Act of 1984 passed.	Conflict between goals associated with operationalization (continued provisioning of land remote sensing for the public good) and commercialization (removal of Landsat fiscal requirements from federal budget) leads to passage of compromise law setting out the phased commercialization of Landsat, and allowing for licensing of commercial systems with political restrictions.
1986–87	Launch of SPOT-1 and availability of KVA-1000 (Soviet) data.	**External "shocks"** leading to reformulations of U.S. land remote sensing policy.
1988	Reagan's National Space Policy Directive removes 10-meter resolution restriction on commercial satellites and promotes the commercialization of remote sensing.	**Conflict** between economic goals (international competitiveness, commercialization of space) and national security (protection from external military threats) leads the Reagan Administration to **learn** about the necessity for removing unfair limitations on the resolution of U.S. civilian satellites.
1989–90	The unexpected break-up of the Soviet Union. The Cold War ends.	**External "shock"** leading to significant changes within the security establishment and elsewhere.
Early 1991	The Gulf War	**External "shock"** where the sharing of secret U.S. high-resolution data galvanized the support of several foreign governments for the use and development of their own high-resolution satellite systems or data sources.

Table 1—*continued*

Dates	Event	Theoretical Significance
Mid-1991	Hill National Reconnaissance Office (NRO) memo arguing support for U.S. commercial high-resolution satellite ventures.	Key national security interests begin to change attitudes regarding the desirability of commercial high-resolution satellites (**"learn"**) based on changing political, commercial, and technological conditions.
1992	Land Remote Sensing Commercialization Act of 1992.	Because of the failure of regulatory conditions set out in the 1984 Landsat law to promote commercial remote sensing ventures, **conflict** between economic goals (commercialization of remote sensing) and political goals (equitable and widespread use of remote sensing data) enable policymakers to **learn** and adjust the law to distinguish between public and privately funded satellite systems.
Late 1992	Exiting Bush Administration approves Earthwatch's 3-meter observation satellite system.	
1993	Proposals for 1-meter systems submitted to the Department of Commerce. Renewed national security concerns lead to high-level review of policy.	
March 1994	Clinton Presidential Decision Directive 23.	Continuing **conflict** between national security goals and economic goals addressed with compromise policy allowing high-resolution systems, foreign data sales, and technology exports with specific government controls.
1994–95	Eyeglass/Saudi Affair.	**Conflict** between Israeli security concerns (as expressed through lobbying efforts) and private economic goals causes Eyeglass/Orbimage to "voluntarily" restrict remote sensing over Israeli territory.
1996	At the behest of several U.S. satellite manufacturers, the Clinton Administration moves control of export control policy from the Department of State to the Department of Commerce.	
Late 1996	U.S. Congress passes an amendment to the 1997 Defense Authorization Bill that limits U.S. companies from collecting data over Israel with higher resolution than is available from non-US sources.	**Conflict** between U.S. economic, national security, and foreign policy goals leads to legal ban on collection of ultra-high-resolution data over Israeli territory.
Dec. 1997	Earthwatch launches "Earlybird" a 3-meter system that fails in orbit.	
Sept. 1998	Congress introduces amendment to return control of satellite exports to the Department of State.	**Conflict** between U.S. economic and national security goals leads to policy proposals designed to toughen export controls on satellite technology.

and mostly unexpected external shock) which led key actors within the security establishment to "learn" to view the existence of a commercial high-resolution satellite industry in the U.S. as a benefit rather than a threat. In addition, conflict between economic goals (commercialization of remote sensing) and political goals (equitable and widespread use of remote sensing data) during the same period led key policymakers in Congress to learn about the need for a distinction between private and public satellite systems and, eventually, to alter the second Landsat Law to remove the non-discriminatory data access provisions for privately funded satellite systems. As these two cases demonstrate, external events, learning, and conflict did indeed interact to enable consequential policy change in this issue area. In the first case, an external shock led to policy-oriented conflict between economic and national security goals and this conflict then enabled the Reagan Administration to learn about the need to adjust national security policy. In the second case, an external shock enabled key elements within the security establishment to view commercial remote sensing as a benefit rather than a threat.

One general observation that can be drawn from these two cases of interactive change is that it appears as though the episodes of *conflict* involving U.S. remote sensing policy centered on disagreements over *goals* while the episodes of *learning* centered on choices of policy *instruments* for achieving these goals (or for reconciling competing goals). For example, I argue that the unexpected break-up of the Soviet Union and the Gulf War were significant external shocks that eventually allowed key elements within the security establishment to adjust their preferences regarding the desirability (in terms of national security) of commercial high-resolution satellites in the U.S. This "learning" eventually translated into a change in policy instruments that involved a perspective on security that struck a balance between economic security and military security: Clinton's 1994 Executive Order. During approximately the same time period, conflict over economic goals (the commercialization of remote sensing) and political goals (the equitable and widespread use of civilian remote sensing data) enabled lawmakers to learn about the need for a distinction between public and private remote sensing systems in regard to the "non-discriminatory data access" policy. This learning was translated into a change in policy instruments via the 1992 Landsat Law.

Interestingly, this conflict/goals learning/instruments finding relates to an emerging body of work by Jones and Glick (1996) which suggests that policy "choice reversals" can result not from a shift in goals, but from a shift in the amount of attention and importance that policymak-

ers place on specific aspects of any given issue. These authors suggest that since humans are serial processors of information, they are only able to pay attention to a small subset of aspects of any given topic, and that over time the specific aspects which they pay attention to can change dramatically. These changes in salient factors can, in turn, lead to significant reinterpretations of policy needs and, therefore, to major alterations in policy. I would suggest that this is what occurred for the intelligence community on the desirability of commercial high resolution satellites beginning in 1991: the overarching goal of protecting the U.S. from external threats remained the same but key elements within the security establishment altered the specific aspects of those threats that they paid attention to with regard to satellite remote sensing.

A second major point of discussion following from this research relates to the need to more closely analyze the role that learning played in these cases of interactive policy change. In particular, to answer the question: "Who learns?" This case study has documented, among other things, policy-oriented learning by the security establishment regarding the desirability of commercial high resolution satellites. This shift was apparently set off by a secret memo circulated in 1991 by Jimmy Hill, the director of the National Reconnaissance Office (NRO), one of its key institutions.

Although we do not know the exact manner in which the recommendations in the Hill memo were propagated throughout the security establishment, it is probably safe to say that not all elements within the intelligence and defense communities embraced its contents with the same fervor. Circumstantial evidence for this observation comes from the fact that several influential participants in the security establishment have yet to fully endorse the commercialization of high resolution satellite technology (Dailey and McGaffigan 1996:177). It is likely, therefore, that the changes set out by the Hill memo set off some significant debate within the black corridors of government that pitched "hardliners" against those, like Jimmy Hill, who were in favor of loosening control of this technology. This case can then be viewed as one of "asymmetrical" learning by an influential subset of actors within this policy area. It is probable that this learning led to some rather significant policy-oriented conflict with those in favor of commercializing the technology eventually coming out on top. The key point is that when considering the role of learning in policy change, it is crucial to identify who exactly does the learning. The answer to this question will be important for determining what is learned, from where, and with what effects.

Implications and Suggestions for Further Research

This research has described and analyzed the processes and conditions that have produced changes in U.S. satellite remote sensing policy over the last three decades. As detailed above, external events, policy-oriented conflict, and policy-oriented learning have all influenced the evolution of policy in this area. Although these processes and conditions have at times acted independently to affect policy changes, there have indeed been significant interactions among them. This section will explore the implications of this study both for the theory of public policy change, and for U.S. remote sensing policy.

In terms of the theory of public policy change, several implications can be taken from this study. First, although policy-oriented conflict is the best understood and most often cited source of change, this case shows that significant policy change can result from changes in the attitudes of major actors within a policy subsystem. Part of the bias toward conflict based explanations stems from the fact that protracted and intense political conflict produces mountains of evidence that actors indeed disagree on a policy. Evidence for learning-based change is usually more difficult to collect. In order to get a complete picture of how and why policy changes occur, however, the role of learning cannot be dismissed. Obviously, strategies and techniques for identifying learning-based change could and should be a major area of study for scholars of the policy process. At the core, this area of research needs the development of techniques for identifying changes *within* actors relating to policy-oriented beliefs rather than simply looking at the *interactions* between actors for sources of change.[11]

Second, the interactions between learning and conflict as interdependent sources of policy change should be investigated more fully. As discussed above, conflict often enables learning and learning can also be a significant source of conflict. This is true at the individual as well as group level. This investigation points to the need to consider the complex interactions between these two major "sources" of change in assessing how and why policies change over time. For example, if an analyst is interested in gauging the likelihood of change in a specific policy area, they need to consider both the relative power positions and policy preferences of major actors (to judge potential outcomes of policy-oriented conflict), and also how the interactions among actors with different views enable learning across these competing perspectives. Similarly, one could attempt to gauge the likelihood of future conflict based on a significant actor or set of actors within a subsystem changing their attitudes (based on the collection of information –

learning) and then going on to challenge the existing (dominant) perspective within that issue area.

Third, although policy-oriented conflict and policy-oriented learning can act as inter-dependent sources of change, many specific instances of change will largely be associated with one or the other. It would be interesting, then, to investigate the differences between policy choices that are made based largely on conflict and those based largely on learning. In particular, one could compare: (1) the resources and time needed to affect both types of change, and (2) the robustness and/or effectiveness of policies resulting from both types of change. Once again, it may first be necessary to develop research techniques to get at the concept of policy-oriented learning in order to help better identify cases of learning-based change.

Fourth, it is useful to begin to consider the conditions that may help predict when specific instances of policy change will be dominated by either conflict-based change or learning-based change, and when an interactive type change may occur. Sabatier and Jenkins-Smith (1998) have begun to consider this issue inasmuch as they have attempted to outline the general conditions that may promote policy-oriented learning across advocacy coalitions. In general they have determined that learning is facilitated by: (1) an intermediate (as opposed to a high) level of conflict; (2) the existence of accepted quantitative data on the problem; (3) the existence of a prestigious and professional forum for deliberating the issue.

Finally, in discussing the implications of this research for U.S. national security policy, it is important to recognize that one of the most important policy changes that occurred in this area involved a significant shift in the policy position of members within the security establishment. This is significant because actors in these institutions are often viewed as being very conservative and highly resistant to change. As this case demonstrates, however, these actors are indeed capable of major shifts in their perspectives based on policy-oriented learning. One important consideration to keep in mind on this point is that these organizations have highly developed data collection and analysis capabilities that can give them a very forward looking, anticipatory perspective. As a result, one might expect policy-oriented learning to play an important role in affecting changes in the preferences of key individuals within these organizations. Obviously, the problem with assessing learning-based change within the security establishment is that much of the activity is hidden in the "secluded" corridors of government. As this case demonstrates, recent changes in security policy that are removing what many perceive to be unnecessary levels of secrecy may make research in this area easier to undertake in the future.

NOTES

1 The U.S. company is Space Imaging which is a subsidiary of Lockheed-Martin. The Space Imaging satellite will produce images with a resolution of approximately 1-meter meaning that the smallest object that can be identified from these images will be three feet across (Ball 1996). In December 1997, another U.S. remote sensing company launched a 3-meter satellite from a rocket base in Russia. Unfortunately, this satellite malfunctioned after achieving orbit.

2 For a close look at how policy-oriented learning can take place across national boundaries and across time, see Rose 1993.

3 One fairly developed model of policy making that explicitly incorporates both conflict and learning as potential sources of change is the Advocacy Coalition Framework (ACF) (Sabatier and Jenkins-Smith 1993). In this model, conflict-based change results from the interaction of coalitions of actors with divergent policy perspectives, and learning-based change occurs when actors within coalitions alter their positions based on the collection and assimilation of policy relevant information. One innovative part of this model that relates to this research involves how learning is often enabled by the conflicts between coalitions. This topic will be revisited in the conclusion.

4 The more altruistic interpretation of the "open skies" principle ended up being codified in the 1984 Landsat law as "non-discriminatory access" policy. This policy stipulated that data collected from the Landsat system should be distributed in a non-discriminatory manner so that no single consumer could monopolize use of the information. In 1986, after nearly four decades of intense lobbying by the U.S. and other space faring nations, the open skies principle was given some measure of international legitimization with passage of UN General Assembly Resolution 41/65 which allows states to take part in satellite remote sensing activities without advance notice, and permits public dissemination of data without prior consent of the sensed state. See: United Nations 1967.

5 The Thematic Mapper was eventually flown aboard Landsats 4 and 5 which were launched in 1982 and 1984, respectively. This sensor is capable of producing images with a resolution of 30 meters.

6 Recently declassified information reveals that the U.S. had a reliable system of observation (spy) satellites in orbit continuously from 1960 onward. The first operational spy satellite program, called CORONA, supplied the U.S. intelligence agencies with hundreds of thousands of increasingly detailed images from space between 1960 and 1972 (McDonald 1997, Day, etal, 1998). By the early 1970's these images possessed a ground resolution of about one meter. Based on the demonstrated usefulness of this information for strategic and tactical planning, the security establishment recommended the 10-meter limit for civilian remote sensing satellites.

7 In 1992, the Russians beat out all other potential suppliers of high-resolution imagery when a commercial spin-off from its spy satellite program, Soyuzkarta, began marketing 2-meter data from the KVR-1000 satellites. The KVR data is derived from a film return system which means the turn around times are measured in months rather than days as for the upcoming electro-optical systems from Earthwatch and Space Imaging.

8 The major impetuous for the redrafting of the 1984 Landsat law was the failure of the commercialization of Landsat. With the passage of the Land Remote Sensing Act of 1992, Landsat was returned to the public sector as an operational government remote sensing program.

9 According to an AP news wire, on July 22, 1998 the State Department met with representatives from Space Imaging, Earthwatch, and Orbimage to discuss the legal limitations on the sensing of Israel. A State Department official speaking on conditions of anonymity said that prohibiting 1-meter imaging of Israel achieves a balance among economic development, national security, and foreign policy while respecting Israel's security. For a lengthy discussion of the U.S. Government's position on sensing Israel see: Brauer 1998.

10 The attention of Lawmakers on the dangers of dual use technology was focused by an incident where two U.S. communications satellite companies (Hughes and Loral) were accused of providing Chinese engineers with "insights that were crucial for improving their abilities to launch satellites and ballistic missiles" (Gerth 1998). The companies provided the potentially sensitive technical information to the Chinese in 1995 after a series of launch failures destroyed American made satellites that were being launched aboard Chinese Long March boosters.

11 Sabatier and Jenkins-Smith's work on the ACF is once again helpful here. In the appendix to their 1993 book they develop a powerful coding methodology that is useful for identifying and

tracking changes in the expressed preferences of policy elites. While this coding methodology is one powerful tool for gauging policy-oriented learning, others based on interviews or surveys could also be developed to provide more timely information.

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