NATIONAL SECURITY $C^3I^3H^3$:

A STRATEGIC AND TACTICAL INFORMATION MANAGEMENT PERSPECTIVE

Command, Communications, & Computing

Inter-Agency, Inter-Disciplinary, Inter-Operability

Heuristics of the Community Intelligence Cycle

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by

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ABSTRACT

The National Security Community is beset by severe challenges in terms of manpower, organizational constraints on information management and operational coordination, and demands from a complex, rapidly changing, and increasingly hostile or unstable global environment.

The impact of these challenges is multiplied many times over by a further challenge: the information explosion. Responsible decision-making at the highest levels will be increasingly impossible unless drastic actions are begun immediately to enhance the ability of the member agencies comprising the National Security Council (NSC) to collect, process, disseminate, evaluate, and act upon the almost infinite range of essential elements of information (EEI) required to understand and cope with the modern international arena - and do so in a coordinated fashion allowing for near-real-time inter-agency cuing.

The potential of artificial or machine intelligence technologies - and in particular vision, speech, understanding, and very large data base technologies as well as expert systems- is discussed, and a lengthy examination of national security heuristics is offered, with attention to and specific examples of data acquisition, data interpretation, and decision-making heuristics relevant to national security.

The paper concludes with recommendations for the establishment of a national Office of Information Technology, a Commission for the Study of National Security, the establishment of a University of the Republic, and the consolidation of a National Security Corps. While focused primarily on the urgent need to exploit existing and potential technologies in order to make the human actors with their limited cognitive capabilities at least relatively "competent" in the face of the reviewed challenges, the paper also stresses the impact of "order of magnitude" challenges and changes: the national security community must face the fact that fundamental changes must be made in its character and structure if information is to be managed effectively, and this dictates fundamental changes in the character and inter-relationships at all levels of personnel responsible for national security matters.

About the Author

Mr. Robert D. Steele is a Foreign Service Officer with the Department of State. He has served in Washington, El Salvador, Venezuela, and Panama, and was most recently responsible for inter-agency coordination on multilateral issues affecting Panama and Central America, including terrorism, the international gray arms market, money laundering, high technology theft, and European ties with revolutionary groups in Latin America. He is completing an M.P.A. with the University of Oklahoma.

He received an M.A. in International Relations from Lehigh University in 1976, writing a thesis on "Theory, Risk Assessment, and Internal War: A Framework for the Observation of Revolutionary Potential"; and an A.B. in Political Science from Muhlenberg College in 1974, where his Senior Paper dealt with "Multinational Corporations, Technology Transfer, and the Lesser Developed Countries".

Mr. Steele is also a Captain in the Reserve of the U.S. Marine Corps, with ten years experience as an infantry officer and international affairs officer, including limited duties in military intelligence billets. He is serving at present as the action officer (reserve) for the Theater Intelligence Architecture Plan, a planning and budgeting mechanism for designing the communications and intelligence architectures of the various unified and specified theater commands.

He has completed the Amphibious Warfare School (AWS), the Foreign Service Institute (FSI) course for entry-level career officers, and has received advanced training in artificial intelligence, knowledge engineering tools, and software project management.

TABLE OF CONTENTS

Introduction

The national security community of the Republic, comprised of those federal government agencies whose representatives are stationed abroad in whatever capacity - notably the Department of State, the United States Information Service, the Agency for International Development, the Department of Defense and its subordinate Services, the Central Intelligence Agency, the Federal Bureau of Investigation and the Drug Enforcement Administration, the U.S. Customs and U.S. Immigration and Naturalization Services, and the Department of Commerce - is beset by severe challenges, and unable to satisfactorily collect, process, disseminate, evaluate, and act upon the information needed by the President and his subordinate policy-makers responsible for the foreign interests of the Republic.

These challenges include severe shortages of professional personnel, severe organizational constraints on information management and operational coordination, and severe demands from a complex, rapidly changing, and increasingly hostile or unstable international environment. The impact of these challenges is multiplied many times over by a further challenge: the information explosion. Not only is there more and more information to be had, but there is an increasingly pervasive attitude within the community that almost <u>any</u> datum could be important, and therefore should be collected. The blue sky wish

lists (requirements) have multiplied to the point of self-imposed oblivion. The national security community as a whole requires immediate attention and substantial assistance if its vitality and effectiveness are to be restored.

Artificial intelligence (AI) appears to offer significant potential in not only alleviating the existing short-comings in national security command, control, communications, and intelligence (C^3I), but also enhancing our ability to collect, process, disseminate, evaluate, and act upon the almost infinite range of essential elements of information (EEI) required to understand and cope with the modern international arena. In particular, data acquisition and entry techniques being developed under the multi-disciplinary AI rubric, and including vision, speech, and understanding systems, offer the prospect of automated acquisition and storage of data then subject to already automated and traditional data processing techniques such as searching, sorting, linking, and clustering.

Expert systems, applying AI theory in the areas of heuristics, knowledge representation, and dealing with uncertainty, offer the prospect of automating much of the first-cut processing now either done by seriously overworked staff, or not done at all. In addition to making near-real-time and near-perfect or all-encompassing pattern matching possible - such as simple scanning for known terrorist names or searching for changes in Soviet Bloc media content - expert systems offer the possibility of enhancing decision-making at all levels by

codifying heuristics of acknowledged experts and either applying those heuristics directly to acquired knowledge, or interacting with human actors able to benefit from the prompting of an AI "mentor".

The problem facing the national security community is two-fold: on the one hand, the community must diagnose and acknowledge its fundamental limitations, and reach a consensus on the need for structural as well as procedural change in the arena of information management and computer-assisted decision-making; on the other hand, it must rapidly develop and implement in a coordinated "inter-operable" manner AI systems capable of enhancing the ability of national security community personnel to fulfill their responsibilities. Although a significant investment has been made by the Defense Agency for Research and Development (DARPA), and other elements of the national security community have begun exploratory research and prototype applications, the current state of AI development within the U.S. government is fragmentary and hence likely to be strategically ineffective. There is however an encouraging increase in interest - by a variety of key players in the U.S. government - in expert systems. This interest is giving rise to the development of knowledge engineering skills within different government agencies, and the gradual codification of very small elements of day to day decision-making (heuristics, or "rules of thumb") which can then be applied by "smart" computers. Unfortunately, there is no central direction of this learning

effort, with the result that there are is no standard or common foundation, and no cross-pollination is taking place. Since the whole point of applying AI to national security information management is to deal with the challenges posed by existing handicaps, such a fragmented effort can not be permitted to continue if we are to harvest broad inter-agency benefits within a two to five year time-frame. Among the institutional actors which might help strengthen the national security community by substantively developing its information management capabilities are a national Office of Information Technology, a Commission for the Study of National Security, a University of the Republic, and a National Security Corps.[1]

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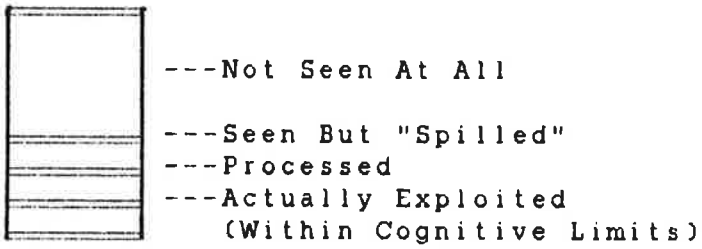
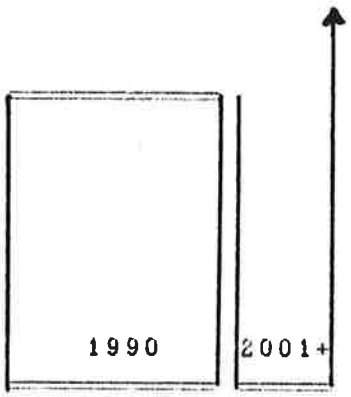
[1] Replacing the Foreign and Civil Service elements, and military staff, now deployed abroad or charged at home with responsibilities for international affairs and U.S. tactical, strategic and grand strategic decision-making within the context of a U.S. Embassy overseas or an inter-agency working group in Washington.

A Graphic Challenge



Information
Available Today



Information
Coming Available

The National Security Community

Mission

The national security community may be defined as the collective of those civilian agencies accepted as members of the National Security Council (NSC) or involved in intelligence collection or covert action against foreign targets, and the various agencies and services comprising the Department of Defense (DOD). In this context, the NSC represents the ultimate arbiter with respect to "the integration of domestic, foreign, and military policies relating to the national security".[a] The NSC is in short, the principal client for the intelligence produced by the various member agencies with representation overseas, and the principal source of direction with respect to collection requirements as well as other activities which do not concern us here. Information management is in essence

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[a] Executive Order 12036, although dated, provides a useful and representative extract:

> 1.101. Purpose. The National Security Council (NSC) was established by the National Security Act of 1947 to advise the President with respect to the integration of domestic, foreign, and military policies relating to the national security. The NSC shall act as the highest Executive Branch entity that provides review of, guidance for, and direction to the conduct of all national foreign intelligence and counter-intelligence activities.

As reprinted in Roy Godson (ed.), Intelligence Requirements for the 1980's: Elements of Intelligence (Washington, D.C.: National Strategy Information Center, Inc., Consortium for the Study of Intelligence), 1979, Appendix III, p. 1. The latest available description of the missions and structure of intelligence community members is contained is Executive Order 12333.

identifiable with the intelligence cycle.[3]

It is the NSC and its individual members[4] who will define the national security paradigm, or world view (e.g. the perceptions of the senior operators in the national security arena); who will pass judgement on and suffer the realities of the epistemology of intelligence (e.g. the availability and relevance of information incorporated into the national security system); who will respond to, arouse, and attempt to manipulate group and political dynamics in seeking to craft a national

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[3] The "intelligence cycle" is generally understood to mean the process which includes the establishment of requirements, the tasking of sources or development of new sources, the collection of the required information (called in the military Essential Elements of Information or EEI), the processing of the information by analysts who fuse it with other information and thereby generated "intelligence", the dissemination of the finished intelligence - as well as raw "intelligence information" reports - to customers at all levels of government, and the subsequent exploitation of intelligence by decision-makers who direct executive action or establish extended, permanent, or ad hoc requirements anew. For an excellent description of the strategic intelligence cycle and the manner in which specific requirements are coordinated within the national intelligence community, see Stephen J. Flanagan, "Managing the Intelligence Community", International Security 10/1, Summer 1985, pp. 58-95. Because this paper addresses "information management" rather than policy making, an emphasis on intelligence rather than foreign policy is necessary. For an elementary review of the latter, see Lincoln Bloomfield's The Foreign Policy Process: A Modern Primer (Englewood Cliffs: Prentice-Hall), 1982.

[4] As will be discussed throughout the paper, the "members" of the NSC will be defined in different ways depending on the level at which a specific individual is acting, and the organizational context within which the individual is acting. Generally the grand strategists and strategists are regarded as single individuals, such as those who were invited to participate in deciding how to handle the Cuban missile crisis, while at the lower levels, such as within a particular Embassy, the individuals are considered "anonymous" and reflective of their organization culture and its inherent priorities.

security policy; and who will finally be instrumental in choosing between alternatives along whatever gamut of choice is perceived to exist: between strategic and tactical foci, between ends and means, between principal and peripheral interests, between essential and marginal values, between international and domestic realities, between secrecy and publicity.[5]

Structure

There are two structures - one strategic and one tactical- which must be considered in addressing the issue of information management for national security. At the strategic level exist the inter-agency working groups and a whole network of highly politicized relationships, understandings and "rules of the game" by which requirements are defined.[6] At the tactical level is the U.S. Embassy, or "Mission", led by the Ambassador.[7]

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[5] One well-known exploration of the changes in policy and perception vis a vis "containment" is provided by John Lewis Gaddis in Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy (New York: Oxford University Press), 1982. Another seminal work is that by Robert Jarvis, Perceptions and Misperceptions in International Relations (Princeton: Princeton University Press), 1976.

[6] For a unique and very forthcoming book about the "rules of the game" in this arena, see Morton Halperin, Bureaucratic Politics & Foreign Policy (Washington, D.C.: The Brookings Institute), 1976. A later work which supports many of Halperin's allegations is that of Seymour Hersh, The Price of Power: Kissinger in the Nixon White House, (New York: Summit Books), 1983.

[7] Traditionally a senior career officer of the Department of State, this position has increasingly been filled by political appointees nominally attached to the Department and primarily oriented toward the President and the political party or patronage network that occasioned their appointment - from a low of 15% in the 1970's, this number (understandably not bandied about) has risen to as high as 45% under the first Reagan

Strategic Structure

As specified in Executive Order 12036 and its successors, the members of the intelligence community responding to the information needs of national security and over whom the NSC exercises its responsibility for review, guidance, and direction include the Department of State (DOS), the Central Intelligence Agency (CIA), the Department of the Treasury (DOT), and in particular the Secret Service, the Department of Defense (DOD) with its service intelligence arms, Defense Attache and Military Assistance networks, and its special collection facilities, the Department of Energy (DOE), the Federal Bureau of Investigation (FBI), and the Drug Enforcement Administration (DEA). Other government agencies will become part of the collection structure under certain circumstances, e.g. upon the assignment of a Customs Attache to an Embassy overseas. The range of functional interests, the geographical scope of activities by the combined agencies, and the relative isolation of their respective data bases from one another constitute the baseline "problem" which this paper considers.

Tactical Structure

A typical U.S. Mission will consist of a DOS component broken down into the political, economic, consular, and administrative sections, a commercial attache provided by the

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administration. The implications of this trend for control over a highly specialized group of agency representatives deserves further attention.

Department of Commerce or DOS, and a variety of other attaches representing such diverse members of the community as the DOD, FBI, DEA, etcetera.[a] Each section maintains its own files and working routines/contacts, and each section (other than DOS) has available a direct and unrestricted communications link to its home office.[b]

Current Challenges

The effectiveness of information management at both the strategic and tactical levels is at once both constrained and made all the more vital by the nature of the personnel, the structure and thrust of the different agencies, and the goals and mechanisms of the operations which together comprise the resources of the national security system. Each of these, whether by commission or omission, strongly influences executive decisions regarding national security matters in that the flow of information upon which are based strategic analyses and policy decisions depends directly on the adequacy of these resources and their day to day direction.

Manpower. There are several critical personnel issues facing the national security community:

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[a] In recent years the proportion of Department of State to "all other" appears to have dropped significantly as DOS positions have been eliminated by budget cuts while other Agencies, and particularly the Department of Defense and the law enforcement agencies, have increased their representation overseas.

[b] Appendix I contains several context diagrams and data flow diagrams meant to illustrate the structure of a typical Mission and the manner in which data is processed.

-- There is a serious lack of mid-grade officers, both overseas and in Washington; the current understanding among officers not privy to restricted personnel information is that close to half the officers have less than five years time in service, and close to half the officers have less than five years until retirement. This is an incredible turn of events, reflective of very inadequate attention to quality of life and compensation issues which have plagued overseas personnel for the past decade, and one which will - if not corrected very quickly- gravely cripple our ability to make informed decisions at every level;[10]

-- There is a desperate lack of trained secretaries and assistants both overseas and in Washington, with the result that a vast amount of raw information (including such simple things as newspapers waiting to be clipped) is either not processed at all, or done by officers as an "additional duty". Office routines being what they are, this inevitably results in the junior officer in a section becoming a highly paid (and very frustrated) clerk rather than a first-tour diplomat-in-training, and it keeps the more experienced officers at their desks longer, rather than with the local officials and nationals they are meant

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[10] A senior military officer puts the manpower dilemma in broader terms: "We are facing declining availability and rising cost of manpower. Such manpower issues, coupled with the rising complexity of our decision environment and hardware systems, is one driving force behind DOD interest in AI." RAdm. Albert J. Baciocco, Jr., USN, "Artificial Intelligence and C³I", in Stephen J. Andriole (ed.), Applications in Artificial Intelligence, Princeton: Petrocelli Books, Inc., 1985.

to be cultivating and communicating with personally;

-- There is an increasing reluctance on the part of highly qualified individuals to accept entry-level employment in government and in particular into the Foreign Service - perhaps because of the same quality of life and compensation issues which are driving out officers with two or more tours under their belts - but also because of the length of the application process and the delay in obtaining clearances and a confirmed assignment; this condition is manifesting itself in the form of a generation of very young officers, fresh out of college, generally without the advanced degree, military or business experience, and foreign language capability that characterized members of earlier generations;

-- As noted above, a large number of our senior officers are close to retirement: they constitute the institutional memory, and the only one we have in the absence of a mid-level cadre of any substance or depth. There is no substitute for experience, suggesting that in five years or less the Republic is going to be poorly managed at home and even more poorly represented abroad.

Organization. The fragmentation of responsibility for information management pertinent to national security is a deliberate manifestation of the nation's commitment to a system of checks and balances, and its historical encouragement of competing factions. Unfortunately, such a fragmentation has immediate and profound implications for information management

and in particular the completeness, coherence, quality, reliability, and timeliness - not to mention relevance - of the information which ultimately reaches the NSC. Among the challenges:[11]

-- Inter-agency coordination more often than not is a fiction, with the result that isolated fragments of information are never brought together under some broad national security imperative, but remain within parochial boundaries;[12]

-- Strategic and tactical linkages more often than note suffer as organizational cultures and internal goals persist and fail to adapt to rapidly changing conditions in the international arena; representatives in the field continue to play to their "headquarters" audience rather than their "field" commander, the Ambassador;

-- Economic and technology collection, like narcotics and terrorism, are not "historical" collection priorities and hence are generally ignored at the tactical level even though a strategic requirement has been levied and is gradually being

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[11] I have no quarrel with the intent of Constitution, only with the inadequacy of the structural and cultural standards of organization - of personnel, function, and information management - which have developed over time. For an interesting published review in this area, see Francis O. Wilcox and Richard A. Frank (eds.), The Constitution and the Conduct of Foreign Policy, New York: Praeger, 1976. My own case is made in "Perversion or Progression: An Examination of Our Constitution's Contemporary Validity in Foreign Affairs", draft, Muhlenberg College, 1973.

[12] A classic work on this problem is Harold Wilensky's Organizational Intelligence: Knowledge and Policy in Government and Industry (New York: Basic Books), 1967. See also Flanagan, supra note 2.

emphasized. The same "lag time" that crippled national security efforts against narcotics and terrorism will cripple strategic efforts to protect our technological edge and increase our economic and financial edge in the world economy;

-- Military "human" collection requirements have been ignored for so long that there is a serious lack of experience and there is no infrastructure responsive to contingency needs; this is particularly troublesome because Defense Attaches are specifically prohibited from engaging in clandestine activities, and the military personnel who are permitted to do so are generally (in my limited experience) insensitive, relatively incompetent, poorly supported by their parent commands, and have marginal backgrounds for their areas of operation;

-- Organizational imperatives have driven security classifications and the compartmentation of information, with the result that there is no significant degree of inter-agency cuing on a near-real-time basis, and no reliable way of pulling together all available information on any topic of interest to national security policy-makers at any given moment. As will be easily demonstrated in the discussion of "choke points" below, the amount of information which does not get into a retrievable format is second only to the amount of information which does not get processed in the first place;

Operations. Operations overseas are unique for their complexity and insecurity - we really are strangers in strange lands, and these lands and the forces which drive their peoples

are poorly understood by too many. El Salvador was a retirement post until ca 1979, and even then Henry Kissinger didn't have "but 30 seconds a day" for this obvious volcano; it took the administration five years to accept the fact that the extreme Left can not be dealt with if the extreme Right is allowed to run rampant. Our existing manpower is not able to handle the current workload, much less the requirements for a broader range of contacts, more intensive research, more thoughtful analyses, and - ultimately - a more intuitive grasp at all levels of the fundamental realities of international relations. The risk to our people overseas has also risen significantly. In short, manpower allocations established when the United States was relatively invulnerable to turmoil in individual countries, and could afford to maintain relatively pro forma missions in most nations, are no longer adequate...and with the information explosion that is occurring, with its concurrent requirement for an increased understanding of such things as revolution, international debt, the international gray arms market, and money laundering, to name a few, we will not be able to maintain even a semblance of competence in foreign affairs unless our human and information management resources are significantly increased, and our investment in training and ongoing systems development also increased. Now, with terrorism on the rise, there is serious discussion at higher levels of the need to reduce our overseas presence even further. This will aggravate reductions already imposed by funding constraints and leave the Republic partially

"blinded" at the ground level and "in-country". Automated data entry and other AI systems might provide a powerful and partial remedy to the effects of this manpower reduction.

Information Management and National Security

The Intelligence Cycle

The elements of the intelligence cycle have already been briefly cited: requirements, tasking, collection, processing (including fusion and analysis), dissemination, exploitation. The theory and the reality of this cycle is outlined very well by Stephen Flanagan[13] and need not be repeated here; he does however make several excellent points fundamental to this paper's argument:

-- That policy-makers generally are not very good at specifying <u>what precisely</u> they need to know, and as a result are given a "dump" defined by what is available or what some collection manager further down the line thought they needed to know;

-- That at any point in time it is difficult to predict what secondary countries or issues will be of interest to policy-makers <u>at any moment</u> with the result that <u>ad hoc</u> requirements frequently cause the neglect of standing requirements, and - in the absence of personnel and collection resources - data bases are neglected and quickly become dated;

-- That the line between raw and finished intelligence is

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[13] Stephen J. Flanagan, "Managing the Intelligence Community", <u>International Security</u>, 10/1, Summer 1985, pp. 58-95. Now the Assistant Director of the Center for Science and International Affairs at Harvard University, he was a professional staff member of the U.S. Senate Select Committee on Intelligence from 1978 to 1983.

obscured by the desire of policy-makers to make their own judgements based on their presumed access to sensitive information (including information about the President's interests and intentions) which even the senior analysts don't know - this is a fundamental problem, for it strains even further the limited management/policy resources we have.[14]

Choke Points & Distortions

There are a variety of ways whereby information can be by-passed, ignored, withheld, distorted, or (assuming a best case hypothesis) not noticed by the individuals responsible for its collection. The following illustrations are not meant to be comprehensive, only suggestive:

-- There are requirements and then there are REQUIREMENTS. The development and dissemination to the field of "requirements" for each Mission component reflect two different forces: on the one hand, the inter-agency force represented by the National Foreign Intelligence Board (NFIB) and carrying with it the authority of the NSC, through such vehicles as subordinate inter-agency working groups and the Intelligence Community Staff (ICS),

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[14] It merits mention that Flanagan's article, which assumes that the structures for collecting and producing national intelligence are "essentially sound", misses a very important point, which is that the structures are completely inadequate for the fulfillment of their mission - the execution of the intelligence cycle - in the face of both an external information explosion and an internal fragmentation rife with information "choke points" and "spillage". His conclusion that more guidance with respect to requirements and the foci of both collection and analysis efforts is needed is right on target - but without resources to meet these needs, such guidance, even if forthcoming, would be moot.

ultimately results in the production of classified and unclassified "country" plans for human collection (HUMINT) by all elements of a given Mission; on the other hand, each organization has its own goals and roles, and the senior representative will know full well what organizational REQUIREMENTS he must meet irrespective of the over-all collection plan. The bureaucratic realities of inter-agency coordination regarding "requirements" are such that any "national" plan becomes nothing more than a comprehensive inter-agency "dream sheet" to be ignored by tactical collection managers. By trying to do too much (or by failing to impose discipline on the process), the NSC has in effect abdicated strategic collection management to the individual agencies and their tactically oriented plans.

-- Information overload is a serious problem certain to become much worse in the next few years. In the same way that too many requirements create so much "noise" that they are not "heard" by U.S. officers in-country, so does an information overload result in a lesser grasp of the over-all picture, a disoriented effort to collect and report information, and, inevitably, the loss of significant elements of information for lack of time or "sense".[18] It can be fairly said that most

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[18] An excellent summary of the problem from the military's C³I perspective (which as this paper suggests is an over-all national security command & control question) follows:

> "Among the most difficult problems facing today's military centers are the escalating requirements placed on command, control, communications, and intelligence (C³I) systems. These centers are inundated with a continuing flood of information and data from highly sophisticated, complex networks of sensors-

officers consider themselves severely overworked and unfairly taxed in many instances by the absence of appropriate clerical support. The result is that only one of five local newspapers is read, local and regional journals fall unread to the bottom of the pile, inter-agency traffic is poorly screened and rarely absorbed (in effect only the subject line is ever read, and those usually don't reflect content as well as they should), and memoranda of conversations by officers in other sections are not routinely examined. The end result is that instead of mastering 70 or 80% of the available information (e.g. on the Left if the officer is responsible for serving as the Embassy's point of contact to these parties) an officer will end up scanning only 30-40%, retaining even less, and coping from day to day with endless memoranda he must himself generate for others to ignore. A good example of how this can be counter-productive is provided

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> information and data that must be processed, analyzed, correlated, and disseminated to military field commanders in the form of situation and threat analyses, status reports, and targeting information. Control center staffs are hard pressed to meet command requirements, and hardware and software systems designed to support intelligence analysts are pushed to their limits. As more sophisticated sensor systems now in development come on-line, and the type of problems to be solved become more complex, control center performance is sure to drop below the levels necessary to maintain an adequate battle advantage." David A. Brown and Harvey S. Goodman, "Artificial Intelligence Applied to C³I", in Stephen J. Andriole (ed.), Applications in Artificial Intelligence (Princeton: Petrocelli Books, Inc.), 1985.

Everything the authors say about military C³I in war is even truer of a typical Embassy and the national security goals it pursues in peace - alert on all sides to an overwhelming flow of information, unsure at any moment when the next crisis will occur and what information will be needed to respond effectively.

by an officer who returned from a lunch with an occasional Foreign Ministry contact, excited by the prospect of being able to send an "immediate" to Washington on a pending negotiation to which the host country was a party. What he did not realize until too late (another section embarrassed him when the telegram was coordinated) was that a) this had already been reported and b) it had also appeared in the newspaper. His Foreign Ministry contact probably thought he was simple as well.

-- Reporting formats are unique to each agency, and this is a major cause of information "spillage" in that even if the information is collected and reported by a given Embassy officer, it may be reported in such a format as to be irretrievable, uncoordinated, and thus useless. It merits comment that not only is there no inter-agency standard for either electronic message or hard-copy memoranda, but some formats are easier to deal with than others, or politically "safer", which is to say less likely to invite critical scrutiny from others while still appearing to be useful. The hard-copy "think piece" or the cumulative list of key personalities (e.g. host country National Guard officers with Colombian business interests) sent from any section directly to its parent organization's desk falls in this category. As it will be received only by the respective Agency desk, this "safety" from inter-agency scrutiny and local comment tends to force a large amount of data into these less visible and less exploitable channels.

-- Data base fragmentation is an understandable consequence

of a fragmented Mission and a fragmented national security community. As may be surmised from the preceding material, each section maintains its own data base, in own reporting formats, its own standards for indexing[18], and its own standards for inter-agency coordination and for classification of information- all this in addition to its own parochial collection requirements and paradigmatic or cultural perspectives as described below. Consequently, the national security "data base" is not only fragmented by organization (say 12-20 agency data bases, each presumed to be coherent and organized in isolation) but also by location (each desk in Washington and each section at Embassies overseas) and by medium (besides electronic messages, there exist hard-copy files which are regularly sent back to the bowels of Washington or destroyed (the latter being more likely since it's easier), microfiche historical records, index cards, and the vast store of unrecorded information resident in the memories of the individual officers). In short, there is no inter-agency standard for acquiring, recording, registering, sharing, grading, or exploiting information.

-- Finally, to end our series of suggestive examples, there is organizational culture. Each organization represented in a Mission has its own distinct culture and hires/retains people whose personal style's are consistent with that of the organization. Four distinct "styles" of four leading catagories

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[18] Identifying an individual or organization to be formally registered in the parent organization's "list" or the inter-agency "list" together with the related information.

of players are crudely characterized below:

-- Department of State. Conservative and extremely hierarchical in nature; junior officers generally do not receive significant allocations of representational funds, and consequently do little substantive reporting. Those officers that do have representational responsibilities are obliged to limit themselves to overt contacts with individuals believed to be "sincere" and they consequently rely heavily on newspapers and the initiative of foreign nationals willing to talk to them. Although some very insightful and even brilliant officers exist, as a rule the reporting tends to be pedestrian, too late to be useful, and overly subject to the personal prejudices of the Counselor or Ambassador.

-- United States Information Service (USIS). A unique entity, with incredibly good access to the most vital segment of most Third World countries (the academic, cultural, and media block of intellectuals, generally leftist), USIS refuses to accept a reporting role for fear that this will be detrimental to its primary mission of promulgating American propaganda. As a result their bright and insightful officers, usually fluent in the local language, are not contributing <u>in the slightest</u> to the formulation of U.S. impressions of (and the historical data base regarding) local conditions and personalities...what is particularly sad is that they are among "the best and the

brightest" of all Mission employees.[17]

-- Defense Attache (DEFATT) and/or Military Assistance Group (MAG). By virtue of being associated with the U.S. military (with a percentage of assigned enlisted personnel having reporting roles), the DEFATT and/or MAG tend to suffer from a lack of perspective and a lack of status within their own organizations. On the one hand, the DEFATT program is operated by the intelligence arms of the individual services. This has two very serious ramifications: first, intelligence in the military is still a "second-class" occupation.[18] While this is a fact of life which is gradually changing (and faster in high-

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[17] There is a least one really imaginative and dedicated Director of a major USIS Bureau who requires his officers to engage in political reporting and related assessments, and their products - particularly their assessments of moods and intentions based on their uniquely advanced grasp of language and culture- appear to be of tremendous value to the highest level U.S. leaders involved in summitry and other face to face negotiations.

[18] The "second-class" appellation is too well founded to require extensive documentation. It appears to have originated on the one hand from a distinction between "line" officers eligible for command and staff or limited duty officers not so eligible, and on the other from the almost paranoic security consciousness within the military, leading to the "green door" syndrome by which denigrated intelligence personnel got their own back by denying the line types access to their "sensitive" information. Particularly in peacetime, intelligence slots at the tactical levels are good places to put young officers not up to the demands of platoon leadership, and they may ultimately be eased out of infantry and into this more "limited" military occupational specialty. This unhappy state of affairs may be coming to an end with the increasingly technical aspects of intelligence requiring individuals of the highest caliber; the Army appears to be leading the way in reintegrating the operations and intelligence staff functions, and this is certain to result not only in a more effective force, but in restored status and influence for military intelligence personnel and those (such as Defense Attaches) associated with them.

tech services such as the Air Force), it can not help but hamper the effectiveness of the Defense Attache program; second, by being subject to direction from "intelligence" even though specifically proscribed from engaging in any clandestine collection activities, Defense Attaches are too often put in the position of having to respond to an immediate requirement from the Pentagon which almost dictates that some surreptitious activity be undertaken (e.g. photographing of a Soviet military officer transiting Panama, or contacting a former Air Force enlisted man now living with his common law wife in Nicaragua and visiting Panama to collect his retirement pay).[19] The Defense Attache suffers one other inequality, which is that his tour is a "one of one" tour and out of the mainstream.[20] More than one such tour can blight a career. Thus the DEFATT combines the worst of all worlds - a high turnover with limited background in

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[19] In fairness to the national military authorities directing that hapless Defense Attache, it must be said that they are turning to him because they have consistently failed to receive satisfaction from other agencies more appropriately suited to such collection requirements.

[20] "One of one" refers to the "truth teller" on military performance appraisal reports where, in order to provide for inflation and bring some level of credibility into reports where all officers were invariably "outstanding", the reporting senior is obliged to rank the officer relative to other officers of the same grade being evaluated at the same time. For convoluted reasons, promotion panels appear to have decided that "one of one" tours, rather than meriting special regard (e.g. as when an officer was elected to represent his entire service at a joint, unified, or specified command) were simply to be discounted on the assumption that judgements of non-Service reporting serniors were suspect and that without a Service based standard of comparison (popularly known as the "truth teller") no fair evaluation could be rendered.

international affairs and foreign operations, and the same overt/foreign limitations which constrain DOS reporting, but with the added danger that one day the Pentagon will ask him to do something <u>really</u> stupid, and he will get caught.

-- No review of different styles would be complete without reference to the "law enforcement" types, such as DEA and the FBI but including other agencies with significant collection responsibilities. These agencies do appear to field individuals with very high degree of both functional and linguistic competence, and extraordinary dedication as demonstrated through long hours. The problem with their products is that no one gets to see them. This does not refer to the formally disseminated reports or inter-agency memoranda that are routinely shared (when they find time to write them up) but rather to what must be an enormous flood of day to day "tid-bits" that never make it into a formal report meriting inter-agency dissemination - tid-bits which might add value to information already in hand within other sections of the Embassy.

-- Lastly, we come to the human factors independent of organizational style or processes. Besides individual degrees of dedication, or linguistic fluency, or cultural empathy - all of which appear to have taken a down-turn in recent years as risks and discomforts have risen and relative compensation has dropped - there are personal processing prejudices such as the understandable prejudices of one dashing young officer who insisted on cultivating only attractive women, justifying himself

by somehow managing to find attractive women in the Foreign Ministry as well as in other organizations of reasonable interest to the Embassy. At the strategic level, as has been well discussed in the works of Halperin, Jarvis, and Hersh, distortion and even deliberate deception can creep in - human handling can fold, spindle, and mutilate information just as easily, and with more subtle imagination, than any machine....which brings us to artificial (or machine) intelligence and what it can do to improve the management of information vital to national security.

Artificial Intelligence and Information Management

Overview of the Field

Artificial Intelligence (AI) can be considered synonymous with its predecessor term, machine intelligence, and an extension of research and development in office automation, seeking to program computers to perform tasks requiring reasoning and perception.[81] The generally understood difference between AI and traditional programming is that AI seeks to codify knowledge (as opposed to data) explicitly, developing programs which can apply the knowledge to data, while traditional programming emphasizes sequential programs strictly limited to processes and only implicitly reflecting knowledge. Whereas traditional data processing (TDP) relies on two disciplines - computer science and electrical engineering - AI with its focus on knowledge acquisition and exploitation is multi-disciplinary, calling upon cognitive psychology, sociology, neuroscience, philosophy, and the disciplines of each of the "domain experts" whose knowledge

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[81] One common definition of AI is "the attempt to understand the nature of intelligence and to produce new classes of intelligent machines through programming computers to perform tasks which require reasoning and perception". National Science Foundation Information Technology Workshop, as cited in International Data Corporation, Artificial Intelligence: Techniques, Tools, and Applications (IDC #2742), Framingham: IDC, 1985. The latter volume is one of the most useful and well illustrated overviews of expert systems and related technologies. For a commercially oriented report on AI as a whole, updated annually, see Howard K. Dicken and Harvey P. Newquist III (eds.), AI Trends '85: A Comprehensive Annual Report on the Artificial Intelligence Industry, Scottsdale: DM Data, Inc., 1985.

is targeted for codification and inclusion in an AI system.[82]

Because DARPA has taken the lead in AI research for national security applications, a summary of the areas against which the DOD is focusing can provide a useful overview of AI potential for national security in general, and set the stage for our own discussion. As itemized by one author,[83] the general areas in which AI offers the most potential include:

-- Planning & Decision-Aiding. The purpose of this research is to develop systems that can stimulate and ultimately improve human problem-solving and decision-making. At the very least, these AI systems are intended to augment human problem-solving; the more robust ones may very well consistently outperform human planners and decision-makers.

-- Computer-Aided Instruction (CAI). The initial experiments in unintelligent CAI suggested that tremendous

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[82] There is a growing literature on AI, with, for example, hundreds of articles pertinent to expert systems having been published in 1985 alone. For a complete listing, an annotated bibliography is available from the author. The following are generally useful as introductory material: Rogers P. Hall and Dennis F. Kibler, "Differing Methodological Perspectives in Artificial Intelligence Research", The AI Magazine, Fall 1985, pp. 166-178; Henry C. Mishkoff, Understanding Artificial Intelligence, Dallas, Texas Instruments, 1985; Patrick Henry Winston and Richard Henry Brown (eds.), Artificial Intelligence: An MIT Perspective (Vol. I and Vol. II), Cambridge: MIT Press, 1979; Edward A. Feigenbaum and Pamela McCorduck, The Fifth Generation: Artificial Intelligence and Japan's Computer Challenge to the World, Reading: Addison-Wesley, 1983; Ryszard S. Michalski, Jaime G. Carbonell, and Tom M. Mitchell (eds.), Machine Learning: An Artificial Intelligence Approach, Palo Alto: Tioga Publishing Co., 1983; Committee on Human Factors, National Research Council, Research Needs for Human Factors, Alexandria: Defense Technical Information Center, 1983; David S. Touretzky, LISP: A Gentle Introduction to Symbolic Computation, New York: Harper & Row, 1984; and Sherry Turkle, The Second Self: Computers and the Human Spirit, New York: Simon & Schuster, Inc., 1984.

[83] Stephen J. Andriole, "Artificial Intelligence and National Defense: An Agenda and a Prognosis", in Stephen J. Andriole (ed.), Applications in Artificial Intelligence, Princeton: Petrocelli Books, Inc., 1985, pp. 479-490.

advantages can be gained via the computerization of important instructional materials, advantages such as wider distribution and cost-effectiveness.[84] Experiments also revealed that for many kinds of tasks, computer-aided instruction is actually more effective that conventional classroom instruction. Intelligence CAI is expected to dramatically improve all kinds of training, accelerate the distribution of instructional materials, be cost-effective, and contribute directly to improved readiness.

-- Data Base Management and Image Understanding. Natural language interface systems have already demonstrated their applicability to data base management problems....Natural language front-ends...can make nearly all data bases accessible to even widely distributed users who might otherwise become frustrated with conventional query systems.

-- Command, Control, and Communications (C^3). A whole host of DOD problems converge at C^3I. Just as AI is many things to many people, so too is C^3I and the range of its analytical and functional domain. Many regard C^3I as the control of weapons and units, while others regard it as the process by which humans make and execute decisions. Many see it primarily as a communications process while others see the real challenge of C^3I in data base management....The former Chief of Naval Research[85] has identified a number of research areas including automated decision-making, distributed problem-solving, crisis warning, automated planning and scheduling, and situation assessment, among other areas.

-- Navigation, Guidance, CAD, CAM, Robotics, and Automated Programming. Given the ability of smart systems to recognize all kinds of data, and to fuse it once it has been identified, we can expect a significant amount of applied AI impact to occur within the areas of weapons design, operation, and production, areas that have already yielded to unintelligent and near-intelligent CAD, CAM, and robotics. We will also expect our AI systems to help create new systems through applications in robotics and automated programming.

The above distinctions are useful as research proceeds and applications are developed, but in fact an AI application for

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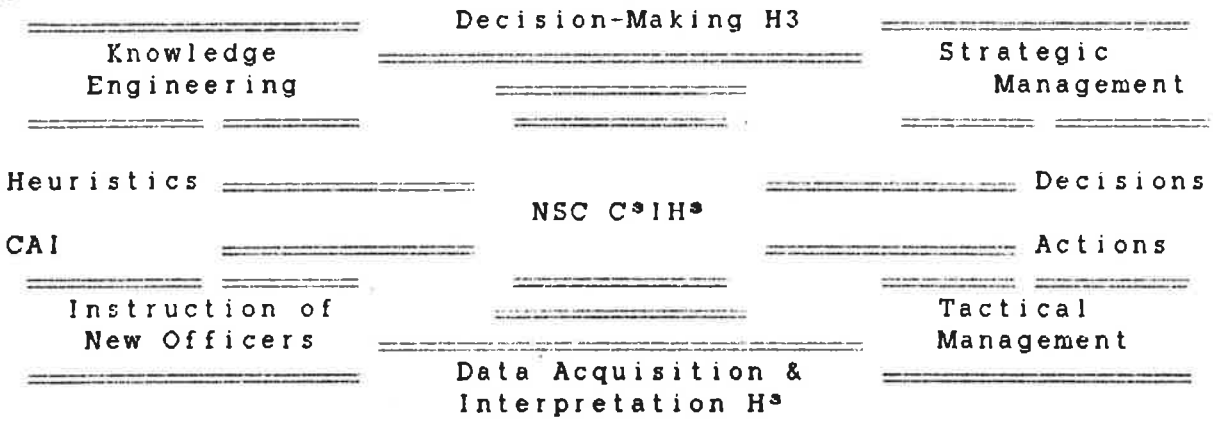
[84] Andriole cites Jesse Orlansky and J. String, Cost Effectiveness of Computer-Based Instruction, Alexandria: Institute for Defense Analysis, 1979.

[85] Andriole cites RAdm. Albert J. Baciocco, Jr., USN, "Artificial Intelligence and C^3I", in Stephen J. Andriole (ed.), Application in Artificial Intelligence, Princeton: Petrocelli Books, Inc., 1985, pp. 491-504.

national security information management must inevitably combine many of these functions in a single integrated system that learns from itself and the humans it works with, imparts that new knowledge to novice humans coming on-line, aids its human managers in data acquisition and data base management, and in so doing develops new plans, decision prompts, and so on, all a reflection of national security heuristics (H^s).

The specifics of this design, and the substantive content of each area and the inter-relationships between each area are discussed in the remainder of the paper. H^s is a fanciful allusion to C^s and the variety of competing expressions, but also reflects a serious cube illustrated in the section on Heuristics and National Security, a cube which combines a matrix consisting of functional or geographic specialties along the horizontal axis, and process-oriented duties along the vertical axis. The depth is provided in recognition of the competing requirements imposed by the different levels of responsibility and cultural foci found in the different organizations comproising the National Security Community.

National Security AI Information Management System



Data Acquisition & Storage

This paper will not focus on the wide variety of information "types" which are considered necessary for national security, nor on the means by which they are now "acquired".[ee] Suffice to say that we take in printed matter and audible matter, and that all of this information must either be stored, fused with other information, or discarded. As was illustrated earlier, we now are missing are great deal of the available information, and will soon be missing a great deal more. We now "spill" quite a bit of information, and can be expected to "spill" even more if we do not build an information management infrastructure appropriate to our requirements and our capabilities.

This paper also will not focus on technologies and directions not immediately applicable to the problem at hand- for instance, there is little doubt that "vision" can eventually provide for autonomous vehicles as well as surveillance cameras (such as found at banks) with memories and "smarts" - e.g. images of all convicted bank robbers can be retained and an alert conveyed when one of them even walks <u>into</u> a bank. For our purposes, the ability to acquire simple printed matter will suffice. We will also not explore advanced signals and other "audio-related" technologies, that being much beyond the scope of

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[ee] I.e. as represented by the various disciplines (human intelligence, or HUMINT; signal intelligence, or SIGINT, imagery intelligence, or IMINT; certain others; and the broad range of collection targets addressed by the various (blue-sky) collection plans.

our interests. Instead, simple acquisition of human speech, whether directly (as in radio announcements or at political rallies) or indirectly (as now found with tape recorders and dictating devices) is of highest concern. Natural language understanding is an important long-range goal essential to "mentoring" members of the national security community, and will be discussed. Finally, very large data bases must be considered, as an increase in acquisition effectiveness must be matched with an increase in storage capabilities or a dramatic increase in H^3, or a combination of the two, if we are to exploit the information. Because increased storage capabilities are more likely to develop before refined heuristics do, the emphasis in this paper is on the former as a short-term goal, the latter as a mid-term goal.

Vision

For the limited purposes of Embassy operations, vision is being confined in this discussion to optical character recognition. As one authoritative source comments:[87]

> In our era computer speeds are given in terms of nanoseconds, but computer input is still measured in terms of seconds; 25 to 50 percent of all data processing operating cost is consumed by the data entry process. The greatest cost factor in this phase is personnel, such as keypunch operators....The key to efficient and economical data entry lies in the elimination of data transcriptions and its associated labor cost by direct capture at the source. Optical readers offer a means to accomplish this feat by directly reading printed, typed, hand-marked, or hand-printed data without special manual intervention.

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[87] Anon., "Auerback on...Optical Character Recognition", in Auerback Computer Technology Reports, Optical Character Recognition, Auerback Publishers, Inc., 1980, p. 1.

Making a rough calculation of the amount of time an officer overseas spends reading newspapers, memoranda, inter-agency traffic, etcetera, accepting 40% as an approximation, and then extrapolating from that the number of man-hours ca 8,000 Embassy-related personnel spend "acquiring" information from printed matter, we reach a figure (assuming a very conservative eight-hour day) of about 25,800 man-hours or over 3,200 man-years invested in this activity. The alternative, automating the acquisition process and then enhancing the efficiency with which selected portions of the acquired material are delivered to each customer according to a pre-set profile, has the potential of, in effect, increasing our presence overseas by between one third and one half, without hiring a single new body. Even more to the point, we will double or triple the amount of acquired information, since newspapers, journals, directories, memoranda, and other hard-copy will be absorbed in their entirety. As will be clear in the section on data acquisition heuristics, the cultural announcements, social sections, and even the obituaries have important ramifications for U.S. diplomacy and national security, and these are not now being exploited to their fullest - neither are we able to exploit historical information, such as might be provided by a built-in newspaper "morgue" for each country in the world.[ee]

[ee] A newspaper morgue, for those unfamiliar with the term, is the newspaper's own library of clippings, where each day every issue is cut into individual segments and filed appropriately. While countries with more advanced type-setting technologies may now be using the same data base for storage and retrieval

Without belaboring the point, there is also a need for a historical record of radio broadcasts, and there could be significant benefits to be gained from any technology able to "acquire" conversations on tape recorders.[aa] The FBI, with its telephone interceptions which must be transcribed, then reviewed by an officer, and finally filed, cross, referenced, etcetera, could reap significant benefits from a technology allowing for near-real-time acquisition then subject to the same "alert" profile used with newspapers or other materials in the data base. Officers overseas probably spend 20-30% of their time listening to radio announcements, attending political rallies and then writing them up, interviewing local officials and political leaders, etcetera. Since a one hour meeting takes roughly two to three hours to write up (including research and cross-checking references), imagine the value to our officers if - with the consent of the person being interviewed, or in accordance with established procedures, a recording of their meeting could be

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purposes, most Third World countries are still printing manually and - if the do maintain such things as newspaper morgues - doing these manually also. Imagine the utility to our Embassy in a small African country, upon learning of an Army Captain's successful coup d'etat, of being able to call up all newspaper references to that individual - his graduation from high school, his entry into the military, his marriage, any scandals known to the public, related information on relatives reported on in the media, etcetera.

[aa] For an interesting review of some of the difficulties in this area, and its connection with telecommunications, see J.A. Waterworth, "Interaction with Machines By Voice: A Telecommunications Perspective", Behavior and Information Technology, 3:2, 1984, pp. 163-177.

"burst" into the data base, the cross-checking done automatically, inconsistencies or related information of value quickly identified, and the base set for whatever higher-order analysis the officer then wished to carry out!

Understanding

Understanding, whether of printed or audible natural language, has some significant implications for the "mentoring" capabilities of expert systems, and for autonomously creating new knowledge from old and new date using existing knowledge.[30]

Its principal value stems from the consequent ability of the program to deal with unstructured knowledge and/or with uncertainty. Examples of natural language usage or potential include the translation of documents from one language to another (with context dependent meaning and almost unpredictable grammatical usages by different speakers or authors); the ability to create abstractions or summaries of documents, or bring related documents to the attention of interested users; and the ability to generate documents tailored to individual needs or responding to specific requests.

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[30] Three useful articles in this area are B. Chandrasekaran and Sanjay Mittal, "Deep versus Compiled Knowledge Approaches to Diagnostic Problem Solving", International Journal of Man-Machine Studies, 19, 1983, pp. 425-436; Georgios I. Doukidis and Ray J. Paul, "Research into Expert Systems to Aid Simulation Model Formulation", Journal of the Operational Research Society, 36:4, 1985, pp. 319-325; and Gary G. Hendrix and Earl D. Sacerdoti, "Natural Language Processing: The Field in Perspective", in Stephen J. Andriole (ed.), Artificial Intelligence Applications, Princeton: Petrocelli Books, Inc., 1985, pp. 149-191.

Understanding could allow an expert system to "read" an officer's report (e.g. on his meeting with a Foreign Ministry official, or a chance encounter with a representative of a hostile nation such as the Soviet Union) and "prompt" the officer with related information or draw the officer's attention to existing requirements. For instance, the program could alert an officer in the political section to the interest of the DEA representative in this particular official due to his family ties with Colombia, ask the officer if a copy of his report (or an appropriate abstract or version) may be routed to the DEA representative, and then do so. Or the officer could be prompted regarding the need to send a copy of his report on the Soviet official to the Regional Security Officer as well as the Ambassador. In the case of novice officers, particularly those unfamiliar with functional areas such as international economics or petroleum production, a "smart" program could check an officer's figures for consistency with other data (e.g. a report from a political officer sourced to a Ministry of Plans officer to the effect that the country will be doubling its petroleum production could be questioned based on figures from the economics section regarding optimal capabilities and current production). A request from a non-descript individual for a visa could quickly draw a consular officer's attention to the Ambassador's personal interest in that individual's treatment, or the very high interest of the Defense Attache or any other Embassy officer in meeting the individual <u>and</u> (unlike TDP)

provide some quick tid-bits on the individual's background in response to queries from the officer, or suggest conversational topics likely to elicit a favorable impression - while alerting the interested parties of the individual's presence in the Embassy compound.

Very Large Data Base(s)

Just as more information is becoming available, technologies for "acquiring" - at least momentarily for screening purposes- the new information are also being refined or developed. Consider for instance the routine information which Embassies around the world (assume 100 Embassies for the sake of discussion) would feed into their data base: 700 newspapers in their entirety each day, over 400 journals per week, 50-100 commercial and professional directories, and government publications as well as academic and cultural publications as they became available, 100 telephone directories each year, and 1000 or so memoranda each day. Add to the data base network the unified and specified commands and their subordinate elements, and eventually the Washington inter-agency establishment and the analysts with all of their publications, and you get an idea of just how much storage is going to be required. By way of illustration, one source indicates that one high resolution photograph requires ca 1/4MB to be digitalized and stored on-line.[31] On the other hand, the same source states "it is

[31] Daniel Schutzer, "Artificial Intelligence-Based Very Large Data Base Organization and Management", in Stephen J. Andriole (ed.), Applications in Artificial Intelligence,

practical today to talk about on-line storage of huge volumes (billions of bytes) of diverse forms of data (computer data, narrative text, graphics, pictorial, and voice)." Some specialists are already beginning to mention T-Bytes (TB). [88] At the same time the author notes that innovative programs and concepts will be required before these very large data bases can be fully exploited, and notes that the new high density storage devices such as optical disks require programs that can arrange, store, and dynamically link vast archival and control blocks of information. Such systems will need "a capability for deductive inferencing and for natural language processing".

Expert Systems

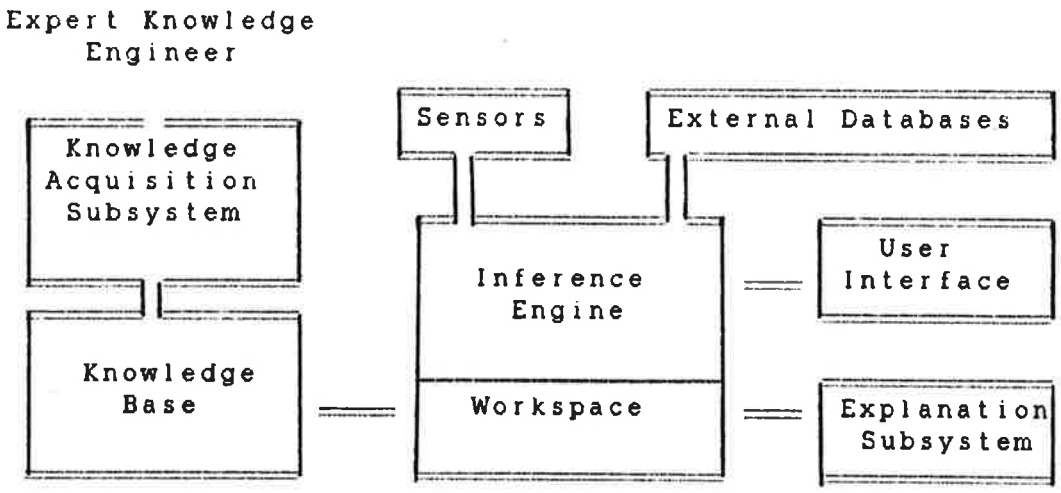
General Description

We arrive finally at the "heart" of any machine system able to exploit AI technologies, the expert or knowledge-based system (KBS).

Princeton: Petrocelli Books, Inc., 1985, p. 254.

[88] Conversation with John McDermott and Gio C.M. Wiederhold during a professional encounter in February 1986 in Washington, D.C.

Architecture of an Expert System[33]



[33] Duplicated from International Data Corporation, Artificial intelligence: Techniques, Tools, and Applications (IDC #2742), Framingham: IDC, 1985.

At this point expert systems do exist, both in application and in prototype. The successful ones are "domain dependent", that is, strictly centered on a narrow area of expertise where the rules to be elicited from the human "expert" can be codified and applied to a fairly restricted data base. The basic elements of the expert system illustrated above include:[34]

-- Knowledge Acquisition Subsystem. The core of the entire structure, and the foundation for its effectiveness; generally the knowledge must be tediously acquired through extensive observation and debriefing of the experts of choice, and then constantly refined in a trial and error process. A sophisticated system might begin and 100 rules, and gradually expand to 2000 or more. Ultimately an expert system can be programmed to "learn" from the user's decisions as reflected in the selection of data and consequent actions.

-- Knowledge Base. Acquired information is stored in a dynamic format responsive to the needs of the user and amenable to searching, sorting, clustering, linking, and the generation of new data resulting from the system's own review of input.

-- Inference Engine. Applies rules and operational paradigms established by the user, acquired by the knowledge engineer, and entered into the system by the programmer.

-- User Interface. A complex subsystem permitting non-technical user interface with the system through the use of natural language or simple commands. [As much as 70% of the code of a particularly "friendly" expert system shell can be dedicated to user interface.]

-- Explanation Subsystem. Related to the inference engine and the workspace within which the knowledge base meets the inference engine, allowing the user to question the system and follow its line of reasoning; can allow for system "learning" and user modification of rules or insertion of "exceptions".

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[34] Besides the excellent references already cited, the reader unfamiliar with expert systems should consider consulting William B. Gevarter, "Expert Systems: Limited But Powerful", IEEE Spectrum, August 1983, pp. 39-45; and Frederick Hayes-Roth, "Knowledge-Based Expert Systems", Computer, October 1984, pp. 263-273.

Intelligent Assistants vs. Mentors

One distinction which should be made explicit when discussing expert systems is that between those meant to serve as "intelligent assistants", applying routine rules to large amounts of data, and those meant to serve as "mentors", prompting and overseeing the efforts of a human operator. An assistant can be programmed using TDP; the AI element comes into play as the "rules" to be applied by the assistant are derived and codified. A simple example is a flagword profile established by recipients of electronic messages; an analyst focused on Algeria but with a generalized interest in revolution, for instance, could establish himself as an automatic recipient of any messages containing the character string "Algeria.." or the character string "revolution..". AI expert systems applications exploit such rules as: "Algeria and revolution but not in relation to sports, business, or religion". A mentor on the other hand counsels the human user by offering automatic access to a vast store of historical and institutional data, interacting with the user in a dynamic (that is to say, unstructured) manner in real-time. An officer specializing in petroleum reporting, as noted in the example contained in the section on understanding, could receive background information prior to going to a meeting (with the mentor searching out appropriate material based on the users description of who he was going to see as well as an autonomous search of related media reports, ad hoc inter-agency requirements, and the standing collection requirements for

petroleum in the region), could critically review the report once submitted (and perhaps even take dictation and organize the report) and augment it with appropriate reference to other materials, and aid the user in determining appropriate routing and follow-up inquires via other Embassies, sections, or local nationals with whom the officer maintains contact. The "mentor" capability is going to take longer to reach than the "assistant". A useful intermediate step may be the "librarian", whereby an expert system program applies flagword-type programming to an officer's own reporting, and in that fashion selects from existing national or local guidance or related data to offer the officer the option of reviewing these items - an officer keyboarding a report on a meeting with an official from the Ministry of Mines and Energy could trigger a "dumb" question from the system inquiring if the officer wishes to see (and then list) the national, departmental, front office, or inter-section requirements and memoranda entered into the system in the past year, or related media reports entered into the system in the past week....

Heuristics and Decision-Making

Finally, we reach the "soul" of the expert system, the heuristics ("rules") which constitute the knowledge base.[38]

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[38] Only a few articles pertaining to heuristics and useful to the development of national security heuristics have been identified: Dina Berkeley and Patrick Humphreys, "Structuring Decision Problems and the 'Bias Heuristic'", Acta Psychologica, 50, 1982, pp. 201-252; Robert F. Bordley, "Systems Simulation: Comparing Different Decision Rules", Behavioral Science, 30, 1985, pp. 230-239; B. Chandrasekaran and Sanjay Mittal, "Deep

"Acquiring" good heuristics from the pertinent experts is a challenging task, and one which requires patience, an ability to learn rapidly about the domain in question, and an ability to discover by trial and error the "missing links" which even the expert may not have focused upon. The budding field of "knowledge engineering" is emerging, populated by individuals who are combining a knowledge of systems analysis or operations research with a knowledge of computer science or electrical engineering or software project management, and practicing the art and science of interviewing and prototyping: debriefing the "expert", codifying a few rules, inserting them into a prototype shell, testing them, obtaining verification or modification from

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versus Compiled Knowledge Approaches to Diagnostic Problem-Solving", International Journal of Man-Machine Studies, 19, 1983, pp. 425-436; William J. Clancey, "Heuristic Classification", Artificial Intelligence, 27, 1985, pp. 289-350; Bruce L. Golden and Arjang A. Assad, "A Decision-Theoretic Framework for Comparing Heuristics", European Journal of Operational Research, 18, 1984, pp. 167-171; Gary D. Hill, Anthony R. Harris, and JoAnn L. Miller, "The Etiology of Bias: Social Heuristics and Relational Decision Making in Deviance Processing", Journal of Research in Crime and Delinquency, 22:2, 1985, pp. 135-161; Albert S. King and Deborah Lauer, "Heuristic and Systematic Evaluation of Policy: Exercise in Decision-Making", Simulation & Games, 14:2, June 1983, pp. 163-178; Don N. Kleinmuntz, "Cognitive Heuristics and Feedback in a Dynamic Decision Environment", Management Science, 31:6, June 1985, pp. 680-702; Howard Tamashiro and Gregory S. Brunk, "Expert Systems as Elite Foreign Policy Advisors: Some User/Machine and Organization/Machine Issues", draft, 1985; Warren Thorngate, "Efficient Decision Heuristics", Behavioral Science, 25:3, May 1980, pp. 219-225, and B.E. Tonn, "The Cyclic Process Decision-Heuristic: An Application in Time-Allocation Modeling", Environment and Planning A, 16, 1984, pp. 1197-1220.

the "expert", and then moving on to develop still more rules.[36] The difficulty with developing consistent heuristics for anything other than a very mechanical function (e.g. the repair of a locomotive) is that no two people operate by the same "rules"; each operates within a personal paradigm ("world view") and may or may not share certain values and preconceptions with the model reflected in any particular expert system.[37] There is still no agreement on which model(s) of problem-solving have the greatest potential for helping understand decision-making and thereby the underlying heuristics of any particular group of people.[38] Following is an illustration of the range of heuristics which must be considered within the national security community.

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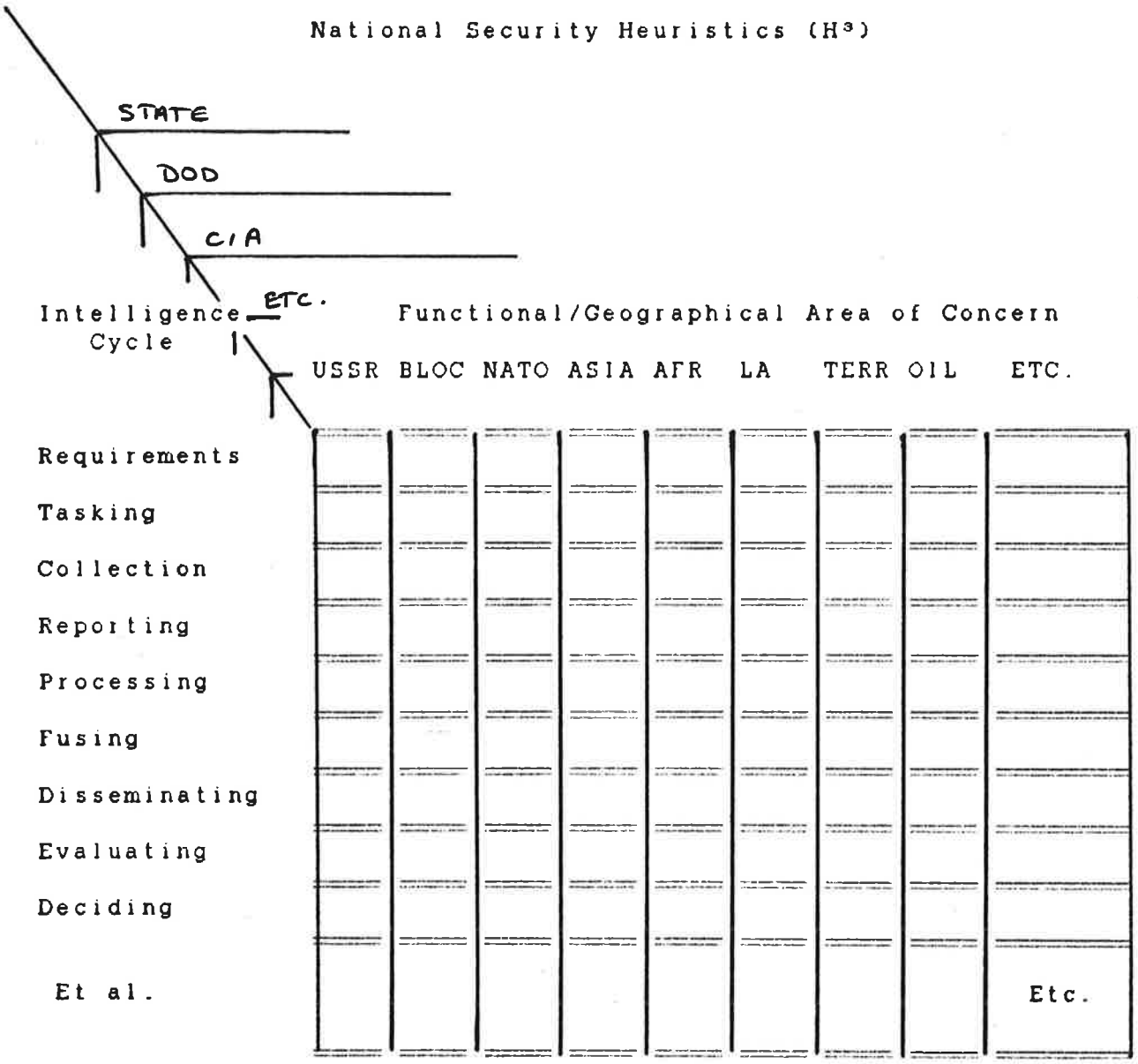
[36] A good review of this process is provided by Mike Freiling, Jim Alexander, Steve Messick, Steve Rehfuss, and Sheri Shulman, "Starting a Knowledge Engineering Project: A Step by Step Approach", The AI Magazine, Fall 1985, pp. 150-164.

[37] See for instance John P. Lovell, "The Idiom of National Security", Journal of Political and Military Sociology, 11, Spring 1983, pp. 35-51, in which he identifies five distinct sub-cultures within the national security community: technocrats, strategic supremacists, strategic pragmatists, strategic reformers, and Consciousness III reformers. See also Robert Jervis, Perceptions and Misperceptions in International Politics, Princeton: Princeton University Press, 1976.

[38] Herbert Simon, "Human Nature in Politics: The Dialogue of Psychology with Political Science", The American Political Science Review, 79:2, June 1985, pp. 293-304 is an outstanding review of the two principal theories of human rationality prevailing today, one related to cognitive psychology, the other to economics. His discussion of bounded rationality in relation to decision-making is a vital part of the theory of heuristics which is just beginning to develop.

National Security Heuristics (H^3)



Naturally there are different rules for each stage of the intelligence cycle, as there are different rules contingent on the functional or geographical arena within which the "expert" is operating. What complicates this matrix further is the fact that each agency has its own rules stemming from its organizational culture, and that even within agencies, and certainly between agencies, there is even another dimension, that reflected in the rules contingent on the level at which action is taking place- personal power politics (P^3), office politics, Mission politics, Departmental or agency politics, and NSC or inter-agency politics. We may find ourselves not just with H^3 but with H^4! The remainder of the paper will focus on this complex architecture and illustrations of how different heuristics affect data entry, integration, intepretation, and decision-shaping.

Heuristics and National Security

Heuristics, or "rules of thumb" which are largely experiential and enacted as if they were intuitive as opposed to logical and algorithmic, are critical to every facet of the intelligence cycle pursued by every U.S. official. These rules- whether acknowledged or not - guide the daily actions of our officers at home and overseas. These rules help them deal with uncertainty, and make decisions. [39]

There are six general areas in which the "heuristics" of foreign policy making can be studied at the level of the individual: data acquisition, data integration, data interpretation, decision-shaping, inter-agency heuristics, and decision-maker influencing (i.e. presenting a case to the President).[40]

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[39] Dina Berkeley and Patrick Humphreys, "Structuring Decision Problems and the 'Bias Heuristic'", Acta Psychologica 50, 1982, pp. 201-252.

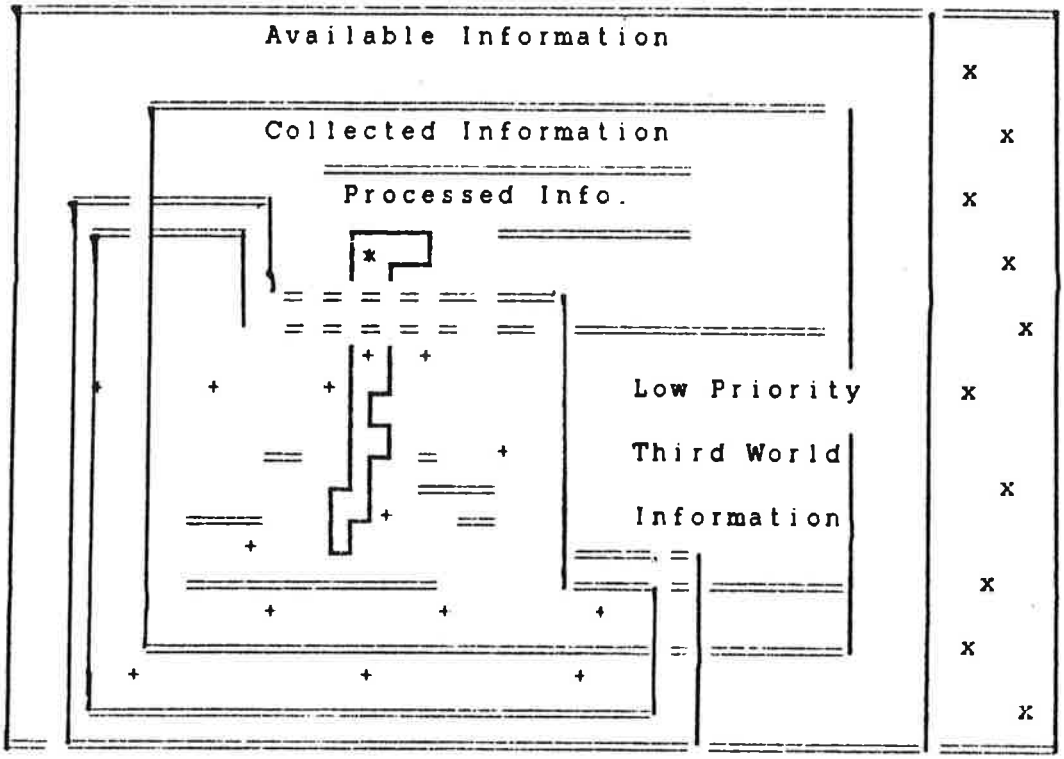
[40] This paper can not and does not attempt to review the outstanding efforts of others who have attempted to understand how foreign policy is "made". Among a number of classical works are Richard E. Neustadt's Presidential Power: The Politics of Leadership from FDR to Carter (New York: John Wiley, 1980); Francis E. Rourke's Bureaucracy and Foreign Policy (Baltimore: Johns Hopkins, 1972); David Davis's How the Bureaucracy Makes Foreign Policy: An Exchange Analysis (Lexington: Lexington Books, 1972), and I.M. Destler's Presidents, Bureaucrats, and Foreign Policy (Princeton: Princeton Univeristy Press, 1972). The only doctoral dissertation or publication which focuses exclusively on this important issue is that of Howard Y. Tamashiro, "Problem Solving Heuristics in International Politics", Ohio State University, 1981. Dr. Tamashiro's heuristics are reproduced in

Data Acquisition

The illustration on the next page is meant to highlight the problems facing a typical officer either overseas at ground level dealing with a foreign and largely public information domain in both print and audio-visual media, or in Washington and receiving a vast and never-ending collection of overt as well as covert informatio from different collection platforms.

Appendix III, and those of Thomas S. Bailey, from The Art of Diplomacy: The American Experience (New York: Appleton Century Crofts, 1968) are reproduced in Appendix IV. Both illustrate, on the one hand, the difficulty of isolating "rational" elements of the decision process, and the difficulty of developing generic "rules" applicable on a day to day basis.

Explosive Information in a Complex World



* Information actually delivered as "finished intelligence

\+ Information reaching decision maker in raw or finished form

x Information we are not able to obtain from protected sources

The above chart raises a number of questions which will be discussed in following sections but among which are:

-- Why are we collecting so much information that does not get processed and exploited by the decision maker?

-- Who is making the decisions as to what should be processed and how?

-- Who is making the decisions as to what reaches the decision makers, and how it is presented? In particular, who is allowing (or demanding) that so much raw and unprocessed information reach the decision makers?

-- How are decisions shaped within the office of the individual decision maker?

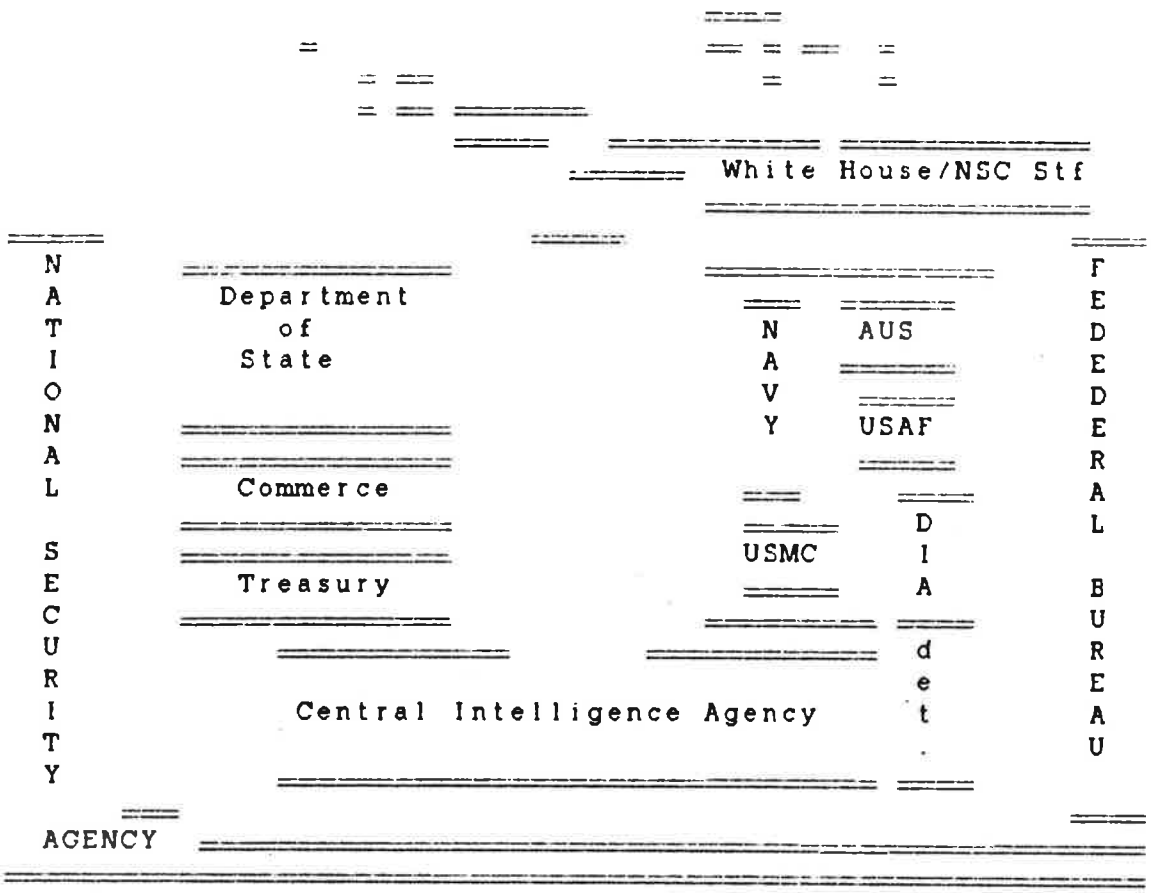
-- What impact do the different Agency cultures have on decision shaping and the intelligence cycle?

-- What "rules of the game" apply to efforts by individual national security actors to influence the ultimate decision makers, the President and Congress?

Data Integration

The problems of data integration were alluded to in earlier sections of this paper (pages 18-27). The chart on the next page illustrates the "spillage" and consequently the failure of the national security community to reduce uncertainty even when it has the information (somewhere) necessary to do so. Elements of the U.S. government have been collecting information in a relatively comprehensive and organized way (in so far as collection but not processing and even less so exploitation) since the end of World War II. Much of that data is useless, and the volume of data collected on a day to day basis is so overwhelming as to drown out with "noise" those clear but hidden tid-bits of strategic or tactical value.

Of Fiefdoms and Fragmentation



Without belaboring the point, there are two principal consequences of the fragmentation of national security data bases and collection management strategies:

-- We are wasting a great deal of money and even scarcer human resources collecting either the same thing over and over again, or marginally useful things

-- We are failing to exploit what we <u>do</u> collect as a government because the "missing links" are not evident and the pieces are not being pulled together at one central location

Data Interpretation

The previous illustration and earlier comment should make the following point self-explanatory: if everyone brings to bear a different paradigm and a whole different set of perspectives vis a vis their personal, tactical, and strategic missions, then, following the rule of "where you stand depends on where you sit", we find ourselves falling naturally into the position of the blind men "analyzing" the elephant: DIA is certain its foot is about to crush us, the FBI is all over the ear, the White House is wrapped up in the trunk, NSA is listening to its heartbeat, the CIA thinks its feces is a new form of biological warfare, and Commerce is developing a protective tarrif plan against the "curios" on the front end of whatever it is.

Decision Shaping & Inter-Agency Positions

These different perspectives will shape internal Agency decisions about how to present the information and what actions to recommend, and will also shape the strategies each Agency pursues to ensure that "it's" (assuredly correct) view prevails. This is nothing new to the literature on bureaucracy, and will not be belabored. The sections which follow will simply illustrate how the culture and the mind-set <u>drive</u> collection in such a way that the interpretation and resulting decisions are to a significant extent shaped at the data entry level and then

refined at every level thereafter.[41]

Influencing the President

There is no substitute for a reading of Morton Halperin's classic work, Bureaucratic Politics & Foreign Policy.[42] Following is a brief review of specific "rules of the game" he has outlined; they set the stage for understanding the distance between tactical data entry, integration, and interpretation, and the realities of decision-making at the highest levels:

1. Report only those facts that support the stand you are taking.

2. Structure reporting of information so that senior participants will see what you want them to see and not other information.

3. Do not report facts which show danger.

4. Prepare a careful and detailed study to present facts in what appears to be an authoritative manner and to discover new facts which may bolster your position.

5. Request a study from those who will give you the desired conclusion.

6. Keep away from senior participants those who might report facts one wishes to have suppressed.

7. Expose participants informally to those who

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[41] A useful unclassified overview is found in Walter Laquer's A World of Secrets: The Uses and Limits of Intelligence (New York: Basic Books, 1985). The classic series reviewing intelligence operations are those published by the Consortium for the Study of Intelligence on Intelligence Requirements for the 1980's, and include volumes on Elements of Intelligence, Cladenstine Collection, Covert Action, Counterintelligence, and Analysis and Estimates.

[42] Written with the assistance of Priscilla Clapp and Arnold Kanter, published by the Brookings Institution in 1974. A valuable adjunct to this reading is Stanley Hoffman's The Price of Power: Kissinger's Years in the Nixon White House, 1984.

hold correct views.

8. Get other governments to report facts which you believe will be valuable.

9. Advise other participants on what to say.

10. Circumvent formal channels.

11. Distort the facts if necessary (and you can get away with it).

It is worth noting that the President has certain rules he can apply to counter such strategies, but the rules must be forcefully and consistently applied - one speculates that in the press of business most Presidents are reluctant to "manage" their own time and information flow, and end up inevitably defaulting to their more ambitious staff. Still, some rules:

1. Instruct the White House staff to seek alternate sources of information on critical issues.

2. Create new channels of reliable information.

3. Surround yourself with divergent views.

4. Ask for the separate views of each advisor.

5. Encourage adversary procedures

6. Call middle-level officials and permit them to call.

7. Contact ambassadors directly.

8. Send representatives to the field.

9. Go outside the government.

It is much beyond the scope of this paper to consider the difficulties of implementation once a decision is reached. Halperin covers this well in two cahpters on "Decisions and Implementation" and "Actions in the Field", and there is an ample

literature on "implementation" as an area of public policy and public administration study.

Data Acquisition Hueristics

The reader should not expect a "learned" nor "logical" exposition - as will quickly become clear from the "rules" outlined below, the "way we do business" is haphazard at best, controlled only in isolated instances, and generally reliant on an over-all mood and poorly defined understanding at the individual level of "what is important. The "garbage can theory" of public administration[43], our propensity to "muddle through"[44], and "bounded rationality and the need to "satisfice"[45] all hold sway.

Data acquisition, for the officer in the field, appears to to break down into three main areas: what to intake or review in the first place, what to file for retention, and what to fuse

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[43] As developed by Michael D. Cohen, James D. March, and Johan P. Olsen in "A Garbage Can Model of Organizational Choice", Administrative Science Quarterly 17/1 (March 1972), pp. 1-25, and discussed in Charles Perrow, Complex Organizations: A Critical Essay (New York: Random House, 1986), pp. 135-139. For an excellent collection of presentations on this theory applied to command and control, see James D. March and Roger Weissinger-Baylon's Ambiguity and Command: Organizational Perspectives on Military Decision Making (White Plains: Pittman Publishing, Inc., 1986).

[44] Cf. Charles E. Lindbloom, "The Science of Muddling Through", Public Administration Review 1959, reprinted in Richard J. Stillman II, Public Administration: Concepts and Cases (Boston: Houghton Mifflin Company, 1983), pp. 238-249, and Allyn Morrow, "Mulling Over 'Muddling Through' Again", International Journal of Public Administration 3/4 (1981), pp. 483-508.

[45] Cf. Herbert Simon, "Human Nature in Politics: The Dialogue of Psychology with Political Science", in The American Political Science Review 79/2 (June 1985), pp. 293-304.

(i.e. what to follow up on and attempt to exploit).

"What to intake" appears to depend on just a few main rules, and a variety of subordinate rules:

-- What is being provided at one's desk without any additional effort?

-- What information is most easily scanned and digested?

-- What information "makes sense" in the context of one's personal background and position?

-- What is most easily available that meets the minimum need for information known to be of interest?

-- Is it an action item from Washington? From any other Embassy? From the Ambassador or Political Counselor?

-- Does it deal with perishable or time sensitive information?[46]

-- Is it in English or the local language?

-- Is it more than a day old?

-- Is is more than four pages long? (Or if an article in a newspaper, more than a quarter page?)

-- Is it something anyone else might already have seen and reported on?

-- Are any of the names immediately recognizable as local "players" or third country visitors of high-level interest?

-- Are any of the names <u>not</u> recognizable in text already selected as being of interest?

-- Can it safely be ignored?

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[46] The main problem, in my view, is that too frequently political officers become bogged down with material which is "time sensitive" <u>only</u> because in a few days no one will care and the information will be overtaken by events. In effect political officers are "competing" with the American press, and are at best two to three days ahead of the press.

-- Did the Political Counselor or First Secretary say anything on their way in this morning?

-- What outstanding requirements exist from the most recent staff meeting?

-- Have we not reported on the Ambassador's pet topics in the last ten days?

-- Is there enough left in one's personal representational allowance to take someone interesting to lunch?

-- Are there any decent cocktail or dinner invitations in the stack? Who is likely to attend?

-- Are there any Congressional delegations on their way in, and if so, what have they expressed interest in? Is there anyone on the delegation worth cultivating toward the day we return to Washington?

-- (If a bachelor) When was my last good date, who's out there that's single and attractive, and what kind of excuse can I invent so as to use representational money?

-- (If married) When was our last good party, will my spouse want to go to the trouble- even with the maid's help - and do I have enough in my representational allowance to get some potentially useful local contacts together and still invite American friends to a good time?

"What to file" is dependent on three general conditions:

-- The existence of a standard or well known filing structure (rare)[47]

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[47] It is worth STRESSING that each section, even sections belonging to the same State Department, maintain their own files and in general do not file to any kind of central reference point. Thus an officer in the political section coming across an item of information relevant to the commercial section is generally NOT going to pass that item on to the commercial section nor exploit on the basis that it "probably has already been covered". Between sections representing different agencies, for instance the Drug Enforcement Administration and the

-- Is the material directly pertinent to the individual officer's area of responsibility?[48]

-- Is the material about a personality known to be of general interest, or about a topic known to have a file?

-- Is the material likely to duplicate material already in the file (don't check, just guess).

-- Does the material include a recent photograph of personalities which could update the file?

-- Available clerical manpower (even rarer - an officer usually does his or her own filing or gives up on the FALSE assumption that there is a "record" copy being filed back in Washington)

-- Is the material something which will fit in one's personal files right at hand?

-- How far away are the general files?

-- Are the general files near the desk of an irritating or disliked officer one would prefer to avoid?

-- Is there any penalty likely to be imposed for NOT filing, assuming the responsibility can be

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political officer responsible for passively monitoring terrorism, it is HIGHLY UNLIKELY that relevant information will be passed between sections, and CERTAIN that most of the DEA information being reported back to DEA headquarters will never be retrievable by State Department officers even if they were to imagine its existence.

[48] In my limited experience most officers are so overworked that they can not afford to "be on the look-out" for anything other than what they are specifically responsible for. Even though each officer technically represents the Department as a whole (or the U.S. Government in the case of other agencies) and even though it is CERTAIN that officer will frequently encounter information likely to be of value to other officers responsible for other areas, in general it is too time consuming and too much trouble for officers to route miscellaneous reading to one another as a day to day routine.

attributed?[49]

-- A personal frame of reference which makes a particular tid-bit of information meaningful at that point in time.[50]

-- If information is in local language, is the officer fluent enough to understand nuances?[51]

-- Has the officer ever lived overseas as a

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[49] There is a widespread feeling among officers that anything that goes into official message traffic is being "filed back in Washington" and hence is retrievable "in a pinch". In fact, nothing is retrievable unless someone actually indexes terms or names in the message that would cause it to be retrieved, unless it is directed to a specific file AND someone on the other end has the time, or a computer spin search is directed. There is a distressing tendency on the part of most officers to not specify a particular file, and an equally disturbing tendency back in Washington to allow for "Country-General" files which are nothing more than organized wastebaskets.

[50] For an exhaustive review of rules associated with frames of reference, see Ph.D. diddertation by Howard Y. Tamashiro, "Problem-Solving Heuristics in International Politics", The Ohio State University, 1981. His heuristics are accurate; the focus of this paper is different, i.e. on the "mechanics" of processing information vice the "philosophy" or psychology of assessing and acting on that information. For another view of how national and personal histories influence the processing of day to day information througth the use of analogies, see Richard E. Neustadt and Ernest R. May, Thinking In Time: The Uses of History for Decision Makers, (New York: Free Press, 1986.

It merits emphasis that the single greatest shortcoming of the current filing and indexing practices of the U.S. government are that they are not comprehensive and are much to dependent on current priorities, hence do not lay the foundation for later retrieval of information which is not important at the time of filing, and crucial at a later time.

[51] The minimum qualification for service overseas is a 2 on a scale of 5 (native). In fact experience has demonstrated to the author that no less than a high three is needed to function in friendly, patient, and supportive company in a fairly structured environment, and that at least a four is needed to understand nuances in a fast-moving verbal situation, an advanced written political analysis, or a hostile or derisive atmosphere such as might frequently be encountered at Third World National Day celebrations or leftist political parties.

child?[82]

"What to fuse" in turn depends on:

-- Current priorities[83]

-- Personal memory of related items[84]

-- Practical payback in near real time[85]

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[82] There have been two disturbing trends in recent years:
a) The compensation and hardships have discouraged the best applicants - except for the most idealistic - and as a result instead of officers already fluent in at least one foreign language, with an advanced degree and several years of "real world experience" and at least some foreign travel behind them, the Department is recruiting people right out of college who have never been overseas and don't speak a foreign language. Inevitably they perpetuate the "naive American" stereotype until they have at least one tour behind them; and
b) Partly related to the above, there has been an effort to achieve demographic parity or "representation" of Middle America, with the result that more people from rural and slow moving environments, less polished and able to adapt to overseas stress, end up sitting at their desks unwilling to venture out. One officer, memorable for his sideburns and loud shirts, stands out as representative of the species.

[83] The more parochial the priority, the more likely it is to hold sway. Personal power politics (P^3) will be more influential than tactical requirements, which in turn will be more recognized than strategic requirements.

[84] The low burn times in all Embassies in the field (i.e. the reduction of locally held files to almost zero) has left officers in the field with nothing to work with but their personal experience. Given the tremendous bureaucratic intertia which constains the retransmittal of information to the field as needed, "institutional memory" is essentially defined by the personal memory of the person who has been in the field (or at a particular Washington office) for the longest - by and large this means no more than <u>three years</u> - the "institutional memory" of the U.S. government is AT BEST three years old on average.

[85] The bottom line will always be: what kind of recognition will the officer receive for a particular report? Right now there is so much emphasis on "current" reporting, and so little access in the field to historical or corrobative information, that much of the U.S. government's reporting has been reduced to nothing more that "situation reports" (SITREPS) of a journalistic

Data Integration Heuristics

If an officer decides to work with a datum that has been acquired, then the next series of decisions must revolve around how to integrate that datum with other data in order to develop meaningful information and ultimately - if lucky- intelligence.[ss]

Four general areas for decision and action are apparent:

-- What to look for

-- Who to ask

-- What to ask

-- How to ask

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source, and with little tactical analytical input. Even back in Washington, where analysts at least have some access to historical information, the same "current intel" ethic prevails, and people are rewarded for getting "day to day" items in the National Intelligence Daily (NID). Thoughtful analyses are either not recognized, or worse, politicized.

[ss] The value of "intelligence" has been steadily undermined as the number of "collectors" has increased and each agency, including the military services, have attempted to maintain autonomy in collection and analysis, while increasing their influence in the national security community. The result has been a proliferation of "intelligence reports" which are no more classified nor relevant to policy making than the local newspaper. Following are some definitions for this paper:

-- Data: Tid-bits of fact or speculation stemming from a particular source at a particular time. Can be public, private, or protected information. Can be verified or unverified.

-- Information: Data organized in context of a requirement, i.e. a combination of different data sources together with an officer's evaluation of the meaning of the data.

-- Intelligence: Information from a source with good access to protected information, of proven reliability, which is relevant to the expressed or perceived needs of the policy makers and which is obtained, processed, and disseminated in a timely fashion.

Deciding what to look for is heavily reliant on:

-- How familiar the officer is with information available within the Embassy

-- How familiar the officer is with information available from Washington (and even more remotely, from other agencies in Washington)

-- How experienced the officer is in general

-- How familiar the officer is with the interests of his or her immediate supervisors

-- How familiar the officer is with the host country and its leading personalities and institutions.

In general, given the politicization of Ambassadorial appointments, the increasing hardships overseas and the reluctance of more experienced officers to accept subordinate positions when earlier they might have been eligible for Ambassadorships, and the tendency of many junior officers to become disenchanted and leave the Department after five years or so, the over-all level of experience appears to be declining. A typical small Mission might have a politically appointed Ambassador, two experienced and two inexperienced Counselors of senior rank, and eight to fifteen junior officers on their first or at best their second tour.

This lack of general experience is significantly aggravated by the reduction of file holdings in all Embassies, by the limited time allowed for "overlap" between replacements, and by the shortness of tours (two to three years on average) - in effect an officer could arrive, have two weeks in which to quickly meet all his predecessor's replacements (and then in a rush not at regularly scheduled and more leisurely affairs) and

ask any questions that may come to mind. Having come directly to the Post from either home leave or another country, and had at best a few days consultations in Washington, the officer is simply not prepared! Following are a few gambits experienced officers think of:

-- "Intimate" tid-bits are always better than public research

-- The Ambassador's social secretary (usually a foreign national from elitist circles) knows everyone worth knowing

-- USIS officers know local newspaper reporters who not only have the dirt on everyone, but also have access to the local newspaper morgues

-- AID officers know the leading personalities in the rual areas and have a sense of terrain and public mood[87]

-- Consular officers have a great deal of "credit" in the local community, and have probably "facilitated" or "expedited" visas for the children or relatives of a number of "big wigs" in different circles

-- Commercial officers, but particularly the foreign national secretary in the commercial section, knows everyone that matters in the local Chamber of Commerce and Rotary Club

All of the above lead an experienced officer much beyond the limited Embassy file holdings and the sterile patterns of association of inexperienced predecessors, and answer naturally the question "who to ask". There is one additional rule that can

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[87] A real tragedy in today's Foreign Service is the loss of both funds and personal initiative which in the past saw young officers spending their week-ends in the hills, so to speak, getting to know the country. "Familiarization travel" is no longer affordable and most foreign countries are so expensive that private travel is not possible even if the time could be found. Officers' fluency is often inadequate to survival in a totally foreign environment, and there is a tendency for everyone to stay in the capital city on the grounds that "99% of the politics and economics takes place there".

be useful:

-- Always ask the opposition first[88]

What and how to ask are to a large degree dependent on both the local culture and the personality and position of both the officer doing the asking and the individual being asked, and will not be covered at length. A few general rules:

-- A brokered introduction is always better than a cold approach (e.g. a request for an interview)

-- If a brokered introduction is not possible, audacity does pay off and a U.S. Embassy officer can usually reach just about anybody

-- An initial social encounter should be used to break the ice, not gather information

-- Being seen with the Ambassador and Counselor pays off

-- Stay out of the visa business except for unusually important situations[89]

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[88] E.g., when interested in the Middle Eastern presence in connection with terrorism, start with leaders of the Jewish community. Be aware that they will report their conversation immediately to both the B'Nai Brith and most likely to Israeli intelligence, but they can provide a useful perspective and starting point. By the same token, when looking at the possibility that the Colombians are doing something odd, start with the Venezuelan Second Secretary - they've almost gone to war a couple of times. Obviously leftist political leaders will have a lot to say about National Guard violations of human rights, and the National Guard will be more than willing to talk about leftist political support for transitting revolutionaries (don't believe it - the Guard takes a cut for every transit).

[89] Being too free with visa assistance not only wastes an officer's time but earns them a reputation as an "easy mark" or in the Latin parlance, "a useful idiot". Even with the most important personalities, insist on confirming the nature of their request and its urgency - I remember vividly being duty officer and having another officer get me out of bed to issue four visas for the ranking general officer in Venezuela. When I insisted on speaking with the general, it turned out his family was not traveling until a week later!

Data Interpretation Heuristics

Data must be evaluated. The national security community is suffering from information "overload" and a large part of this problem stems from the indiscriminate entry of unevaluated data into the system. The Embassy officer can not control data that is captured from overhead platforms or through other technical means, but <u>does</u> have a responsibility for evaluating any data collected through conversations and the review of written or audio-visual materials. Four areas should be addressed:

-- The relevance of the datum

-- The source's access

-- The source's reliability

-- The weight of the datum in context

Again, the experience of the officer will play a significant part in determining how accurate his or her evaluation will be. Relevance is unfortunately determined not only by substantive meaning or correspondence to national level collection requirements[oo] but also by what is "timely".

A few rules:

[oo] Even though national collection requirements are routinely prepared and forwarded to all Embassies, the current process for identifying such requirements is so bureaucratic that they end up being massive "wish lists" and hence must be ignored in the field. Instead, the individual preferences of senior officers in-country, and direct agency to field expressions of interest, guide collection which is responsive. More seriously, "responsive" collection is minimal. In fact, most reporting stems simply from what is easily available and of current <u>popular</u> interest - our intelligence community is driven by current events and technical capabilities rather than national security priorities and refined "methods".

-- The more immediate the supervisor interested in the information, the higher the payback for doing the work - it is "relevant"

-- The more "classified" or protected the information appears to be, the more "relevant"

-- The more consistent the information is with existing preconceptions, the more "relevant" it is except when lots of it is available, it hangs together, and the Political Counselor's interest is aroused

-- Rank and position do not necessarily guarantee access and certainly not veracity

-- Family ties are important indicators of genuine access

-- The earlier in a relationship with a source that the source's political sponsors can be identified, the easier it will be to verify access

-- Forget about historical veracity; no one will remember a source's previous reporting and no one has time to check anyway

-- Disparities between an officer's rank and the rank of the source (as the source perceives it) will reduce the reliability of the information

-- The weight of the datum will be directly proportionate to the amount of already available information to which it can be attached

Decision-Shaping Heuristics

The literature on heuristics, such as it is (see note 35 on pages 44 and 45) has yet to deal with the "level of analysis" problem because it has focused entirely on the individual "domain" expert and thereby limited itself to relatively functional considerations. The heuristics cube illustrated on page is dominated by three functional dimensions:

-- Actions dictated by the intelligence cycle process

-- Targets dictated by the intelligence requirements process

-- Interpretations dictated by the agency concerned

In fact, based purely on personal observation (there no doubt are useful references available but none surfaced during the bibliographic research), there are five over-lapping and sometimes contradictory "frames of reference" within which individuals pursue the practice of foreign policy representation:[61]

-- Personal Power Politics (P^3)

-- Functional Officer Responsibilities

-- Mission Tactical Goals

-- Departmental Stategic Goals

-- National Grand Strategy

"Personal power politics" is the most fundamental. The

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[61] It merits comment that many officers do not have a substantive appreciation for their "mission". Personally I define it as a mixture of protecting national interests, projecting national values, and informing the American people via bureaucratic channels of international realities, but such "goals" are rarely expressed in any tangible form.

fitness reports of individual officers are written by their immediate supervisors and reviewed by the next senior officer. None of the officer's reporting or their personal accomplishments as are brought to the Department's attention through official traffic will have anything to do with whether or not they are promoted. Unfortunately, the job descriptions and the "precepts" which are clearly required and/or prescribed by Department regulation rarely have anything to do with an officer's actual assignment or evaluation. An officer assigned to London for a specific requirement could on arrival be given an entirely different assignment, and have almost no choice in the matter. Hence, the bottom line is that to succeed, most officers must do precisely what their immediate supervisor - however incompetent or biased - desires, and must compete on a day to day basis with other similarly situated individuals.

Functional office responsibilities correspond in some ways to "generic" management: the Department, for instance, is divided into the political, economic, consular, and administrative cones, and each cone has its "standards" for reporting, its expectations, its protocols. To a lesser extent, any officer's educational background may influence their perspective, but in general the "tone" and "culture" of the cone (or agency if not from the Department but from another agency such as Drug Enforcement) will influence what "rules" are applied and how they are applied.

Mission (tactical) goals depend to a large degree on the

current situation in-country, and the preferences of the Ambassador. El Salvador under Ambassador White (who understood the danger represented by an uncontrolled extreme right favored by a naive Republican administration) required completely different activities than were encouraged subsequently. The "rules of the game" changed considerably five years into the Reagan administration when they realized Ambassador White had been correct and started "getting tough" by sending Ambassador Walthers down to threaten a withdrawal of support in light of human rights violations.

Departmental (strategic) goals have a very strong tendency to bias reporting. As terrorism and narcotics receive more emphasis, a vicious loop develops: a "correct" report is praised, leading to "more of the same". The "body counts" of Viet-Nam have been replaced by equally distorted "poppy counts" in those countries with a narcotics reporting responsibility, and local "successes" against narcotics traffickers and harvests quickly become inflated. Departmental reporting (including particularly the military services) is <u>ammunition</u> in the Congressional budget games and in vying for the attention of the President. Requests for "background" from the Department on any given topic will yield the "party line" rather than consolidated information from different agencies, compounding the trend toward mirror reporting.

Finally, we come to National Grand Strategy, another way of saying "the individual's perception of his or her duty as God

game him (her) the light to see it". Individuals will do things against their personal interest, against the Ambassador's expressed desires, against the Department's expressed direction, all in the name of "national grand strategy". It does not happen often, and the individual usually gets hurt because they did not have the whole picture[ee], but sometimes a single person can have a far reaching impact on foreign policy. Daniel Ellsberg and the Pentagon Papers come to mind, and George Kennan's "X" article provides a historical precedent which William Smith tried to emulate with limited success with regards to our Cuban policy.

These five "frames of reference" convert our heuristics cube into a multi-dimensional octagon, and therin lies the complexity and the challenge of knowledge engineering in the national security arena....a challenge which will not be met unless certain strategic initiatives are undertaken as soon as possible.

[ee] This can even happen to the Secretary of State! Halperin, cited earlier, noted that the Secretary of State made remarks in Japan which severely hampered Kissinger's secret negotiations with the Communist Chinese - the Secretary of State was not privy to the fact or the substance of those secret negotiations!!!

Recommendations for the President

A. Establish a national Office of Information Technology

We need to quickly establish a national Office of Information Technology (OIT) equivalent in stature to the Office of Management and the Budget (OMB) and, in security/interagency respect, to the National Security Agency (NSA). This office should be charged with all U.S. government telecommunications, data processing, and office automation systems development and maintenance - not including Department of Defense C³ systems, but establishing interoperability standards encompassing DOD, and also including all military elements specifically subordinate to an Ambassador, such as Defense Attaches and Military Assistance Groups. We urgently need a decision at the NSC level, based on recommendations from such an office, regarding the development and acquisition of information technology which will eventually put a personal terminal on the desk of every officer[aa] both in Washington and overseas, and which will allow for multiple levels of access and interagency compartmentation as required. The same decision should direct the creation of a global data base which at a minimum cross-references all mention of specific individuals, sites, and other discrete elements, and which will permit both classified electronic mail and artificial intelligence applications.

The OIT should contain four Centers or Bureaus:

[aa] Not just political, military, and intelligence officers, but <u>all</u> serving officers in the national security community, including the Departments of Commerce, Treasury, etcetera.

-- A Center for Information Management & Security

-- A Center for National Security Heuristics

-- A Center for Reserach & Development

The first must focus on such things as common reporting formats and data bases, vital prerequisites to strategic and tactical effectiveness. As outlined earlier, some serious "choke points" and distorting elements exist in the Mission reports structure; taken together they essentially cut in half the amount of usable, retrievable information which is available to the national security community as a whole. The most serious deficiency relates to the amount of information which never reaches Washington or other agencies - the kind of information put on note cards or in hard-copy memorandums at Post, or, as commonly happens, the kind of information sent back in a single-copy memorandum for the desk so as to avoid the need for interagency dissemination either at Post or in Washington. The plethora of data bases is also a serious impediment to effectiveness - besides notecards and hard-copy files which are unlikely to be fully duplicated in Washington, there are microfiche, diskette, hard disk, and human memory banks in every section of every Mission as well as in each of the different agency offices. Even in the case of terrorism, with strong direction from the highest levels of government, there is no way we can be effective so long as this morass of unexploitable or unreported information is our baseline.

The Center for National Security Heuristics must be

established in recognition both of the increasing scarcity of human resources, and the increasing complexity of the international arena. A long term effort must begin immediately to identify, debrief, and consequently develop expert sytems replicative of the "experts" acknowledged as essential to the conduct of coherent and consistent foreign policy through the changes of administration and the passing out of the "old school".

The Center for Research & Development must move aggressively to incorporate the unsuccessful but still important elements of both the General Services Administration and the Office of Management and the Budget which ahve been responsible for "managing" Federal information technology. Working closely with the National Bureau of Standards and the Information Resource Management offices of the various agencies of national security community, including DARPA and the individual military services, this Center should immediately establish a clearinghouse for information about different information technology products, and establish three inter-agency working groups for Requirements, Standards, and Architectures.

B. University of the Republic

No effort to consolidate or integrate information is going to be successful unless there is a standard of training and a universal "operational code", "idiom", or "paradigm" prevalent across agency boundaries and known to each individual serving in a national security capacity.

The perspectives and background experiences which our diverse agency representatives take with them to their overseas assignments and/or draw upon during their Washington assignments are so foreign from one agency to another as to impede coordinated action and collegial sharing. For the same reasons that a restructuring of the Joint Chiefs of Staff is now taking place, we need to consider initiatives which will help bond our national security/foreign affairs community together. One such initiative could be the establishment of a University of the Republic with a Center for National Security Studies, responsible for coordinating classified programs of instruction (POI) for all civilian and military organizations. This may be the only way a coherent national framework for judgement and action will be established, through the standardization and integration of POIs to the point that they complement rather than contradict or distort one another. This Center could also take as its goal the development of an advanced degree program in national security administration which draws on the existing and excellent resources of the academic community in the Washington area. The curriculum could combine unclassified study with classified instruction with the result that individuals could receive programs tailored to their specific agency while at the same time acquiring the broader perspectives essential to the needs of the national security community and the government as a whole.

C. National Security Corps

Finally, given integrated tools and integrated training, it

only remains to establish one other fundamental, integrated personnel. While each agency should retain its functional and cultural identity, it will not be possible to establish inter-agency and inter-disciplinary data bases unless all personnel dealing with those data bases share a common (highest denominator) security clearance baseline. Cross-clearances and investigations are essential prerequisites to interagency success in this complex and fast-moving world. We can not expect agencies dealing with highly sensitive information to be fully forthcoming with agencies whose personnel do not receive adequate security clearances with investigations and polygraphs appropriate to their degree of access. While there may be some justification for not administering the polygraph examination to the most senior appointed officials, there is every reason to believe that the polygraph is a uniquely effective means of protecting our national interests, and is a resource which should be applied across the board. By the same token, agencies with differing standards in their selection of personnel for overseas assignments can hardly be expected to deal with one another on an equal basis. The military will continue to suffer within the Mission so long as its intelligence branches - responsible for the handling of Defense Attaches - remain "second class" citizens in comparison to the more respected "line" occupational specialties, and so long as the promotion panels continue to denigrate "one of one" tours as being out of the mainstream.

Conclusion

The National Security Community is beset by severe challenges in terms of manpower, organizational constraints on information management and operational coordination, and demands from a complex, rapidly changing, and increasingly hostile or unstable global environment.

The impact of these challenges is multiplied many times over by a further challenge: the information explosion. Responsible decision-making at the highest levels will be increasingly impossible unless drastic actions are begun immediately to enhance the ability of the member agencies comprising the National Security Council (NSC) to collect, process, disseminate, evaluate, and act upon the almost infinite range of essential elements of information (EEI) required to understand and cope with the modern international arena - and do so in a coordinated fashion allowing for near-real-time inter-agency cuing.

The potential of artificial or machine intelligence technologies - and in particular vision, speech, understanding, and very large data base technologies as well as expert systems- is discussed, and a lengthy examination of national security heuristics has been outlined, with attention to and specific examples of data acquisition, data interpretation, and decision-making heuristics relevant to national security.

The paper has concluded with recommendations for the establishment of a national Office of Information Technology, a

University of the Republic, and the consolidation of a National Security Corps. While focused primarily on the urgent need to exploit existing and potential technologies in order to make the human actors with their limited cognitive capabilities at least relatively "competent" in the face of the reviewed challenges, the paper has also stressed the impact of "order of magnitude" challenges and changes: the national security community must face the fact that fundamental changes must be made in its character and structure if information is to be managed effectively, and this dictates fundamental changes in the character and inter-relationships at all levels of personnel responsible for national security matters.[64]

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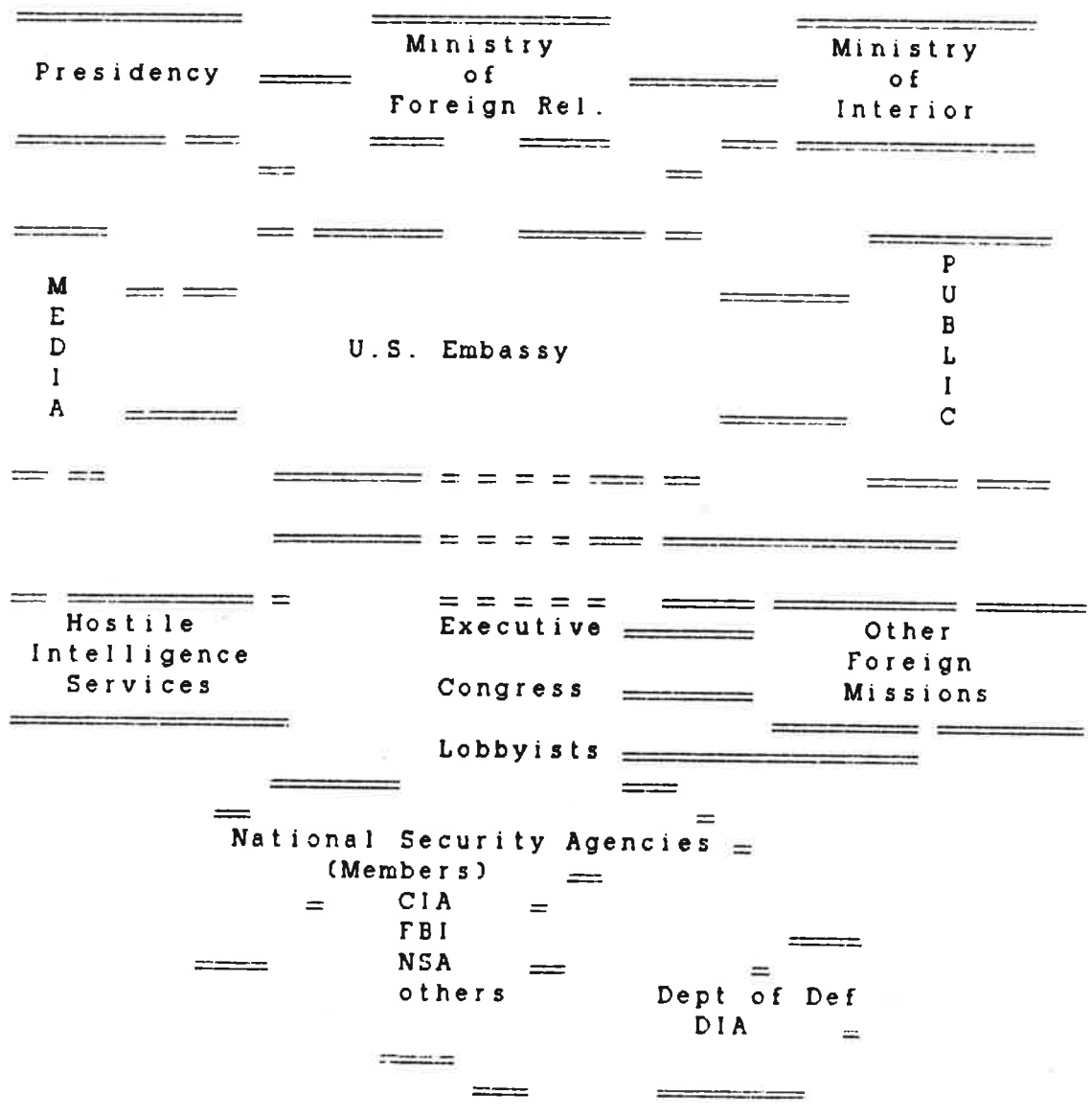
[64] Just in: Stephen J. Cimbala (ed.), Artificial Intelligence and National Security (Lexington: Lexington Books, 1987).

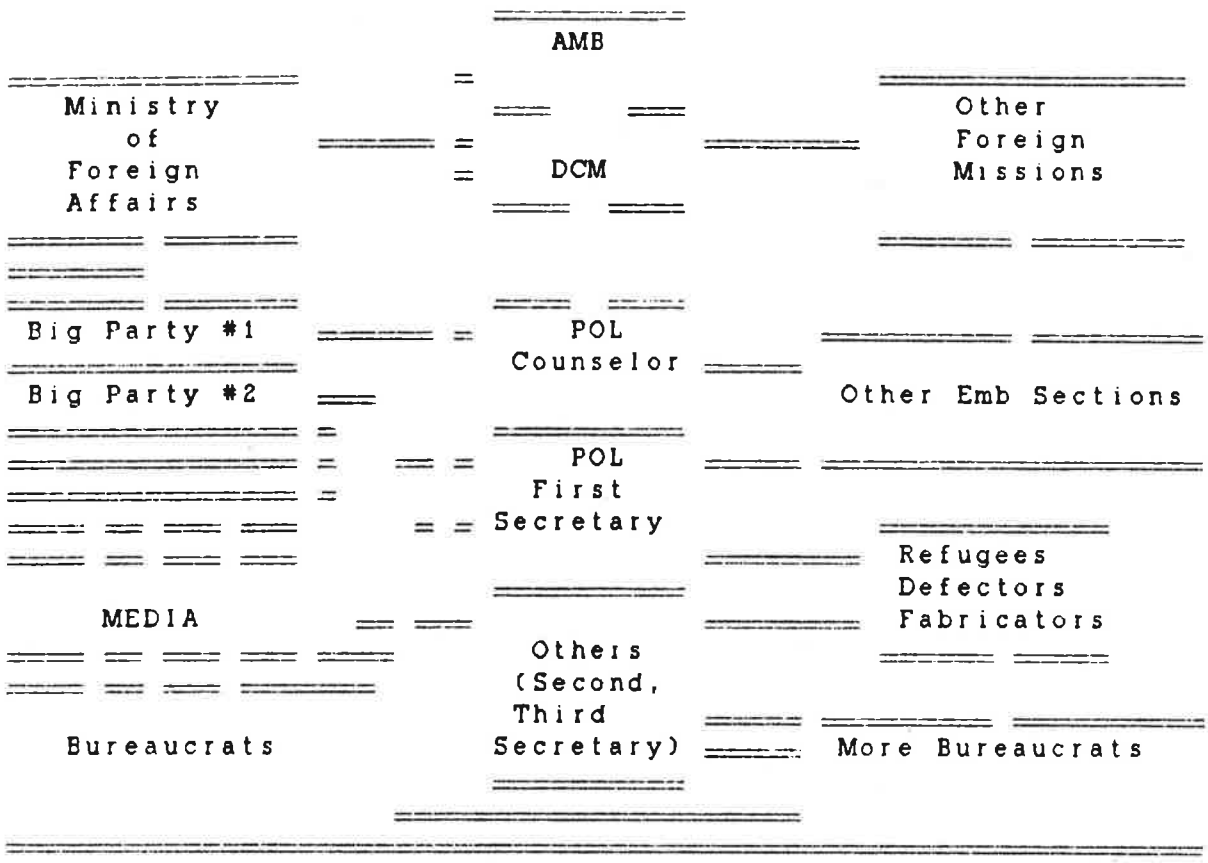
APPENDIX I: High Level Structured Analysis of a Mission

High Level View of the Embassy In Country



The above is simply an illustration of the kinds of institutions and "information generators" and "information consumers" a typical U.S. Embassy must contend with.

High Level View of One (Political) Section



The above is a very simplistic illustration. There are very few things within an Embassy that the Political section does not get involved in - influential citizens interested in visas, U.S. businessmen hoping for local leverage, CONGRESSIONAL DELEGATIONS and all of the people in all walks of life they think they want to see....

APPENDIX II: Moments in the Life of a Political Officer

A political officer overseas typically spends at least fifty per cent of his time reading - newspapers, books, directories, official correspondence, inter-agency messages of varying classifications - and perhaps twenty per cent of his time listening - to the radio, television commentators, and speakers at University, cultural, or political gatherings. Only thirty per cent of his day, if that, is spent "engaged" in political activity, that is, in interactive encounters with key political leaders or local commentators able to contribute information or views of interest to the U.S. Government.

In short, approximately seventy per cent of an officer's time is occupied by a relatively passive but fundamental and time-consuming activity: the processing of information from inanimate or remote sources. The purpose of the material which follows is to illustrate how the application of artificial intelligence, in the form an expert system and the heuristics therein, could result in a significant conservation of all too scarce manpower, while at the same time providing for a significant enhancement of each officer's capabilities.

FIGURE A is a constructive extract from a Panamanian newspaper, reporting an item of interest to the political section.

FIGURE A: A NEWSPAPER LEAD

La Prensa 1 Nov 85 (Bogota). Gabriel Garcia Marquez announced today that he had accepted an invitation from the Communist Party of Panama (PCP) to attend ceremonies commemorating the death of Alfonso Martinez Cuenca, former Secretary-General of the PCP. Garcia will be accompanied by his close personal friend Nelly Sarmiento, a militant in the Colombian Liberal Party (PLC), and several members of the Solidarity Committee for Revolution in Central America (CSRCA).

From Panama Dr. Nils Castro Herrera, Secretary-General of the Popular Revolutionary Party (PRP) announced that a march would be held on 10 Nov 85 at the Plaza Gabriel, to honor the great Colombian poet. Graham Greene, intimate friend of the leader of the revolution, General Omar Torrijos, will attend.

A political officer responsible to the Ambassador (via the Political Counselor, but pretty much on his own and directly accountable to the Ambassador for the quality of his effort) for tracking communist and revolutionary activity in Panama would have some fairly elementary homework to do (assuming he noticed the article in the first place), particularly if he were new to the Post. Among he question he would have to be able to answer:

-- Who are each of the individuals named? What are their past records of political activity and with whom do they associate with in Panama?

-- What are each of the groups named? What are their past records of political activity, who are their leading members, and what ties do they have to other communist or revolutionary groups in the region?

-- Where is the Plaza Gabriel?

-- Is Graham Greene a U.S. citizen? If still a British subject, does the Second Secretary at the British Embassy have any comment on why Greene has been invited?

-- What else is happening in Panama that week? In particular, what does USIS have planned that could off-set the communist celebrations, and what if anything does the U.S. Southern Command (USSOUTHCOM) have planned that might spark an incident?

The above fragment of public information sets in motion a lengthy and time-consuming process of information collection and

processing. At a minimum the officer must review any available biographic material on each of the individuals named, must review files on each of the local political groups, and must check the city map (in conjunction with the Regional Security Officer (RSO)) to determine if Plaza Gabriel is near any U.S. government installation or popular Embassy neighborhood. Depending on what the officer finds in this first cut review, he may or may not need to pursue additional sources, such as local inter-agency checks, Washington inter-agency checks, or correspondence with the Embassy in Bogota. FIGURE B is a constructive page from the file on Gabriel Garcia Marquez.

FIGURE B: GARCIA FILE

MEMCON dtd 23 Feb 83

During a routine lunch today with Captain Federico Martinez Sosa, personal aide to Colonel Manuel Noriega Perez, he let slip (after our fourth Scotch) that Gabriel Garcia Marquez secretly visited Panama last month to deliver a personal message to Noriega's boss, General Felipe Agreda Saenz. According to Martinez, Garcia offered Agreda a personal gift of one million dollars on behalf of the M-19 as a token of their esteem and in essence to ensure the continued free passage of drugs for arms and vice versa. (Comment: Martinez seemed scornful of the amount, and hinted that although Agreda had taken the money, he might still impose a slow-down on traffic pending a more "suitable" gift.)

We now have a whole different ball game. With the Vice-President being chairman of <u>two</u> different task forces - against narcotics and terrorism - the mere association of a "terrorist" group (the M-19) with Garcia's name requires a much lengthier process of investigation and follow-up. Every name associated with his visit should be run down and made a matter of record. Other sections of the Embassy must be tasked to report on the

visit, and in particular to report - in advance if possible - any of their contacts expected to participate in activities related to the visit. This will require at least one and possibly two memos, and a message to Washington and Bogota one the initial local reports are in. Still, the whole picture is not here; FIGURE C is an extract from an old file on various Sarmientos.

FIGURE C: SARMIENTO FILE

IMMEDIATE WASHINGTON INFO PRIORITY PANAMA DTG030984Z0922

LOCAL OFFICIAL JUAN ALBERTO PICCO DE LA GRACIAS (PROTECT) HAS JUST ADVISED RSO THAT ONE NELLY SARMIENTO AKA "GUAPA WAS A LEADING MEMBER OF THE GROUP WHICH EXPLODED BOMB OUTSIDE EMBASSY COMPOUND 010984. HER CAR WAS FOUND ABANDONED FOUR BLOCKS FROM EMBASSY, AND SHE APPEARS TO HAVE FLED, ACCORDING TO SOURCE'S UNIDENTIFIED CONTACT AT INTERNATIONAL AIRPORT, TO PANAMA. NFI.

Now what? There is nothing we can do to interfere with her travel; obviously she is "protected" in Colombia and being allowed to travel openly. The original report may be in error. However, there is such a strong interest in this kind of thing, we should probably refer her pending visit to the appropriate Embassy sections, and let them pursue the matter. This will require a memorandum to make sure our referral is a matter of record.

What about the different groups and their members? This might be an excellent opportunity to update the Embassy's "book" on local communists with ties to revolutionary groups in Central America and the region. Initially the officer will have to chart the names that <u>are</u> known - really a variation of citation analysis, applied to politics. This is tedious work that can only be done at this point through a manual review of a wide

variety of personality and subject files. It basically requires two types of links: between the individuals themselves, and between the groups they are affiliated with; eventually, inherited links will be established. Any member of Sarmiento's circle is suspect by association, and might lead to local personalities not previously known to be supportive of arms or drug trafficking. This information in turn can be passed to the Consular section, which will watchlist such individuals to provide for an alert in the event they apply for a U.S. visa.

Now to illustrate the "heuristics" that were applied:

FIGURE A

-- If "communist" or "left" appear in article, note all names and places and events

-- From all articles isolated for follow-up, check all names against existing files

-- From all articles isolated for follow-up, check all places against map of U.S. installations

-- From all articles isolated for follow-up, check all dates against calendar of U.S. events

FIGURE B

-- If "terror" or "narco" are associated with any names isolated for follow-up, alert all pertinent sections of names and related information

-- If "terror" associated with any names isolated for follow-up and if local visit planned, prepare alert memoranda

FIGURE C

-- If "terror" associated with any name isolated for follow-up and travel is public knowledge, assume no action can be taken but obtain decision from Ambassador regarding alert to local authorities

-- If it's noontime and you haven't eaten, go to lunch

Assuming that such print media has been entered into a large data base, there is some serious potential for AI expert systems to assist in the processing of routine information. The application of heuristics should not be confused with routine flagword routing. Naturally the "rules" applied to a particular fragment of information are much more complex than the ones roughly laid out above; decisions are being made as to whether or not to pursue additional information, about where to look for the additional information, and about what to do with the collated information once acquired. It bears mention that even advertisements and obituaries can be exploited by a "smart" data system, in the first case offering particular officers an opportunity to meet people of high interest, in the second case offering a trigger for an automated trimming of the data base by removing related information to a remote site.

APPENDIX III: Problem-Solving Heuristics in International Politics by Howard Yukio Tamashiro[1]
printprt

Frame Finding Heuristics

A. Strategies Using Cues to Suggest Opening Problem-Solving Moves

1) Task guidance via cue saliency - focus on cues to find problem-solving steps. If one's environment has referenced or responded to a particular cue, then consider any task involving that cue.

2) Problem-solving guidance from "near-misses" or partial successes - focus on cues that were recently referenced and connected with earlier, promising, problem-solving attempts. Search for entities related to or resembling these cues (e.g. either generalizations or specializations) and reattempt the problem-solving activity.

3) Generating cues for identifying primary subtasks in a problem and estimating the difficulty of attainment (the "wishful thinking" heuristic) - assume the problem has been solved and ask what necessary conditions must be satisfied as a consequence.

4) Working backwards - start from your objective and try to determine preceding steps, which, when taken together, will produce that goal.

5) Frame selection by contradiction avoidance - given a set of alternative perspectives and a contradiction, select the perspective that eliminates the contradiction.

B. Strategies for Assigning Saliency to a Concept

1) Saliency by frequency of interesting appearances - a concept or event is interesting if referenced in several, interesting conjectures.

2) Saliency by surprise - a concept is interesting if it is related in a rare or surprising way to another concept that arose in a very different way.

3) Saliency by analogy - a concept is interesting if it is linked analogically to another concept of great interest.

4) Saliency of an analogy - an analogy is interesting if it associates two concepts, each having many conjectures, many examples, and high interest.

5) Saliency by inconspicuous uniqueness - an entity is interesting if it is an example of some larger class, but lacks those distinctive, interesting features often associated with that class.

6) Saliency from boundary conditions - the boundary of a concept consists of all items that barely fall into or barely miss satisfying the definition of that concept. Accordingly, an item is interesting if it falls on the boundary of one or more interesting concepts.

7) Saliency by processing efficiency - an item is interesting with respect to some operation if that item can be processed extraordinarily efficiently while other items cannot.

8) Saliency by exception - an item is interesting if it meets a rarely satisfied condition.

9) Saliency by association - a concept is interesting if it is closely related to another, very interesting concept.

10) Saliency by extremes - a concept is interesting if its extreme values or special cases are interesting.

11) Saliency bestowed by patterns - all key concepts associated with patterns or regularities are interesting.

12) Saliency by compatibility - when comparing two choices, all common dimensions are given greater, relative weight.

13) Saliency from generalization or specialization - a concept is interesting if its generalizations or specializations turn out to be unexpectedly interesting. Further, if a concept has an interesting property lacked by one os its specializations (or generalizations), then both the concept and its specialization (or generalization) become more interesting.

14) Saliency by equivalence - if two, seemingly unconnected concepts turn out to be equivalent, then they are both interesting.

15) Saliency criteria for actions - an action or policy is interesting if:

a) it preserves interesting properties

b) it eliminates undesirable properties

c) it creates new, interesting properties

d) its initial conditions (starting points) are interesting

e) it is of recent origin, or

f) other, interesting actions exist having the same initial conditions or consequences.

Frame Altering Heuristics

A. Strategies for Generating Examples

1) Examples extracted from mappings - to find examples of a concept, consider maps related to the concept.

2) Examples extracted from specialization - to find examples of a concept, specialize the concept by adding new constraints or conditions, and then look for examples of that new specialization.

3) Examples extracted from generalization - to find examples of a concept, generalize the concept by removing constraints or conditions, and then look for examples of that new generalization.

4) Examples by association - given an example of a concept, examine other, closely related variation of your example. They too may be useful examples of the original concept.

5) Examples from extremes - to find examples of a concept, consider all extreme cases of that concept.

6) Examples from boundary conditions - examine all entities near the boundaries of a concept for examples.

7) Examples by instantiation - given a proposition, instantiate its variables to find examples.

B. Strategies for Modifying Problem Formulations

1) Using special case examples to clarify a problem - consider the special conditions, constraints, specifications, or other properties contained in a particular example. Try using these properties: a) to illuminate important, but perhaps too abstractly formulated, portions of a problem, b) to explore boundary conditions, focal points, or extreme conditions within the problem's context, c) to identify the problem's domain of applicability, or d) to identify modal, "garden variety" situations within the problem context.

2) Using special case examples to partition a problem - consider the special conditions, constraints, or specifications a particular example might possess. Try forming a subproblem by introducing these special features into the original problem formulation.

3) Using examples to check for equivalence - assume you have some concept and a specialization of that concept. Further, assume all examples of the concept are also examples of the specialization. Then, conjecture that the conjecture that the concept and its specialization are equivalent. Check this conjecture when new boundary examples of the original concept are found.

4) Using "example-derived" patterns or saliencies to generate conjectures - try conjecturing from any patterns or saliencies observed from a few examples, and test the conjecture with later, incoming examples.

5) Using examples to patch-up falsified conjectures - if a universally quantified conjecture (i.e. a conjecture dealing with all elements of a given set as opposed to a conjecture dealing merely with the existence of a particular element) is falsified by some instance, try to find some pattern in these counter-examples. If some regularity does exist, try to restate the conjecture so as to exclude these "patterned" counter-examples.

6) Conjectures suggested by conceptual specializations/ generalizations - if no substantive connection is known between two concepts but they both are specializations or generalizations of some other, core idea, then try finding some conjecture tying both concepts together.

7) Conjecture formulation by analogy - given a particular analogy connecting two sets of concepts, one set filled with interesting conjectures, the other set less so, then, using the conjectures in the first set, consider the analogous conjectures in the second set.

8) The "missing piece" conjecture - given a set (e.g. propositions, concepts, etcetera) defining the conditions of a problem, assume this set is incomplete. Expand it in various ways, discovering what new "givens" might be useful for solving the problem.

9) Problem modification via simplification - try the relaxing specifications on a problem. The simplified form may be easier to solve and may provide insights leading to the solution of the original problem.

10) Analogy extension - given an analogy between two

concepts, search for analogies between their specifications or generalizations.

11) Action expansion and reduction - given some action of policy, try enlarging or shrinking the "pre-policy" domain to be processed without changing the nature of the action itself.

12) Examining action inverses - if the outcomes or some action or policy are salient, then consider "counteractions" that might undo those salient outcomes.

13) Projecting intentions - in the absence of contrary information, resolve ambiguities by assuming the actions of others are intentional; further, assume others will also resolve their perceptual ambiguities by imputing intentionality.

14) Checking for analogical changes - given some map M associating two collections of elements, see if changes (e.g. conceptual changes, physical changes, representational changes, functional changes, etcetera) in one collection are naturally associated with changes in the other. Sometimes changes in on collection will be analogous to changes in the other where the original map M represents the analogy.

C. Estimation Strategies

1) Probability estimation via "representativeness" - the closer event A resembles a class or process, the higher the confidence or probability estimate that A belongs to, originates from, or is generated by B.

2) Probability estimation via "availability" - the greater the ease with which instances of an event are imagined or remembered, the higher the probability estimate for the occurrence of that event.

3) Anchoring the adjustment - select a natural or salient starting point as a first approximation to some judgement (the anchor). Then, adjust the anchor as new information is received and integrated.

4) Estimating drawn from outcomes - when faced with the problem of evaluating an action, estimate first the outcomes of that action for all salient elements (e.g. elements that are boundary values, external, interesting, etcetera).

D. Strategies for Selection Between Alternatives

1) Optimization - select the option that satisfies one's maximal acceptance criteria.

2) Satisficing - select the first option that satisfies one's minimal acceptance criteria.

3) Elimination by aspects - eliminate all options that fail to satisfy one or more acceptance criteria.

4) Historical selection criteria - select or reject options based on your knowledge of precedents. In particular, a) reject all options that resemble unacceptable options chosen in the past (past-oriented elimination) and b) select the option that most resembles relevant, acceptable options chosen in the past (past-oriented selection).

5) Ordering options - given several options: a) if their ordering is critical (i.e. using one particular option forecloses the use of some others later), then first use those options that foreclose the least number of other options (the "LBJ" heuristic), or b) if their ordering is not critical, arrange them by frequency of successful use, with the most useful option first.

E. Strategies for Diagnosing Unpromising Searches

1) Generating useless, circular results - abandon any search that produces recurring patterns of failure without any sense of progress or promise of imminent breakthroughs.

2) The absence of useful relations, concepts, or intermediate results - abandon any search that does not produce useful, intermediate concepts or results.

3) The absence of useful problem reformulations - set aside any problem that does not appear to have tractable reformulations.

4) Time pressure - abandon any search that cannot be solved in a timely fashion.

5) Unpromising problem decompositions - set aside any problem that cannot be simplified by decomposition.

6) The "bare cupboard" heuristic - abandon any search that produces only unsatisfactory alternatives.

7) The "contradiction" heuristic - abandon any search or problem formulation that reveals contradictions between its working assumptions and its goals.

Frame Fixing Heuristics

A. Strategies for Deflecting Contradictions

1) Resolution by frame embedding - resolve a contradiction by: a) containing it within a limited context, and b) showing how the contradiction's force is nullified by considering larger contexts.

2) Evasion by shifting frame brackets - avoid a contradiction by setting a frame's scope in a fashion that either excludes the contradiction or includes some much as to "dilute" the contradiction's force (e.g. by the addition or removal of constraints, variables, alternatives, rules, conventions, modes of interpretation, etcetera).

3) Containment by "residual categorization" - placing contradictions in "residual categories" where they need not be addressed further.

4) Avoidance by cue saliency - avoiding contradictions by avoiding any tasks that might bring them to one's attention. In particular, if a cue has led to some contradiction in the past, then lower the priority of any task involving that cue in the future.

B. Strategies of Frame Reinforcement

1) The "no choice" ploy - arguing no viable alternatives exist, or stressing the great risks of switching to another frame, if one exists.

2) Decontextualizing - narrowing a frame's scope or denuding it of contextual elements so that cognitive freedom is constrained.

3) Cognitive bolstering - psychologically reinforce a favored frame by: a) exaggerating favorable consequences, b) minimizing unfavorable consequences, c) denying aversive feelings, d) exaggerating the remoteness of costs, e) minimizing social surveillance, f) minimizing personal responsibility, and g) altering goals.

4) Concreteness - using particularistic information explicitly received from external (and often functional and graphic) sources and only in the form in which it is received. Any additional information that might be inferred, abstracted, generalized, or transformed is either discounted or ignored.

5) Causation and correlation - tying elements of a frame by some causal or correlational nexus to promote a sense of coherence and consistency.

6) Inoculation - exposure to preparatory information and

reassurances designed to increase tolerance for setbacks and stress after some decision has been made.

1. Howard Yukio Tamashiro, "Problem-Solving Heuristics in International Politics" (Ph.D. Dissertation, Ohio Station University, 1981).

APPENDIX IV: 267 Maxims for Diplomacy by Thomas Bailey[1]

1.0.00 PERSONNEL PROBLEMS

1.1.00 The Role of the President

1.1.01 The President Should Provide Leadership
1.1.02 Leadership is Impossible Without Followership
1.1.03 The President Cannot Shirk His Responsibilities
1.1.04 The Power and Prestige of the Presidency Should be Preserved
1.1.05 Presidential Powers Should Not be Mothballed
1.1.06 Never Lead a Divided People Into War
1.1.07 Never Press Big Decisions on Small Minorities
1.1.08 The President Should Always Put Country Above Party
1.1.09 The President Is Not The Secretary of State
1.1.10 Short-Circuiting the State Department is Dangerous
1.1.11 The President Should Give Ear to the Experts
1.1.12 Special Executive Agents Should Be Used Discreetly
1.1.13 Blank Checks from Congress Can Be Useful
1.1.14 Never Give One's Adversary a Blank Check
1.1.15 Study Your Opponent's Strengths and Weaknesses
1.1.16 Keep All Channels of Communication Open
1.1.17 Avoid Appeals Over the Heads of Government
1.1.18 The Honest Broker Runs Grave Risks
1.1.19 Presidential Press Conferences Must be Used With Caution
1.1.20 People-to-People Diplomacy Involves Hazards
1.1.21 Lame Ducks Should Cooperate with Their Successors

1.2.00 The Department of State

1.2.01 The Secretary Should Enjoy the President's Confidence
1.2.02 The Secretary of State Should Speak for the President
1.2.03 A Strong Secretary Often Indicates a Weak President
1.2.04 There Can Only be One Secretary of State at a Time
1.2.05 Brinkmanship is a Dangerous Ship
1.2.06 Never Gloat over Diplomatic Victories
1.2.07 Avoid the Open-Mouth Policy
1.2.08 The Secretary Should Rise Above Politics
1.2.09 Self-Righteousness Does Not Become a Secretary of State
1.2.10 Reversing Policy Capriciously is Bad Policy
1.2.11 Never Antagonize Congress Unnecessarily
1.2.12 The Secretary Owes Loyalty to His Staff
1.2.13 The Secretary Should Not be a Gadabout
1.2.14 Sick Men Can Make Sick Policies
1.2.15 Eliminate Bureaucratic Strangulation
1.2.16 Leave Foreign Policy to the Foreign Policy Agencies
1.2.17 The Central Intelligence Agency Should Not Make Policy

1.3.00 Picking the Right Ambassador

1.3.01 Choose Ambassadors of Intelligence and Talents
1.3.02 Send Abroad Men (and Women) to Match Our Mountains
1.3.03 Select Envoys of Exemplary Character
1.3.04 Tactfulness is the Essence of Diplomacy
1.3.05 Self-Possession is a Prime Virtue
1.3.06 Discretion is the Handmaiden of Diplomacy
1.3.07 Adaptability is Preferable to Unconventionality
1.3.08 The Diplomatist Must be Patient
1.3.09 Champagne is the Lubricant of Diplomacy
1.3.10 Foreign Language Competence Should be Encouraged
1.3.11 Professionals Are Generally Preferable to Amateurs
1.3.12 The Spoils System and Diplomacy Do Not Mix
1.3.13 Prestigious Men for Prestigious Posts
1.3.14 Wealthy Men for Expensive Posts
1.3.15 Send Envoys Who are Persona Grata
1.3.16 Honor the Religion of the Host Country

1.4.00 Utilizing the Ambassador

1.4.01 Bring the Ambassador Home Periodically
1.4.02 Leaving the Ambassadorship Vacant is Risky
1.4.03 Keep the Ambassador Fully Advised
1.4.04 Avoid Diplomatic Musical Chairs
1.4.05 Overstaffing is Poor Staffing
1.4.06 Beware of Upstaging the Ambassador
1.4.07 Give the Experienced Diplomat Some Leeway
1.4.08 Weed Out the Incompetents
1.4.09 Operate Through Regular Diplomatic Channels
1.4.10 Poor Housing Does Not Befit a Rich Nation

1.5.00 Advice for the Diplomat

1.5.01 The Ambassador Should Brief Himself Adequately
1.5.02 Employ Reliable Interpreters
1.5.03 Precise and Objective Reporting is Essential
1.5.04 Prolixity is the Foe of Clarity
1.5.05 The Ambassador Should Obey Instructions
1.5.06 Refer Important Proposals Home
1.5.07 Develop an Empathy for the Host Nation
1.5.08 Cultivate Friends But Not Intimates
1.5.09 The Ambassador Should Maintain Mobility
1.5.10 The Ambassador Should Avoid "Localitis"
1.5.11 The Diplomatist is a Warrior for Peace
1.5.12 Public Loquacity is Poor Policy
1.5.13 A Diplomat Should Avoid Criticism in Public
1.5.14 Meddling Leads to Muddling
1.5.15 Never Lie for Your Country
1.5.16 Have No Traffic With Spies
1.5.17 Secrecy Must Be Safeguarded

2.0.00 POLICY FORMULATION

2.1.00 The Supremacy of National Interest

2.1.01 Self-Interest is the Mainspring of Foreign Policy
2.1.02 Self-Preservation is Paramount to All Law
2.1.03 Ascertain What Other Nations Regard As Their Interests
2.1.04 A Nation Often Does Not Recognize Its Own Self_interest
2.1.05 Sentiment Changes But Self-Interest Persists
2.1.06 Idealism Can Be Fatal in Foreign Affairs
2.1.07 Naivete is the Foe of Reality

2.2.00 The Shaping of Policy

2.2.01 Policies Without Purpose Are Pointless
2.2.02 Basic Policies Should be Reexamined Periodically
2.2.03 Flexibility Facilitates Policy
2.2.04 Consistency Clarifies Policy
2.2.05 Military Power Should be Tailed to Support Policies
2.2.06 Nations That Drift With Events May Become Their Victims
2.2.07 Improvisation is Risky Procedure
2.2.08 Personal Vendettas Are No Substitute For Policy
2.2.09 Cross-Purposes Are Poor Purposes
2.2.10 Sound Information is the Taproot of Sound Policy
2.2.11 Present Decisions are Often Prisoners of Past Decisions
2.2.12 Policy Planning is a Complicated Art
2 2.13 Confidential Deliberations Should Remain Confidential

2.3.00 The Power of Economic Interests

2.3.01 The Economic is Often More Potent than the Ideological
2.3.02 Trade Tends to Promote Peace
2.3.03 Commerce Cements Friendship and Vice Versa
2.3.04 Tariff Walls are Wailing Walls
2.3.05 International Debts Chill International Friendships
2.3.06 Economic Weapons Can be Two-Edged
2.3.07 International Boycotts Are Often Self-Defeating
2.3.08 Economic Entanglements Can be Deeper Than Political Ones
2.3.09 "Dollar Diplomacy" Is Here To Stay

2.4.00 The Domestic Front

2.4.01 Domestic and Foreign Problems are Often Inseparable
2.4.02 Internal Disunity Devitalizes Foreign Policy
2.4.03 Injustice at Home Weakens Diplomacy Abroad
2.4.04 Democracy Begins At Home
2.4.05 Take Advantage of Your Adversary's Domestic Difficulties
2.4.06 Partisanship and Foreign Policy Do Not Mix
2.4.07 Bipartisan Diplomacy is Better than Partisan Diplomacy

2.5.00 The Pressure of Public Opinion

2.5.01 Public Opinion Shapes Foreign Policy in a Democracy
2.5.02 The Public Must be Educated to its Responsibilities

2.5.03 Deceiving the Public is Undemocratic
2.5.04 Opinion Polls Cannot Conduct Foreign Policy
2.5.05 Secrecy Clashes with Democracy in Foreign Affairs
2.5.06 Never Raise Public Expectations Too High
2.5.07 Criticism at Home Weakens Policy Abroad
2.5.08 New Policies are More Palatable Under Old Names
2.5.09 Personal Interest Insures Public Support
2.5.10 World Opinion is a Potent Force
2.5.11 The National Interest is Paramount to World Opinion

3.0.00 DIPLOMATIC TECHNIQUES

3.1.00 Top-Level Diplomacy

3.1.01 Summit Diplomacy is Dangerous Diplomacy
3.1.02 Summit Diplomacy is Inefficient Diplomacy
3.1.03 Statesmen Should Not Lean Too Heavily on Luck
3.1.04 Take Calculated Risks
3.1.05 Trouble Creates Opportunities
3.1.06 Keep the Diplomatic Initiative
3.1.07 Expect the Unexpected
3.1.08 Peacetime Diplomacy Involves Tit for Tat
3.1.09 The Best is the Enemy of the Good
3.1.10 Come to Terms with the Inevitable
3.1.11 Diplomacy is the First Line of Defense
3.1.12 Great Powers Can Afford to Lose Face
3.1.13 Know Thine Adversary
3.1.14 Never Slam Doors
3.1.15 Agreement in Principle May Mean Disagreement in Practice
3.1.16 Avoid Having the Right Policy at the Wrong Time
3.1.17 Time is the Great Solvent
3.1.18 Arbitration Favors the Weak

3.2.00 Ethics and Morality

3.2.01 Honesty is Usually the Best Policy
3.2.02 Moral Judgements Can Obscure The National Interest
3.2.03 Expediency is Sometimes Better than Consistency
3.2.04 Morality Covers a Multitude of Sins
3.2.05 Honor All Commitments
3.2.06 Make Reasons Realistic and Pretexts Plausible
3.2.07 One Might As Well be Hanged for a Ram as a Lamb
3.2.08 To Acquiesce to Great Wrongs is to be an Accomplice
3.2.09 The Big Lie is Often the Credible Lie
3.2.10 Diplomacy Ordinarily Involves Deception
3.2.11 Reality and Not Morality Should Govern Recognition
3.2.12 Never Base Recognition Simply on Prejudice
3.2.13 Refrain from Rush-Order Recognition
3.2.14 Secrecy is the Soul of Negotiation
3.2.15 Secrets Will Out
3.2.16 Secure Your Adversary's Secrets If You Can Discreetly

6.0.00 PROBLEMS OF PEACE

6.1.00 The Perils of Peacemaking

6.1.01 Unconditional Surrender Encourages Unconditional Resistance
6.1.02 Total Victory Imposes Total Responsibility
6.1.03 Military Victory Is Not the Only Kind of Victory
6.1.04 Overeagerness to Talk Peace is Self-Defeating
6.1.05 Military Victory is the Achievement of War Aims
6.1.06 A Dictated Peace is a Perilous Peace
6.1.07 Haste Makes Waste in Peacekeeping
6.1.08 Peace Treaties are not Self-Executing
6.1.09 The Victor Redefines Justice
6.1.10 Might Makes the Record Right

6.2.00 Neutrality and Neutralism

6.2.01 Neutrality is in the American Tradition
6.2.02 Neutralism is Often the Refuge of the Weak
6.2.03 Neutrality is Often the Best Policy
6.2.04 The Equal Treatment of All Belligerents Can Be Unneutral
6.2.05 Neutrals Must Expect Brickbats from Both Sides
6.2.06 Neutrality in Thought is Impossible
6.2.07 A Neutrality Policy Should be Kept Flexible
6.2.08 Neutralism Can Reduce International Tensions
6.2.09 Circumstances Alter Neutralist Viewpoints
6.2.10 The Wages of Unneutrality are Often Belligerency

6.3.00 The Mirage of Disarmament

6.3.01 Weapons in Themselves are not Immoral
6.3.02 Armaments Betray Insecurity
6.3.03 Armaments Are Basically the Symptoms of a Disease
6.3.04 Distinctions Between Offensive and Defensive Arms Are Illusory
6.3.05 Arms Races Result in an Upward Spiralling Vicious Cycle
6.3.06 Superiority in Weaponry Does Not Guarantee Security
6.3.07 Disarmaments Without Adequate Inspection is Risky
6.3.08 Unilateral Disarmament is Self-Delusion
6.3.09 Disarmament Negotiators Must Deal From Strength
6.3.10 Armament and Disarmament Both Entail Risks

1. Thomas Bailey, <u>The Art of Diplomacy: The American Experience</u>. New York: Appleton-Century-Crofts, 1968. [Numerical designations added; capitalization scheme also.]