

**THE OPEN INFORMATION OPPORTUNITY FOR GREATER U.S. INFORMATION POWER**

**LT COL GARY R. HARMON**

**NATIONAL WAR COLLEGE**

**23 MAR 1992**

| Report Documentation Page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                    |                                     |                                            | Form Approved<br>OMB No. 0704-0188          |                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|--------------------------------------------|---------------------------------------------|------------------------------------|
| Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. |                                    |                                     |                                            |                                             |                                    |
| 1. REPORT DATE<br><b>23 MAR 1992</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                    | 2. REPORT TYPE<br><b>N/A</b>        |                                            | 3. DATES COVERED<br><b>-</b>                |                                    |
| 4. TITLE AND SUBTITLE<br><b>The Open Information Opportunity for Greater U.S. Information Power</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |                                     |                                            | 5a. CONTRACT NUMBER                         |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                            | 5b. GRANT NUMBER                            |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                            | 5c. PROGRAM ELEMENT NUMBER                  |                                    |
| 6. AUTHOR(S)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    |                                     |                                            | 5d. PROJECT NUMBER                          |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                            | 5e. TASK NUMBER                             |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                            | 5f. WORK UNIT NUMBER                        |                                    |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br><b>National Defense University National War College Fort McNair<br/>Washington, DC 20319</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                    |                                     |                                            | 8. PERFORMING ORGANIZATION<br>REPORT NUMBER |                                    |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                    |                                     |                                            | 10. SPONSOR/MONITOR'S ACRONYM(S)            |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                            | 11. SPONSOR/MONITOR'S REPORT<br>NUMBER(S)   |                                    |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT<br><b>Approved for public release, distribution unlimited</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                    |                                     |                                            |                                             |                                    |
| 13. SUPPLEMENTARY NOTES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                    |                                     |                                            |                                             |                                    |
| 14. ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    |                                     |                                            |                                             |                                    |
| 15. SUBJECT TERMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                    |                                     |                                            |                                             |                                    |
| 16. SECURITY CLASSIFICATION OF:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     | 17. LIMITATION OF<br>ABSTRACT<br><b>UU</b> | 18. NUMBER<br>OF PAGES<br><b>48</b>         | 19a. NAME OF<br>RESPONSIBLE PERSON |
| a. REPORT<br><b>unclassified</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | b. ABSTRACT<br><b>unclassified</b> | c. THIS PAGE<br><b>unclassified</b> |                                            |                                             |                                    |

### Disclaimer

Opinions, conclusions, and recommendations expressed or implied within are solely those of the author, and do not necessarily represent the views of the National Defense University, the Department of Defense, or any other U.S. Government agency.

Portions of this paper should not be quoted or reprinted without permission of its author. When, with permission, portions of this paper are quoted a standard source credit line should be included. The author would appreciate a courtesy copy of reprints or reviews.

### About the Author

Colonel (selectee) Gary Harmon has spent his 17-year Air Force career almost equally divided between missile warning and attack assessment plans and operations and numerous space system related C<sup>3</sup>I, research and development, and policy assignments. He entered the U.S. Air Force with both B.S. and M.S. degrees with specialization in experimental laser and plasma physics. He has been recognized previously in Jane's Who's Who in Aerospace and Marquis's Who's Who in Science and Technology. Presently a student at the National War College, he is awaiting assignment to Joint duty.

### Acknowledgements

I wish to express my appreciation to Ambassador David Newton, Messrs. James Dixon and William Huntington, and Colonels Bruce Harris and Robert Hughes for listening calmly to turbulent brainstorming and rushing idea streams as I formed the central theme of the following paper. Many far reaching excursions were enthusiastically explored in what I suspect often became a monologue rather than discussion.

Most of all, I wish to thank my wife, Jacquelyn, for her patience, and I thank our children, Lara (8 yrs.), Alaina (6 yrs.), and Pierce (4 yrs.) for home personal computer time when I insisted that this paper had a higher priority than their computer use. Thanks to each and everyone.

Table of Contents

|    |                                                                              |           |
|----|------------------------------------------------------------------------------|-----------|
| 1  |                                                                              |           |
| 2  |                                                                              |           |
| 3  |                                                                              |           |
| 4  | <b>Introduction — A Domestic Confidence Building Dream with U.S. Power</b>   |           |
| 5  | <b>Benefits (Chickens, Pots, Promises, and Power).</b>                       | <b>5</b>  |
| 6  | <b>Needed a Believable Plan—Visceral, But Steadfast.</b>                     | <b>6</b>  |
| 7  | <b>A Tonic Blended for Domestic and Foreign Policy.</b>                      | <b>8</b>  |
| 8  | <b>Sustaining U.S. Superpower — Leveraging Changing Information Mass and</b> |           |
| 9  | <b>Velocity for U.S. Information Power.</b>                                  | <b>10</b> |
| 10 | <b>Focus on information power.</b>                                           | <b>11</b> |
| 11 | <b>Information Lines of Communication (ILOCs) Will Be To 2000 What</b>       |           |
| 12 | <b>Sea Lines of Communication (SLOCs) Were To 1900.</b>                      |           |
| 13 | <b>Memories and Speech.</b>                                                  | <b>13</b> |
| 14 | <b>Information Oceans, Open and Closed Seas, and Pools.</b>                  | <b>14</b> |
| 15 | <b>Bottom Up or Straight from the Top?</b>                                   | <b>18</b> |
| 16 | <b>Information Power As An Instrument of National Power</b>                  | <b>19</b> |
| 17 | <b>Information Deus Ex Machina.</b>                                          | <b>20</b> |
| 18 | <b>The Information Rich Get Richer.</b>                                      | <b>23</b> |
| 19 | <b>Not Necessarily a Zero Sum Game.</b>                                      | <b>25</b> |
| 20 | <b>Dissatisfaction and Wars Still Can Happen.</b>                            | <b>26</b> |
| 21 | <b>More Definitions</b>                                                      |           |
| 22 | <b>Extending the Framework To How Information Flows and How It Is</b>        |           |
| 23 | <b>Distributed.</b>                                                          | <b>27</b> |
| 24 | <b>Information Strategies and Mechanisms.</b>                                | <b>30</b> |
| 25 | <b>New Value</b>                                                             |           |
| 26 | <b>Information Monitor, Supply, or Denial.</b>                               | <b>31</b> |
| 27 | <b>Knowing Thine Enemy</b>                                                   |           |
| 28 | <b>Monitoring, Banking, and Coercing.</b>                                    | <b>33</b> |
| 29 | <b>Symbols that Bind<sup>1</sup> or Cripple.</b>                             | <b>34</b> |
| 30 | <b>Restructuring to Exploit Open and Closed Information Seas.</b>            | <b>35</b> |
| 31 | <b>Using Information Analysts To Analyze Not To Memorize.</b>                | <b>35</b> |
| 32 | <b>New Information Order.</b>                                                | <b>37</b> |
| 33 | <b>Conclusion.</b>                                                           | <b>41</b> |
| 34 |                                                                              |           |

---

<sup>1</sup>Toffler, Alvin. Power Shift: Knowledge, Wealth, and Violence at the Edge of the 21st Century. Bantam, 1990. pp XXX.

1  
2 **THE OPEN INFORMATION OPPORTUNITY FOR GREATER U.S. INFORMATION POWER:**  
3  
4 **-- SUGGESTING A GLOBAL, STRATIFIED INFORMATION STRATEGY RELATED TO**  
5 **DEFENSE, COMMERCE, POLITICS AND POPULAR EDUCATION --**

6 **Introduction -- A Domestic Confidence Building Dream with U.S. Power**  
7 **Benefits (Chickens, Pots, Promises, and Power).**

8       The bases of U.S. economic, military, political, and  
9 psychological powers can be classified as natural and human. With  
10 some attention, the natural elements are long-term--geography and  
11 natural resources. With equal prudence, the human elements--strong  
12 backs and strong minds--can be nurtured each generation. Given our  
13 superpower reserves, in spite of sensational and pessimistic headlines  
14 this election year, the United States with its particularly sturdy  
15 Constitutional democratic government, will survive.

16       Will the United States have the power to lead toward a new world  
17 order that improves the state of humankind and provides stability  
18 vital for international trade to the benefit of all nations? Will  
19 U.S. aggregate power grow sufficiently to take the lead? Will the  
20 United States be well prepared for a world where trans-national flow  
21 of information and wealth will permeate the sovereign borders of our  
22 nation and its states to the point that conventional business  
23 protectionism and import and export controls will no longer be  
24 feasible?

25       Historically, the United States has always risen to the occasion  
26 once it has been decided to apply the full spectrum of its natural and  
27 human resources. If we prudently look beyond election year headlines,  
28 we might rationally observe that the United States has tremendous  
29 resources and it is not likely to succumb to its recent deficit  
30 spending habits overnight. The solution will not resemble those of

1 the past--a monolithic, resolute nation standing strong on isolated  
2 geography--but consensus, agreeable, coalition whose information  
3 lifeblood is shared internationally.

4 U.S. citizens are likely to have increasing direct influence on  
5 both Congress and the Presidency through polling, then popularly  
6 initiated straw polls, and finally to outstrip Congressional power by  
7 unofficial electronic, direct plebiscite voting to their Congressman's  
8 office. Of necessity, U.S. citizens will need to be well-educated and  
9 informed for the responsibility of guiding our nation--these changes  
10 will happen whether they are prepared for the responsibility or not.  
11 The President will need to be highly informed and stake out a  
12 leadership stance. The Congress and Presidency will make less policy  
13 and spend most of their time portraying and executing the desired  
14 policy of the people. Earthshaking change, but within the ability of  
15 the United States to thrive if its citizens are prepared. Focusing on  
16 the immediate future, there remains hope and it is worth looking for a  
17 means of recovery.

18 Needed a Believable Plan--Visceral, But Steadfast.

19 It is not likely that the U.S. economy can regain its former  
20 growth rate, and return us to prosperity, until we hit upon a  
21 believable plan--a plan so believable and tangible to the person on  
22 the street that it has a good feeling at the gut level. The nation  
23 looks toward a contagious means to restore confidence. For President  
24 Kennedy, the Apollo program taking a "giant step for mankind." had the  
25 requisite magic. Space exploration is not the sole answer today. It  
26 is not that space is no longer a magical place, a high ground with a  
27 grand view of planet earth and visions of the primordial universe.  
28 Space is an accepted effort recognized in the budget and important to

1 stimulating a portion of the U.S. economy without a doubt. But U.S.  
2 leadership must restore both foreign and domestic confidence by a  
3 means that is as identifiable as the starry night sky's canopy and the  
4 dawn's blazing sun are to every U.S. citizen. It must be a mental  
5 tonic as magical and rejuvenating as the thoughts of man soaring to  
6 set foot on the moon just after the doomsday shock and specter of the  
7 Cuban missile crisis. It must be a plan that suits the 1990s and can  
8 provide concrete results within this decade. Cold War and atomic  
9 annihilation have been replaced by shifting borders and stagnating  
10 economies. But psychological burden and job endangering economic  
11 impact are no less discouraging.

12         Where can we find such a tonic? Presently, the U.S. leadership  
13 is pursuing corrections in public education, boosting high technology  
14 research and development coffers for biotechnology and advanced  
15 computing, and continuing to probe for understanding of our earthly  
16 environment with satellites orbiting in space. Established U.S.  
17 industry is struggling to bring new and better quality products to the  
18 marketplace and to gain entry into key foreign markets.  
19 Entrepreneurs, seen as potential knights in shining armor, are trying  
20 to protect the virtues of U.S. high technology while attempting to  
21 avoid catastrophic surprise by companies and products that they have  
22 never heard of before. Our moral fiber cries for a means to  
23 ameliorate the effects of a demographic patchwork of immigrants and  
24 impoverished Americans that are suffering and are concentrating on  
25 survival in slums with schools where children are at risk of drugs and  
26 gun shots.

27         Simultaneously, U.S. companies are turning elements of beach  
28 sand into the lifeblood of a multi-billion dollar personal computer



1 industry. Major corporations are taking strides into the post-Cold  
2 War world by becoming integral members of joint telephone,  
3 fiberoptics, and information services ventures in republics of the  
4 former USSR almost as soon as the U.S. government recognized the new  
5 republics. Most Americans know of personal computers, telephones, and  
6 televisions. There is a common theme in these tragedies and  
7 miracles--information.

8 Knowledgeable people are prospering on devices for transmitting,  
9 processing, and reproducing information. Poor people are unable to  
10 lift themselves from poverty and their children are likely to follow  
11 in their footsteps for lack of knowledge. Attempts to stimulate the  
12 economy, to kick start it, by developing biotechnology, computer  
13 knowledge, and inexpensive space systems are vital focused portions of  
14 such a kick start effort, but more is needed. Do the passengers know  
15 where we plan to go when the economy does turn over?

16 We need one last personal and corporate example, Bill Gates.  
17 Gates is a 36-year old that started writing software to manipulate the  
18 internal actions of microprocessors in his youth. He is the creator  
19 of MS-DOS, the basic operating system software that runs 80 million  
20 personal computers. His company, Microsoft, is the producer of  
21 Windows that is being run on 9 million computers. He is a visionary  
22 that plans to add Windows New Technology this year. Windows NT is  
23 intended to begin practical internetting of all computers from palmtop  
24 to laptop to desktop in networks of hundreds.<sup>2</sup> These almost living  
25 interpersonal networks will connect to vast libraries of data called  
26 on-line services available by telephone lines. Furthermore, networks  
27 will connect to other networks anywhere in the world.

<sup>2</sup>Rebello, Kathy and Schwartz, Evan I. "The Magic of Microsoft." Business Week. February 24, 1992. McGraw-Hill: New York.  
60-64.

1 Bill Gates is the richest man in the United States and his  
2 Microsoft Corporation is valued higher than General Motors (Gates'  
3 personal stake is valued at \$7 billion and Microsoft is \$22 billion).  
4 Add one last ingredient--a common awareness of televisions,  
5 telephones, and computers. What do we have? Ubiquitous valuable  
6 information, inventive computer and telecommunications makers  
7 producing a global network, and a suburbia-to-incredible riches story  
8 with a modern hero. Plus the prospect that the personal computer,  
9 telephones, and television could spark these ingredients into a  
10 program transfusing information, education, and wealth that stimulates  
11 the confidence and economy of the United States, while building global  
12 rapport. Exit containment--enter rapport.

### 13 A Tonic Blended for Domestic and Foreign Policy.

14 Information power could be the tonic to cure our economic,  
15 education, and poverty malaise. How? National assistance, like the  
16 TVA Rural Electrification Act, could drive the price and user  
17 friendliness of personal computers and software to commodity levels  
18 and install them in every U.S. school. This could become a national  
19 confidence building program that provides immediate jobs and business  
20 stimulus, moves us from smokestack to silicon-and-information  
21 industry, and provides vital education and heroes to every grade  
22 school American as an investment in sustaining U.S. superpower.

23 Let us apply the brain power from a downsizing Department of  
24 Defense (DoD) and Department of Energy (DoE). One possibility is to  
25 focus new efforts through the Department of Commerce (DoC) at the  
26 National Institute of Standards and Technology by creating a Critical  
27 Information Division (NIST CID) assisted by Defense Advanced Research  
28 Projects Agency (DARPA) computing consortia. A nationally guided,

1 commercially executed program has the potential to use information  
2 power--open source information--domestically as well as  
3 internationally and generate millions of "points of light." The U.S.  
4 Congress is interested in reorganizing the U.S. intelligence community  
5 under a new Director of National Intelligence, perhaps there sweeping  
6 revision should create a Director of National Information--  
7 consolidating closed-source information under the Defense Intelligence  
8 Agency in DoD, moving the remaining Central Intelligence Agency  
9 functions and special legislative authorities of the National Security  
10 Acts of 1947 and 1949 into DIA, and consolidating open-source  
11 information under DoC Critical Information Division (DoC CID). If the  
12 turmoil of broad bureaucratic change is inevitable, let us increase  
13 the scope to prepare for tomorrow rather than patching up mistakes  
14 from yesterday. The DoC CID would answer to the Secretary of Commerce  
15 and DIA would still be under the Secretary of Defense, but the new  
16 Director of National Information would advocate, coordinate, and  
17 ensure the U.S. Government maximum use of open and closed source  
18 information and analyses.

19       For over 45 years, the United States has prospered in the  
20 industry of containing Communism, perhaps for the next half-century,  
21 the United States can more evenly distribute growing prosperity by an  
22 active domestic and foreign policy of information redistribution--  
23 rapport ("info rap?"). The former republics of the USSR need wealth  
24 and they have information that had been denied to the world and their  
25 own people. We could start with the following:

- 1        1. Offer youth the opportunity to produce the next Ross Perot
- 2        (EDS and Perot Systems), Bill Gates (Microsoft), Steven Jobs
- 3        (Apple and Next computers), or immigrant Philippe Kahn (Borland
- 4        Software),
- 5        2. Level basic information globally to ensure mutual economic
- 6        growth and greater political trust, and
- 7        3. Obtain years of missing cultural information and intelligence
- 8        ground truth to foster better relations with the emerging
- 9        Commonwealth of Independent States.

10 Sustaining U.S. Superpower -- Leveraging Changing Information Mass and  
11 Velocity for U.S. Information Power.

12        I have discussed potential benefits of decreasing personal  
13 computer costs through technology and standards and putting computers  
14 in every class room, while giving U.S. computer industry a greater  
15 competitive edge. This would also provide the means to move and  
16 process vast quantities of information for broadly based benefits.  
17 Where do we get the information, the working capital, of the future?

18        Much information is or will be in the public domain, but the  
19 U.S. government will have to perform a vital role in collecting and  
20 making information available. The Government will need to promote  
21 technical standards and standards of conduct, as well as protection  
22 against privacy rights violations.

23        I would like to focus on the U.S. government involvement in the  
24 international transactions of open source information for the  
25 remainder of this paper. I will begin with discussions about  
26 information power and flow. Then discuss reasons global information  
27 is not uniformly distributed and how monitoring and redirecting

1 information flow could be fruitful. Finally, I will propose a  
2 nationally developed open source information "sea."

3 Implementation of the suggestion to develop a national-level,  
4 open-source information sea could telephonically provide information  
5 needed by schools equipped with desktop computers. The combination of  
6 computers and information would give all school children a chance to  
7 step into a more promising world and become the adults that will  
8 maintain U.S. information power.

9 Focus on information power.

10 U.S. trade once used barter--slow--turned to currency--faster--  
11 and is now *de facto* irreversibly reliant on computer bits--nearly as fast  
12 as the speed of light. U.S. superpower is completely dependent on  
13 information ~~masse~~ moving at computer and telecommunications  
14 velocities--information momentum that provides national impact. It  
15 follows that information power is the product of information mass and  
16 U.S. capability to accelerate or redirect information flows for the  
17 time needed to achieve national interests. We survived the beginning  
18 of the information explosion and are learning to channel information  
19 torrents into applications.

20 At the federal level, we have unwittingly used information power  
21 piecemeal, but without recognition of the whole fabric. Recognition,  
22 initial definitions--metaphors borrowed from science and economics--  
23 and then actions and policy should be forthcoming to gain more of the  
24 tremendous leverage available in the global information commodity. We  
25 must also recognize that reliance on information power creates  
26 vulnerabilities that should not be overlooked. For example, there are  
27 more than one-thousand personal computer viruses in today's  
28 environment. Yet there are no national standards or guidelines for

1 banks, hospitals, universities, and emergency services to immunize  
2 data.

3 Information Lines of Communication (ILOCs) Will Be To 2000 What Sea  
4 Lines of Communication (SLOCs) Were To 1900.

5 Long-term national power may be determined by geography, natural  
6 resources, and human character, but transient power is a function of  
7 effective national information use. As Mackinder's "heartland" and  
8 Mahan's maritime strategy for extending and protecting SLOCs excited  
9 and guided the U.S. at the last turn of the century, information  
10 centers and information lines of communication (ILOCs) will greatly  
11 influence U.S. national power at this turn of the century.<sup>3</sup> Is anyone  
12 preparing a strategic atlas of the centers and lines of information to  
13 sustain the U.S. as a superpower--superinformed and decisive? Will  
14 the United States have a Presidential administration that exudes  
15 confidence from being highly informed? The information ocean is open  
16 to all that can muster the means to exploit its contents. Not a zero  
17 sum game, many can benefit by U.S. leadership.

18 The 1990s offer the opportunity to draw on unprecedented open  
19 source information from a rising information ocean while continuing  
20 use of closed source information (intelligence from sensitive sources  
21 and methods). Information can be poured into separate open and closed  
22 information seas, respectively, for domestic and intelligence  
23 analytical use on demand. These seas should be kept pure so open-  
24 source information rapidly can be offered to U.S. commerce and  
25 education without fear of compromising sources and methods. U.S.  
26 defense can have more timely tailored intelligence and access to a  
27 great open sea of supporting information, e.g., maps and industrial

---

<sup>3</sup>Toffler. 20 and 25-26.

1 and communications infrastructure descriptions vital to successful  
2 modern "hyperwar" as evidenced in the Persian Gulf War. This win-win  
3 situation is made possible by the opening of Cold War denied areas and  
4 accompanying political turbulence, vast new potential commercial  
5 markets, and computers that can process millions of megabits of  
6 information each second. Finally, some U.S. information-handling  
7 restructuring to more greatly involve commercial benefactors may be  
8 advisable. Let us step through the "looking glass" to take a new look  
9 at the utility of harnessing information for greater U.S. economic,  
10 military, political, and psychological power as the melted Cold War  
11 raises the world's information ocean level.

## 12 Memories and Speech.

13 American speech is spotted with literature acknowledging the  
14 power of information--knowledge is power, the pen is mightier than the  
15 sword, and one picture is worth a thousand words. The Security  
16 Exchange Commission prosecutes to deter the premature sharing of  
17 "inside" information. The National Photographic Interpretation Center  
18 keeps 160 trillion bytes of imagery and related data handy to assess  
19 changes in the world. In 1985, INTERNET world-wide networking of  
20 computers consisted of more than 5,000 networks in 33 countries and  
21 500,000 connected computers directly attended to by more than 3  
22 million people--recall this was before personal computers became so  
23 common as to potentially add millions more devotees.<sup>4</sup> Communication  
24 satellites (Comsats), crowded less than two degrees from one another  
25 19,000 nautical miles above the earth, compete to serve a world where  
26 it no longer is uncommon for hundreds of millions of people to

---

<sup>4</sup>Applying the INTERNET: Corporate, Research, Educational, Governmental, and Other Real World Uses.' Byte. February, 1992, 111-118.

1 simultaneously watch the Olympic games. Ukraine has formed a joint  
 2 ownership venture with AT&T (39%) and PTT Telecom Netherlands BV (10%)  
 3 to modernize and extend its telecommunications system in the next 15  
 4 years.<sup>5</sup> And USA Today's Special Projects Unit gathers and analyzes  
 5 government data daily for current stories. The newspaper staff has  
 6 coined their work as "database journalism."<sup>6</sup> Imagine the network to  
 7 support CNN! Where change is integral to business, even the most  
 8 agile entrepreneurs fear surprise by companies that they have never  
 9 heard of introducing competitive products and taking market share.<sup>7</sup>  
 10 Corporations are building business information offices to counter  
 11 surprise by competitive products. The rapid accumulation, processing,  
 12 and distribution of data is part of life in developed nations.

### 13 Information Oceans, Open and Closed Seas, and Pools.

14 For the skeletal framework of this strawman, terminology is  
 15 needed for you to visualize the distinctive components. I have chosen  
 16 to refer to the initial quantity of sounds, bits, radiation, and color  
 17 hues and intensities as data. Data filtered for higher level  
 18 correlations--sentences, tables, images, statistics, stochastic  
 19 relations, and so on to suit users--is information. Finally,  
 20 information absorbed and capable of human invention or application is  
 21 knowledge. Intuitively, refined data becomes information and refined  
 22 information, consolidated by persons to solve a problem, is knowledge.

23 There is a growing quantity of data, information, and knowledge  
 24 within, upon, and above the earth without limit that I simply call an  
 25 information ocean. It is continually fed by tributaries replenished

---

<sup>5</sup>Pinsky, Donne (CommWeek International). "Ukraine Signs Net-upgrade Partners." Communications Week. January 27, 1992. p. pnn8.

<sup>6</sup>PC Magazine. March 31, 1992. Ziff Communications: New York. 55.

<sup>7</sup>Hillelt, Stephen M. "Competitive Technology Intelligence." Batelle Today. Number 66, April 1991. Batelle: Columbus. 4-7.



1 by physical processes in our universe and by persons and machines  
2 drawing from the information ocean and changing, rearranging,  
3 processing, and adding value to the ocean's data, information, and  
4 knowledge. For example, if I draw all phone numbers from the ocean  
5 and correlate the numbers with an alphabetical listing of telephone  
6 subscribers, I have created a telephone book. The book has greater  
7 value than the uncorrelated numbers and names. The effort has added  
8 order to the names and numbers and made information of greater value  
9 to telephone users. If I must call a plumber to fix a drain in my  
10 home, a list of plumber's phone numbers has even greater value. The  
11 process of memorizing a plumber's number and placing a call for  
12 repairs is an application of knowledge. I believe that you will agree  
13 that when a leak is flooding your home's basement that having the  
14 knowledge to immediately place a call for repairs is more valuable  
15 than knowing where the phone book is--it might be submerged in your  
16 basement study. The phone book contains essential elements of  
17 information (EIs) for home maintenance. But more valuable is the  
18 knowledge to accomplish the process of calling a plumber when needed.

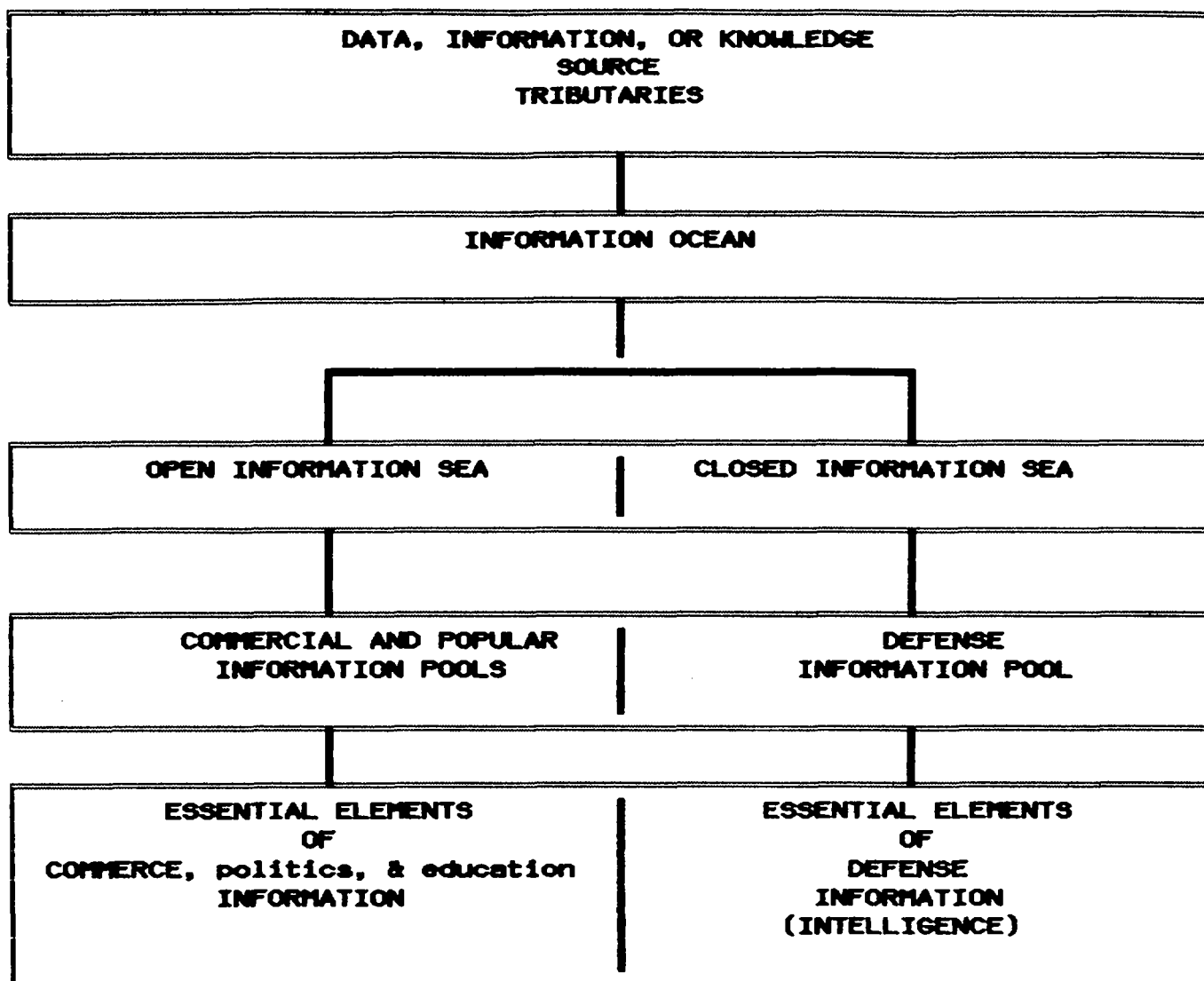
19       Intuitively, since work has to be done to cultivate knowledge  
20 from information and form information from data, knowledge is higher  
21 in value and more sought after than information or data.

22       Carrying our framework somewhat further toward a model,  
23 knowledge together with tools and infrastructure is technology.  
24 Knowledge with appropriate financial tools and a market could beget  
25 commerce. Likewise, selected knowledge, tools, and infrastructure  
26 (when applied to the defense, commerce, politics, or education  
27 "market") can be useful to domestic or international problem solving.  
28 Pressing onward with the information ocean analogy, after processing,

1 data, information, or knowledge collected from the ocean can be shared  
2 by returning it to the ocean by some communication tributary or  
3 diverted, at least temporarily, to an open or closed information sea  
4 where it can be exploited by the nation that collected, added value,  
5 and stored this information. Therefore with carefully selected rules,  
6 collecting and sorting data, information, or knowledge from the ocean,  
7 can lead to two large seas. For simplicity, I name this first sea an  
8 open information sea. The second sea, called the closed information  
9 sea, is filled with data, information, and knowledge collected,  
10 perhaps decrypted, and sorted from sensitive sources and methods.  
11 This second sea is filled with information that is often referred to  
12 as intelligence. But for this paper, I also name it the closed  
13 information sea.

14       The open information sea derived from lawfully obtained open  
15 source information could be used in commerce, education, politics, and  
16 defense with impunity to benefit the United States by domestic  
17 application or to benefit or influence foreign nations without harm to  
18 U.S. intelligence sources and methods. The closed information sea is  
19 not customarily, readily available to U.S. commerce and education.  
20 Portions of the U.S. DoD, DoE, and DoS (and lesser parts of several  
21 other departments) have workable access to the closed information sea.  
22 Time and analysis permitting, under tightly controlled conditions,  
23 U.S. and allied military planners can draw vital information from the  
24 closed sea to acquire weapons systems, establish needed C<sup>3</sup>I links, and  
25 support effective use of military power. The U.S. defense industry  
26 also develops knowledge and technology from the contents of the closed  
27 sea. Information from the open information sea and selected  
28 information drawn from the closed information sea could form

- 1 commercial and defense information pools tailored to readily become
- 2 applied knowledge benefiting the United States.



**FIGURE. ONE**  
**DATA, INFORMATION, AND KNOWLEDGE DEFINED AS OCEANS, SEAS, AND POOLS**  
**SATISFYING ESSENTIAL ELEMENTS OF INFORMATION**

1 Bottom Up or Straight from the Top?

2       During Cold War years, the U.S. intelligence community  
3 necessarily adapted to and grew accustomed to building its knowledge  
4 base--closed information pool--bottom up from data and information  
5 with only an occasional opportunity to access high-value personal  
6 knowledge. All data and information painstakingly had to be validated  
7 by corroborative sources. Access to denied area ground truth and  
8 leadership intentions were rare. The inputs were mostly from the  
9 closed sea. Now, following the breakup of the former USSR, but before  
10 the former USSR republics opt stridently to try to deny access, higher  
11 value ground truth and current open sea information is available.  
12 Furthermore, much must remain open to establish commerce with nations  
13 such as the United States. The United States can gain much by  
14 increasingly drawing from this greatly upwelling post-Cold War  
15 information ocean. The highest value information, such as that  
16 possessed by immigrating scientists, is becoming readily accessible.  
17 For example, Dr. Roald Sagdeev, a former Soviet nuclear physicist and  
18 space operator, is now a University of Maryland Distinguished  
19 Professor.<sup>8</sup>

20       Cold War ground truth and intent could be openly available,  
21 awash in the information ocean. More exciting is the prospect that  
22 evolving telecommunications and computer capabilities may make us  
23 capable of filling and sifting through the open information sea so  
24 rapidly and capably as to discern evolving future economic, political,  
25 military, or non-traditional threats to vital interests in time to  
26 forewarn the United States. Processing systems can be primed and  
27 awaiting appropriate requests by planners for EEIs to draw out needed  
28 information to withstand economic or military threats. Greater

---

<sup>8</sup>Space conference brochure listing Sagdeev as key note speaker.

1 reliance on the swelling open information sea will permit direct use  
2 of information by U.S. industry to increase U.S. commercial  
3 competitiveness.

4       It is still true that open sea information must be validated by  
5 corroboration with closed sea information. Therefore the invaluable  
6 intelligence capability of the United States, painstakingly built  
7 during the Cold War, essentially must remain intact as insurance  
8 against deception or wholesale misinterpretation. But it is  
9 conceivable that portions could be scaled back if one should take  
10 fullest advantage of the open information sea which contains top level  
11 knowledge at less expense and risk of misconstruction. It would be  
12 refreshing to capture the view from the top without always having to  
13 build a look out to stand on to see more clearly.

#### 14       Information Power As An Instrument of National Power

15       There is nothing especially new about this explosion of  
16 information nor the telecommunications that moves portions of it with  
17 the speed of light. But the opening of much of the world's previously  
18 denied areas, former Soviet Union closed society; the use of computer  
19 bits rather than dollars as a unit of accounting in world trade; and  
20 major environmental data gathering initiatives like NASA's Mission to  
21 Planet Earth are examples that indicate that there is a geometrically  
22 expanding information ocean growing far faster than U. S. industry or  
23 defense can exploit it. This ocean contains accounts of world trade,  
24 data waiting to be refined and value added for resale, and much of the  
25 worlds formerly closely held secrets, particularly those for defense  
26 technology. Mining and refining this ocean fastest taps the mother  
27 lode to regain U.S. commercial ascendancy and maintain defense  
28 intelligence superiority. The ocean is not new, recognizing its

1 relation to rate and level of national development and exploiting its  
2 relation to national power and planning to best incorporate  
3 information power in future U.S. strategy--along with the classical  
4 geo-strategic elements of defense, economic, and military power--is  
5 new.

6 Dr. Edwin H. Land, inventor of Polaroid instant photography  
7 said, "Discoveries are made by some individual who has freed himself  
8 from a way of thinking that is held by friends and associates who may  
9 be more intelligent, better educated, [and] better disciplined, but  
10 who have not mastered the art of a fresh, clean look at the old, old,  
11 knowledge." I submit that it is time to take a fresh look at the  
12 value of information that is accumulating. Time to think anew how the  
13 United States uses the foundation built by Morse, Babbage, Bell,  
14 Edison, Marconi, De Forest, Sarnoff, Shannon, and Von Neumann.

15 Information Deus Ex Machina.

16 How can the United States exploit this geometrically expanding  
17 information ocean? Fortunately telecommunications, massively  
18 parallel and optical computers, and new capabilities, like object-  
19 oriented databases and neural computer programming, are likely to make  
20 practical sorting the information flowing through major tributaries  
21 and drawing from the information ocean to put copies of relevant  
22 information into the open and closed seas for future use. Neural  
23 programming could recognize patterns sought by standing EEI  
24 requirements for defense, commerce, politics, and education. Neural  
25 network programs could review past intelligence and economic successes  
26 and failures for patterns that suggest new EEIs--a self-teaching  
27 indications and warning capability for defense and commerce!

1       Let us look at an example. If we were to persuade every human  
2 on earth to speak their mind simultaneously, the result would be about  
3 120 words per minute, two words of five letters, i.e., about 80 bits  
4 per second, times six "giga-persons", or  $4.8 \times 10^{11}$  bits per second of  
5 data--about 150 Encyclopedias Britannica per second. Collectively  
6 communications satellites carry more than  $4.8 \times 10^{11}$  bits of data each  
7 second! Routine communications relay of information exceeds the  
8 entire potential collective expression of mankind at any moment!

9       Could computers process this information flow for useful  
10 information in real-time. That is, are computers available, or soon  
11 to be available, that could process all the speech of mankind as the  
12 words are spoken? All the publications and broadcasts as they occur?  
13 Could current technology search this hypothetical production of  
14 information for EEIs in real-time? Can computers and  
15 telecommunications deliver such rates?

16       The Defense Advanced Research Project Agency (DARPA) leads the  
17 Concurrent Supercomputing Consortium. It has provided a 128-node  
18 (Intel Corp. i860 processor) iPSC/860 computer to the National  
19 Institute of Health which performs  $7.6 \times 10^9$  ( $10^9$  equals one billion)  
20 instructions per second to develop advanced techniques for analyzing  
21 protein and virus structures.<sup>9</sup> The DARPA-sponsored Touchstone program  
22 Delta prototype performed 11.9 billion instructions per second last  
23 November. By developing a newer Intel Corp. microprocessor chip, a  
24 commercial machine, the Paragon XP/S, will offer five-billion-  
25 instruction-per-second supercomputing by 1993. The Paragon will cost  
26 two-million dollars--one-tenth to one-hundredth the cost per  
27 instruction per second of office personal computers and an order of

<sup>9</sup>Taft, Daryl K. "Powerful Computing Leads NIH to New Understanding of Viruses." Government Computer News. February 17, 1992.



1 magnitude cheaper than infamous Cray commercial computers of today.  
2 Such newer computers supporting the aerospace, chemical, electronics,  
3 petroleum, and pharmaceutical industries could increase the U.S. GNP  
4 by \$500 billion in the 1990s. Affordable computers exceed  $4.8 \times 10^{11}$   
5 bits per second and telecommunications is about to pass this 480  
6 billion bits per second rate. Current AT&T fiberoptic T-3 trunks  
7 carry 45 million bits per second between major U.S. metropolitan  
8 areas. AT&T Bell Laboratories have demonstrated 32 billion bits per  
9 second and experiments have produced 100 billion bits per second  
10 rates.<sup>10</sup>

11       If one fed each of the Delta's more than 500 processors one word  
12 at a time taken from the incoming stream of  $4.8 \times 10^{11}$  bits per second,  
13 that is two words per second times six billion persons or  $1.2 \times 10^7$   
14 words per second, it would take  $1.2 \times 10^7$  divided by 500 to look for a  
15 single key word given to all 500 processors simultaneously. Doing the  
16 arithmetic,  $1.2 \times 10^7$  divided by  $5 \times 10^2$  equals 24,000 cycles. For simple  
17 key word search, it would take one-hundred times as long for one-  
18 hundred different key words, that is, it would take 2.4 million  
19 cycles. Neglecting computational overhead, the Delta performs more  
20 than ten-billion instructions per second using its 500 processors, so  
21 each performs two-million cycles per second. If the incoming  
22 information is in plain text in this overly simplistic example, the  
23 current Delta could sort through the entire expression of humankind  
24 for eighty key words without falling behind! The Delta is not even  
25 optimized for this problem.

26       An eighty key word search is not sufficient for substantive  
27 searches, but one most likely would distribute a number of machines--

---

<sup>10</sup>Skerrett, P. J. 'The Teraflops Race.' Popular Science. March 1992. 51-55.

1 remember a \$2 million dollar version will soon be available--at  
2 convenient locations where portions of open broadcast and publication  
3 data would be available. The findings of decentralized, or  
4 centralized multiple machine searches, would be fed to successively  
5 more complex searches by neural network programmed machines to look  
6 for associations that could provide indications or intent of impending  
7 political, economic, or military clashes or opportunities in  
8 inventions or markets and more.

9       Neural nets could perform any algorithm provided by example.  
10 Custom neural programmed chips are commercially available now as are  
11 printed circuit cards for personal computer use that make over three-  
12 million connections per second per card.<sup>11</sup> A Delta machine hybrid with  
13 1860 conventional supercomputer cards and customized, reprogrammable-  
14 by-sample cards would be significantly faster and able to look for  
15 correlations that parallel history.<sup>12</sup>

16       Historical descriptions of conditions before the Yom Kippur and  
17 Arab-Israeli War could be reviewed by neural programs to form EEIs and  
18 search algorithms to best monitor for similar cases of impending  
19 surprise attacks throughout the world. The National Intelligence  
20 Officer for Warning could use this as a tool to expand his staffs  
21 ability to read all the "mail." Analysts could productively spend  
22 more time synthesizing "big picture" looks at trends that threaten  
23 U.S. interests. They could build compelling cases to forewarn in-  
24 country U.S. ambassadors through the State Department watch. An  
25 ambassador could be forewarned before being called to unexpected  
26 meetings with heads of state, such as Saddam Hussein seeking to  
27 reinforce his perception that the United States would not intervene in

<sup>11</sup>About \$2,000 per card at present production rates.

<sup>12</sup>Based on Intel Corp. and California Scientific Software brochures.

1 the Iraqi invasion of Kuwait. The 1990s will bring personal  
2 communication devices ("pocket communicators!") that ambassadors could  
3 carry for immediate communications and personal safety.

4       The Delta is designed to meet the requirements of designing  
5 pharmaceuticals, understanding biological structures, and control of  
6 vehicle signatures. Another order of magnitude in speed will enable  
7 its successors to tackle the extremes of climate modeling; ocean  
8 circulation; semiconductor and superconductor modeling; fluid,  
9 aerodynamics, combustion engine modeling, and human genome data and  
10 modeling. These problems are similar in complexity to fully sorting  
11 essentially the full output of humankind's information in real-time  
12 into selectively EEI-filtered information seas by complex sorting  
13 rules. Collectively all U.S. intelligence analysts working together  
14 could not approach this capability, but analysts can benefit from such  
15 a machine's support.

16       These ultrafast machines use current integrated circuit  
17 technology--that is they "rack and stack" Intelligence Corporation  
18 processors in a massively parallel computing configuration to divide  
19 the incoming information into multiple, parallel paths that are  
20 operated on simultaneously. Hardware will no longer be the limiting  
21 factor and detailed questions need not be formulated and researched  
22 long before national interests determine the specific area to  
23 research. Tongue-in-cheek, but with some serious applications in  
24 mind, I noticed during the Persian Gulf War, one could have perhaps  
25 used CNN input to initiate neural programs to create background EEIs.  
26 These EEIs and algorithms would in turn perform timely research to  
27 confirm or deny the accuracy of CNN reporting, and answer many  
28 questions that CNN generated within the federal government!

# 1 The Information Rich Get Richer

2       Let us take a new look at world resources. Facts about space,  
3 earth, seas, atmosphere, minerals, people, population, society,  
4 business, military art and hardware, countries, nationalities, and so  
5 on are data available for collection, and much has already been  
6 collected. Recall that information is produced when data is  
7 processed, for example, filtered, correlated, and analyzed to extract  
8 and retain a product that can be exploited. Furthermore, knowledge is  
9 a collection of information that is stored within a human mind  
10 equipped with the innate intelligence, education, and communication  
11 skills to practice exploitation. The addition of readily available  
12 computers and telecommunications acts as a catalyst boosting the  
13 mental productivity for the knowledgeable to more readily collect data  
14 and exploit information--to gain knowledge, to invest in technology or  
15 simply sell knowledge to attain power. Already one can observe the  
16 prospect that knowledgeable people more easily become more  
17 knowledgeable and that this is likely to translate into the rich  
18 becoming richer the powerful becoming more powerful.

19       Barter was an initial basis for an economy, but it was slow.  
20 Using currency expedited trade. Using computer bits arranged as  
21 symbols for currency and goods greatly expedites international,  
22 interlingual trade. Similarly, couriers initially were satisfactory  
23 in Napoleonic warfare, but only computer-to-computer relay satellite  
24 links may be fast enough to prime an effective anti-tactical ballistic  
25 missile system. Only high velocity information provided by digital  
26 electronic transmissions, not men on horseback, can support the  
27 Persian Gulf demonstrated hyperwar with low casualties. Simply,  
28 speedy handling and processing adds value and consequently power for  
29 information possessors.

1       The developed nations have information and means to collect,  
2 store, process, and transmit it to their benefit. Pre-sorted open and  
3 closed information seas have negotiable contents and are useable as  
4 national resources. Like gold in Ft. Knox. Lesser developed nations  
5 and newly industrialized nations have to retrace invention paths--  
6 unacceptably slow--or trade for information possessed by the developed  
7 industrial nations to gain technology to continue their national  
8 development. Whether the lesser developed nation is on the moral high  
9 ground, such as a quest to improve agriculture to feed their growing  
10 populations, or pursuing a nuclear arsenal at the expense of billions  
11 of dollars for technology (essentially applied information) lesser  
12 developed nations must invent or purchase crucial knowledge. Because  
13 it takes applied information to extract value from information, the  
14 information rich have a nearly unassailable head start, and are likely  
15 to get richer, while the information poor remain relatively poor.

16 Not Necessarily a Zero Sum Game.

17       Though this need not be a zero sum game as long as natural  
18 resources and data are available, it is certainly true that people  
19 that are not knowledgeable are at an increasing disadvantage.  
20 Likewise tribes, countries, and nationalities lacking knowledge will  
21 fall behind since they may lack even the capability to design or  
22 acquire telecommunications and computing resources essential to draw  
23 from the information ocean around themselves. If they also lack  
24 wealth to buy persons with the needed knowledge their lag behind  
25 nations like the United States will be monotonically increasing.

26       It is also true that the dismantling of unions and republics,  
27 such as the USSR, is releasing great amounts of data, information, and  
28 knowledgeable people. The citizens and member nations will need to

1 exploit the data, information, and knowledge that they possessed to  
2 care for their people, establish commerce, and provide for defense.  
3 The United States can assist in the exploitation of the former USSR's  
4 information to the benefit of both the United States and its trading  
5 partners including new markets in the former USSR. This should be  
6 useful to both the United States and the former USSR member nations.

7       The West can also exploit the quantities of data, information,  
8 and knowledge that previously were bound in NATO countries. If U.S.  
9 defense requirements change in a manner that can be satisfied with  
10 less secrecy than the United States exercised in the Cold War years,  
11 then within the United States there is a body of data, information,  
12 and knowledge that could be exploited for commerce and education as  
13 well as defense.

#### 14 Dissatisfaction and Wars Still Can Happen.

15       Marshall McLuhan introduced the concept of a global village.  
16 Arthur C. Clarke, inventor of geosynchronous communication satellites,  
17 foresees the whole world becoming a global village with every resident  
18 having access to two-way voice and picture communications and  
19 databases containing all information known to humankind.<sup>13</sup> In effect,  
20 everyone would be so easily contacted we all would be in the same  
21 village.

22       It is becoming apparent that the rich and knowledgeable received  
23 a head start that divides the global village. Wealth and knowledge  
24 are not homogeneously distributed within or between countries today.  
25 Networks formed between the knowledgeable form an emerging demographic  
26 strata that is likely to become more distinct with time. Information  
27 will not be dispersed uniformly any more than wealth. Information

<sup>13</sup>Pierce, John R., and Noll, A. Michael. Signals: The Science of Telecommunications. 1990. W. H. Freeman: New York. 231.

1 will be aggregated with the knowledgeable--the rich and powerful.  
2 Rather than a uniform global village, we will see information sprawl  
3 radiating from commercial and academic centers along  
4 telecommunications expressways.

5 With the potential shift from Cold War emphasis on strategic  
6 military power to heated economic power competition, it will not be  
7 pleasant to live on the wrong side of the global village tracks  
8 without information. This division may be the basis for wars both  
9 within a country where it is likely to take sides along racial,  
10 ethnic, and poverty lines and similar divisions internationally  
11 between developed and lesser developed countries. We are likely to  
12 see the unravelling of old world order and the new alliance of  
13 countries into groups based on common information lines ("iso-  
14 knowledge or iso-technology contours") that are likely to resemble  
15 demographic distinctions. We see wealthy third world nations where  
16 the wealth is diverted significantly from most people to gain  
17 knowledge to develop nuclear weapons as an equalizer. There may be a  
18 new phenomenon like colonization, where information "haves" establish  
19 relations with dependent information "have nots."

20 More Definitions: Extending the Framework To How Information Flows and  
21 How It Is Distributed.

22 Information lines of communication (ILOCs) are the means for  
23 movement of data, information, and knowledge between information  
24 centers around the globe. ILOCs subdivide into Data Lines of  
25 Information (D-LOIs) and Physical Lines of Information (P-LOIs).  
26 Either can further be subdivided into accessible and inaccessible.  
27 Information flowing through centers comes from and is distributed to  
28 political, defense, commercial, and popular strata named after their

1 uses within an information center and the information sprawl into  
2 geographic areas outside the information centers.

3 D-LOCs are formed by operating satellite and radio links,  
4 broadcast radio transmissions, fiberoptic trunks, submarine cables,  
5 telephone lines, and more. P-LOCs bulk ship information in published  
6 documents, knowledgeable people, CD-ROM disks and optical disks, high-  
7 technology equipment, and so on. Six CD-ROM disks store the  
8 equivalent of an Encyclopedia Britannica and each disk is the same  
9 size as popular Compact Disks used by the music industry. High  
10 technology equipment is not only useful to nations developing  
11 industrially, it is susceptible to reverse engineering for its new  
12 possessor to derive some of the proprietary knowledge used in its  
13 development. P-LOCs transmitters are aircraft, ships, shirt pockets,  
14 shoes, and so on.

15 Information states send data across sovereignties via  
16 telecommunications paths and information flows into and out of strata.  
17 Balanced dialogue can be held with business strata. Business normally  
18 requires contracts which are inherently two-party exchanges. A  
19 monologue is more typical with defense and popular strata. Ask most  
20 anyone about departments or ministries of defense and they will note  
21 defense personnel tendencies to listen but rarely to provide their  
22 national security secrets. The populous consumes vast amounts of  
23 information from television and movies to magazines while responding  
24 with few letters to the editor or pollsters. They offer their opinion  
25 periodically at elections, through political action committees and  
26 polls, and union or PTA meetings. It is likely that the populous will  
27 provide more direction to their government in the foreseeable future  
28 through computer and telecommunications technology. The relation of



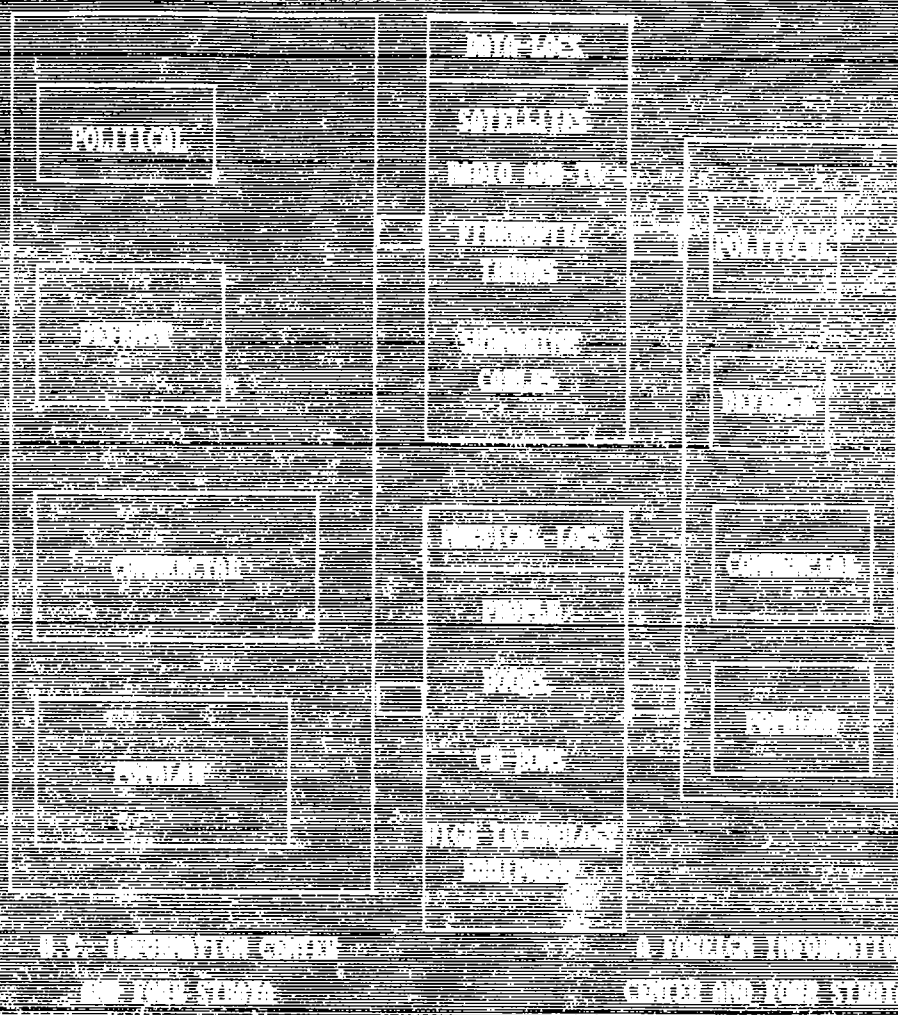


FIGURE 100  
NATIONAL INFORMATION CENTERS AND RELATED STRATA WITH INFORMATION FACTS

### Information Strategies and Mechanisms.

With major world powers reliant on computers and telecommunications, business between world powers and penetrating into third world and former major powers will demand computer and telecommunications services and systems. The consumption of systems, services, and data will be a way of life for attaining political and economic power and consequently supporting military power as well.

The process of adding value to information as it passes through businesses and nations will become a staple portion of international economics. Participating in this data flow benignly for commercial purposes and tapping it for intelligence value for defense purpose will be vital to nations. Information will become sufficiently valuable that information embargoes will become a tool of international power much like the political, economic, psychological, and military instruments are today. In essence, information power becomes equivalent to economic power for the more advanced nations.

Rather than concentrating on analyzing and taking action on a geographic border basis, I submit it will be useful to examine and influence relative power from a geo-information perspective. Concentrated information flows--concentrated in computer networks through major telecommunications link dialogues or radio and TV broadcast monologues--and between developed nations and between developed and lesser developed, newly industrializing or "information acquiring" nations will be an indicator of relative potential power and a means to influence development and competitiveness or interdependence.

The borders of information centers does not necessarily conform to existing nation borders. Each strata--political, defense, commercial, and popular--has a different magnitude and direction of

1 information sprawl. Some strata may be totally contained within  
2 existing borders others may cross borders. For example, military  
3 alliances result in defense strata crossing borders. Furthermore, the  
4 alliance could connect the defense strata of the United States center  
5 with the defense strata of another center elsewhere on the globe, not  
6 adjacent to the United States. The United States may only exchange  
7 defense information with this foreign information center and not have  
8 popular or commercial strata information exchanges. For the sake of  
9 some simplicity, I have included scientific exchanges under the  
10 commercial and defense information strata and cultural exchanges under  
11 political and popular strata.

12 New Value: Information Monitor, Supply, or Denial.

13 The new world's recognized reliance on continuing information  
14 flows suggest information power provides new instruments to support  
15 political, military, commercial, and psychological power:

16 1. Monitoring. Monitoring the immigration of knowledge and  
17 computer and telecommunications equipment to process data,  
18 information, and knowledge provides trend information that may apprise  
19 the U.S. of nations attempting high technology efforts like nuclear  
20 weapons or supercomputer developments that could confront the U.S.  
21 militarily or economically.

22 Example. Determining that Iraq had sent numerous students to graduate  
23 schools for degrees in nuclear sciences and engineering and that Iraq  
24 was purchasing ultra-centrifuges in extraordinary quantities could  
25 have provided indications of interest in processing spent fuel for  
26 plutonium.

27 2. Banking and Trading. Information banks and aid for  
28 humanitarian assistance and developing nations and markets. These

1 banks could be dynamic (using D-LOCs) and provide for direct "drop  
2 shipment" of information (using D-LOCs and P-LOCs).

3 Example. The United States has to continue subsidizing the operation  
4 of the LANDSAT multi-spectral imaging satellite program. Its data has  
5 proven invaluable to geologists, civil and military engineers, and to  
6 petroleum exploration, but there is little need to repetitively image  
7 an area, for example, to find new mineral outcropping. These events  
8 occur at a geological pace. Nonetheless LANDSAT has great utility.  
9 Could the United States send a lesser developed country the modest  
10 equipment needed to experiment with LANDSAT data and then provide the  
11 country with as much LANDSAT data of the country as it requests--not  
12 its neighbors or coveted resources like nearby oil fields or military  
13 installations. In exchange, the United States might simply stress the  
14 need to repay existing debt to U.S. banks.

15 3. Coercion. Information embargoes on telecommunications LOCs,  
16 emigration of knowledgeable people, or control of very specific high  
17 technology equipment.

18 Example. Information embargoes are more likely to focus on  
19 deprivation of high-technology efforts such as development of weapons  
20 while not depriving the masses of food nor medicine as economic  
21 embargoes often do. With refinement and an alliance built on the  
22 present Nuclear Non-proliferation Treaty this could slow nuclear  
23 proliferation. It might also lead the United States to other  
24 suppliers and perhaps permit demarches to slow further export of  
25 equipment needed for developing weapons of mass destruction.

26 4. War. Information wars to deprive a competitor of valuable  
27 information.

28 Example. Information war could be used in the eleventh hour cases

1 when war appears inevitable over strategic materials such as oil. For  
2 example, suppressing communications rates and reliability of  
3 information or destroying ILOCs with adjoining nations could destroy  
4 confidence in receiving tactical warning of compelling United States  
5 or coalition preparations of surprise limited military actions. This  
6 is an area where innovation is nearly unlimited, but great wisdom is  
7 necessary to consider the ultimate impact. Presidential findings and  
8 Congressional notification are likely to be necessary.

9 More Examples. Information deception certainly has been used in  
10 rudimentary ways in support of military power. WWII allies used  
11 deception before the Normandy landings to successfully reinforce the  
12 Axis view that the landings would be elsewhere and "elsewhen." Also,  
13 Patton had the full advantage of proven ULTRA information, but was  
14 restrained so as not to tip the Axis to the fact the Allies had broken  
15 ULTRA.

16 This also suggests a defensive role to protect information lines of  
17 communication. This role would be similar to the U.S. navy's *vis-a-*  
18 *vis* sea lines of communications (SLOCs) and the importance it has in  
19 modern maritime strategy. Technology for encrypting and to reduce  
20 susceptibility to ILOC D-LOC suppression is essential. Security  
21 against "hackers" supported by foes will also be essential. This  
22 should extend to key financial centers and commercial transportation  
23 nodes as well.

#### 24 Knowing Thine Enemy: Monitoring, Banking, and Coercing.

25 Monitoring the international flow of information, even benignly,  
26 by counting information nodes and products may be a reliable  
27 indication of future potential for development. Where are computers,  
28 televisions, telephones, communications satellite (Comsat) and

1 business-operated portable, very small aperture terminals, on-line  
2 data services, publishers, newspapers, stock exchanges, and so on.

3 After Saddam Hussein fell victim to the "Hail Mary" end run,  
4 future competitors will place greater emphasis on exploitation of open  
5 and closed source intelligence for greater military power and  
6 logically for greater economic power also when competing with the  
7 United States.

8 Tracing the acquisition of computer equipment and  
9 telecommunications gear is tantamount to understanding upcoming power  
10 bases in the Third world. Certain equipment is more likely for use in  
11 each information strata whether political, defense, commercial, or  
12 popular.

13 Another potential strategy consisting of the tandem use of  
14 information bank incentives and coercive embargoes or publicity could  
15 use promises and threats to achieve U.S. national interests. Per  
16 Schelling Arms and Influence, China, Britain, and France may have built nuclear  
17 weapons for political rather than military reasons.<sup>14</sup> Much of the  
18 purpose of nuclear weapons development in these nations could have  
19 been served by any extreme technology demonstration, like the French  
20 Arise space commercial launch capability. These are information  
21 intensive projects for power, prestige, or substantive development.  
22 Could we abate nations seeking nuclear weapons for political reasons  
23 by revealing privately to the proliferating country that we know of  
24 their nuclear weapon program or publicly exposing their programs?  
25 Could we apply coercion or promise information causing or making  
26 practical the substitution of other information intensive programs

---

<sup>14</sup>Schelling, Thomas C. Arms and Influence. 1966. Yale University Press: New Haven. XXX.

1 that need not have mass destruction as a potential outcome if their  
2 weapons program is intended to bolster political influence?

3       Whether the equalizer is a weapon of mass destruction, a dual-  
4 use space and missile program, supercomputer development, or the 1990s  
5 equivalent of the first Honda imports aimed at violent destruction or  
6 fierce economic competition, monitoring the migration--even the brain  
7 drain--of knowledgeable people and the acquisition of computers and  
8 telecommunications could provide indications of future potential  
9 competitors.

10 "Symbols that Bind" or Cripple.<sup>15</sup>

11       Sustaining North American economic power denies isolationist  
12 policy acceptance. Americans must communicate with and influence  
13 others to trade. International economic dependence depends on a  
14 policy of free information exchange. Symbols representing accounting  
15 for wealth must be exchanged beyond North America. Information will  
16 need to be imported and processed to add value for export. Future  
17 U.S. policymakers could be accountants and computer technicians!

18       The irreversible dependence on information between the North  
19 American information centers and other world information centers  
20 offers the prospect of growth through international trade. It also  
21 confronts us with vulnerabilities. A collegial international  
22 recognition that the world's information centers are reliant on  
23 continued exchange of valid information is vital. Furthermore, a  
24 gentlemanly approach that emphasizes mutual prosperity and shuns the  
25 crippling effects of information war is critical. The effect of  
26 international information war could be almost as staggering as nuclear

---

<sup>15</sup>Toffler, Alvin. Power Shift: Knowledge, Wealth, and Violence at the Edge of the 21st Century. Bantam, 1990. pp XXX.

1 war with economies dependent on world banks and trade being devastated  
2 and worldwide depression following.

3       Restructuring to Exploit Open and Closed Information Seas.

4       How will the United States be affected when it becomes clear  
5 that computer binary bits have become the standard of accounting  
6 rather than the dollar? Is it then likely that there will be no  
7 strong inherent advantage in international business for English  
8 speaking and dollar using nations? Wouldn't it be prudent and  
9 becoming the developed, information-intensive United States to base  
10 decisions to compete or cooperate with foreign nations on current,  
11 substantive knowledge. To open communications or emigration of brain  
12 power ports, to increase mutual trade, to address environmental issues  
13 when it is beneficial rather than after circumstances have changed so  
14 greatly to condemn the U.S. government to anachronistic policymaking.

15       American schools and manufacturers could have more current,  
16 accurate, and realistic information. American intelligence would have  
17 a broader information base, especially in more third world countries,  
18 and be able to apply information without tight restrictions to protect  
19 sources and methods. Sensitive intelligence collection to corroborate  
20 open sources would be required, but tasking loads for science and  
21 technology or economic intelligence could possibly be reduced to allow  
22 concentration on defense matters especially when significant direct  
23 support to tactical military operations is vital. Like the god,  
24 Argus, the United States could keep eyes on commercial and defense  
25 information simultaneously.



1 Using Information Analysts To Analyze Not To Memorize.

2       What could be done to improve the effectiveness of U.S. domestic  
3 and foreign policy given access to the vast information ocean that  
4 awaits? Generally, the ocean could be continually drawn from to form  
5 readily searched open and closed information seas. Pre-sorting into  
6 seas could make development of timely user-specific information pools  
7 that offer immediate answers to EEIs. Such pools would immediately be  
8 of value to commerce and defense, in particular, to industrialists,  
9 economists, educators, scientists, political economists, demographers,  
10 intelligence analysts, and military planners and operators.

11       Today intelligence analysts produce topic specific pools, but  
12 they are usually restricted, closed information not available for  
13 commerce. Intelligence products are produced for topics that might  
14 never again be of interest. Large numbers of analysts each specialize  
15 in specific topics--a marching army--within which timely cross  
16 information exchanges is extremely difficult. Mind sets develop from  
17 the way humans generalize information for memorization and recall  
18 since it is beyond their capability to retain all details.

19       I suggest it would be more responsive, flexible, and beneficial  
20 to continually update the open and closed information seas, carefully  
21 keep the seas separated, and build the mechanism required to  
22 spontaneously compile EEIs and search for the information sea subset  
23 needed to extract a pool of user-required information--"just-in-time"  
24 information. Both open and closed source pools could advisedly be  
25 formed from two seas so policy requiring open incentives or coercion  
26 could use open source data and not compromise sources and methods used  
27 only in conjunction with the closed pool. Open pool information could  
28 be used to multiply the effect of closed pool information in a manner  
29 seldom exploited today. Today, open information is frequently melded

1 with closed information. Retrieving it from analytical intelligence  
2 products is time consuming and risks compromise.

3       For emphasis, the two seas represent first, the portion of the  
4 information ocean that was collected from open sources to be used  
5 commercially with some impunity and second, the portion that was  
6 collected by sensitive sources and methods to be used discretely to  
7 support perhaps international coercion or military power when  
8 required. Vannevar Bush may have predicted the current world  
9 situation and need to use the growing ocean of information in 1945,  
10 when he suggested that it was time to stop inventing "cruel weapons"  
11 of war and to make peaceful inventions.<sup>16</sup> More than forty years of  
12 Cold War and an immense proliferation and refinement of "cruel"  
13 nuclear weapons interceded and the information oceans have expanded  
14 manifold times.

15       Let us refocus the intelligence requirements of the United  
16 States to better collect knowledge, information, and data in this new  
17 priority order and yet retain the means to corroborate information to  
18 prevent deception and in case significant portions of the world may  
19 again resort to closed societies. Though the world is perhaps more  
20 dangerous than before it is arguably more open so it is feasible and  
21 more practical to collect and exploit the higher value knowledge and  
22 information from many sources, many of which are open. Collecting  
23 data and building intelligence products from the bottom up was  
24 necessary with major blocks of the world closed during the Cold War  
25 years. With greater focus on dangers to the United States from  
26 relatively open societies, the emphasis transfers to speedy collection  
27 and exploitation as well as banking information for redistribution to

---

<sup>16</sup>Ignazio, Fred. Messner's Introduction to the Computer. Messner; New York. 1983. 137.

1 benefit United States commerce as well as defense. This shift to  
2 speed, and the possibility of directly learning or deducing intent  
3 from more open sources, argues for a focus on the high value added  
4 knowledge directly from people and their commerce, then from non-  
5 volatile sources such as publications, and lastly, on data. Much of  
6 the data circulating in the third world was created by the United  
7 States. We know the data. We need insight into their knowledge to  
8 compete with foreign use of familiar data.

9 New Information Order.

10        Though reorganizations are always wasteful in the short term,  
11 reorganization is typically justified when calamitous changes occur  
12 like the end of the Cold War. Congress and the executive branch are  
13 agreed that the intelligence community is in need of reconstruction to  
14 address the developing new world order. The above refocus requires  
15 anew the banking of large, fluid pools of information that must have  
16 high liquidity to be of commercial and economic benefit. And there is  
17 still the requirement for banks of knowledge and information (de-  
18 emphasizing data except for vital bottoms up corroboration and  
19 validation) to support military power that will require protection of  
20 source and methods.

21        This presents the need for two information pools, one that is  
22 open and highly liquid and a second that is closed and more responsive  
23 that in the past because of our good fortune to be able to focus on  
24 high value knowledge and information. It will be prudent to separate-  
25 -not totally isolate the organizations and architectures that process  
26 these pools of information. Perhaps the creation of a commercial  
27 information agency and a defense information agency supporting in  
28 place of the thirteen agencies presently funded from the National

1 Foreign Intelligence Program. Two agencies that perform collection  
2 tasking through information dissemination while any information user  
3 whether commercial or federal could generate information requirements  
4 to be submitted to and tasked by either of the two information  
5 agencies.

6 As the value of information to politics, economics, psychology,  
7 and military becomes vital, it should be recognized to the extent that  
8 a Department of Commerce with a new Critical Information Division  
9 (CID) and Department of Defense with an updated Defense Intelligence  
10 Agency (DIA) may become a prudent approach to recognize that pooling  
11 of information, openly for profit by commerce and behind doors for  
12 sensitive source information for economic and military power, is  
13 becoming central to national power. Denied areas have greatly  
14 decreased and open sources of information could potentially provide  
15 indication of improprieties such as nuclear weapons proliferation.  
16 Sensitive collection means will still be essential but a turn to  
17 processing the ore from the growing lode of open information will be  
18 essential to meet mass and timeliness requirements to effectively  
19 apply information power. Furthermore, without the concerns about  
20 sources and methods it may be legal to open the pool to U.S. and  
21 allies businesses. Military protection of ILOCs during war is also  
22 likely to become necessary.

23 Figure three describes some of the potential uses of information  
24 both domestically and externally through peace and various levels of  
25 conflict. For simplicity, the executive agents for both open and  
26 closed source information are reduced to the Secretary of Commerce  
27 Critical Information Division (CID) and the Secretary of Defense  
28 Defense Intelligence Agency (DIA), respectively, with the

1 administration of information and intelligence under a single Director  
2 of National Information. The figure is a very sketchy notion of the  
3 interaction of information means and management under many  
4 circumstances. Any respectable treatment would easily require another  
5 paper similar in magnitude to this one. Therefore, I hope the reader  
6 limits use of the table to beneficial brainstorming and not to  
7 bureaucratic mayhem.

| 1  | UNITED STATES ACTIONS                   | LEVEL OF CONFLICT | INSTRUMENT OF POWER | INFORMATION EXECUTIVE |
|----|-----------------------------------------|-------------------|---------------------|-----------------------|
| 2  | <u>INTERNAL TO UNITED STATES</u>        |                   |                     |                       |
| 3  |                                         |                   |                     |                       |
| 4  | SITUATION AWARENESS                     | ALL               | ECON/INFO           | CID                   |
| 5  |                                         |                   |                     |                       |
| 6  | STATIC INFORMATION RESOURCES            | ALL               | ECON/INFO           | CID                   |
| 7  |                                         |                   |                     |                       |
| 8  | DYNAMIC INFORMATION RESOURCES           | ALL               | ECON/INFO           | CID                   |
| 9  |                                         |                   |                     |                       |
| 10 | <u>EXTERNAL TO UNITED STATES</u>        |                   |                     |                       |
| 11 |                                         |                   |                     |                       |
| 12 | SITUATION AWARENESS                     | ALL               | ECON/INFO/MIL       | CID/DIA               |
| 13 |                                         |                   |                     |                       |
| 14 | PEACETIME ENGAGEMENT                    | PEACE             | INFO/MIL            | CID/DIA               |
| 15 |                                         |                   |                     |                       |
| 16 | INCENTIVES                              | PEACE             | ECON/INFO           | CID/DIA               |
| 17 |                                         |                   |                     |                       |
| 18 | EMBARGO—INFORMATION                     | CRISIS            | INFO                | CID/DIA               |
| 19 |                                         |                   |                     |                       |
| 20 | EMBARGO—ENERGY/ARMS/STRATEGIC MATERIALS | CRISIS            | ECON/MIL            | CID/DIA               |
| 21 |                                         |                   |                     |                       |
| 22 | EMBARGO—FOOD/FERTILIZER/OTHER           | CRISIS            | ECON/MIL            | CID/DIA               |
| 23 |                                         |                   |                     |                       |
| 24 | COERCION                                | CRISIS            | MILITARY            | DIA                   |
| 25 |                                         |                   |                     |                       |
| 26 | COVERT ACQUISITION                      | CRISIS            | INFO/MIL            | DIA                   |
| 27 |                                         |                   |                     |                       |
| 28 | COVERT OPERATION                        | PEACE/CRISIS      | PSYCH/ECON/INFO/MIL | CID/DIA               |
| 29 |                                         |                   |                     |                       |
| 30 | MILITARY CONTINGENCY OPERATION          | CRISIS            | PSYCH/ECON/INFO/MIL | CID/DIA               |
| 31 |                                         |                   |                     |                       |
| 32 | HYPERSURPRISE ATTACK                    | THEATER           | INFO/MIL            | CID/DIA               |
| 33 |                                         |                   |                     |                       |
| 34 | SPECIAL OPERATION                       | THEATER           | MILITARY            | DIA                   |
| 35 |                                         |                   |                     |                       |
| 36 | HYPERWAR                                | THEATER           | INFO/MIL            | DIA                   |
| 37 |                                         |                   |                     |                       |
| 38 | CONVENTIONAL ARMS WAR                   | THEATER           | MILITARY            | DIA                   |
| 39 |                                         |                   |                     |                       |
| 40 | ANY ARMS WAR                            | GENERAL           | MILITARY            | DIA                   |

FIG. 3  
SUPPORTING RELATIONS

### Conclusion.

1           The late 1800s geostrategic concepts developed into useful  
2  
3 notional models for thought experiments in balance of power. This led  
4 to recognition that countries responded to actions by their neighbors  
5 and formed alliances with their non-adjacent neighbors to contain  
6 immediate neighbors now straddled by an alliance--an Occidental  
7 version of an enemy of my enemy is my friend. In the information age,  
8 such alliances should first of all emphasize rapport. Power will  
9 aggregate along stratification of users in world information centers--  
10 future "heartlands" of world power. Unlike the "heartland,"  
11 information centers can develop in a portion of a nation or be formed  
12 by the interaction of portions of many geographically separated  
13 nations. Centers are not likely to respect current national borders.  
14 They will rise and fall in power far more quickly than currency-based  
15 economic power. Since economic power is enabled by information,  
16 economic power will follow changes in information power.

17          The DoD has been the source of most advanced U.S. technology.  
18 Technology that is often five-to-ten years more advanced than off-the-  
19 shelf state of the industry technology. If the end of the Cold War  
20 diminishes the need for a defense-driven technology base, let us  
21 foster an additional incubator for technology by building up the  
22 National Institute for Standards and Technology (NIST). NIST because  
23 it is situated in the Department of Commerce, open and accessible to  
24 advance commercial, medical, and environmental solutions, and because  
25 NIST is a major developer of advanced computing and vital standards  
26 required for things technical to communicate in a mutually  
27 understandable language. A DoC NIST Critical Information Division  
28 could begin filling the U.S. open information sea and providing the  
29 lead to put a personal computer within reach of every school child in

1 our country. DoC NIST and DARPA could guide and seed commercial  
2 development of desktop computers at commodity prices that would make  
3 it possible to put computers in all classrooms in the United States.  
4 This could enable greater industrial competitiveness and provide  
5 information and perhaps personal computers to be seeded generously in  
6 lesser developed countries to develop markets and improve the quality  
7 of life on the wrong side of the global village tracks.

8       The U.S. government must recognize the existence of great open  
9 sources of information to grasp and process for an industrial and  
10 environmental offense and to provide competitive technology  
11 information that prepares U.S. industry for competition from companies  
12 and products they might not have heard of before new products decimate  
13 U.S. U.S. high-technology product markets.

14       To best exploit the information ocean, the United States should  
15 take a new look at information's role as an emerging national power  
16 much like economic, military, or political power. The United States  
17 should explore new means to rapidly collect and process the contents  
18 of the information that will enable new applications and power.

19       Others are gathering the data, information, and knowledge. Our  
20 government needs to draw on--purchase directly or lift from the public  
21 domain, and process this data to accentuate and redirect information  
22 masses to leverage information power in sustaining U.S. superpower. A  
23 superpower is needed to lead sound development of the planet and the  
24 new world order. Information may be joining wealth as both glue and  
25 solvent that can reorder the world in the hands of a superpower's  
26 craftsmanship. It is not a zero sum game and developed and lesser  
27 developed countries can mutually benefit. There is a growing ocean  
28 of information, much of which is open source sea of information, which



1 treated properly permits uses not possible if the open information is  
2 not collected and maintained separately from closed source  
3 information. The growing open sea of information provides both the  
4 challenge and the opportunity for the United States to adapt and lead  
5 the world confidently into the next century.