National Defense University
Industrial College of the Armed Forces

Academic Year 2012

INDUSTRY STUDIES HANDBOOK

To Industry Studies Students and Faculty,

The information contained in this handbook is intended to supplement the teaching material prepared by the faculty for each industry study seminar.

Based on the spring curriculum review with the Deans and the Commandant, several areas of emphasis have been identified for AY 2012's Industry Studies Program.

1.) It is important to achieve a level of quality and rigor in our industry reports such that all are of "publishable" quality. This would include thorough but concise analysis using analytical frameworks provided in the Industry Analytics course and by IS faculty teams, and inclusion of key industry issues in the ten pages of "essays on major issues" section of the report. ICAF will, subject to the availability of funds, publish the top five to seven industry reports submitted this academic year.

2.) Given the compression of the schedule after international field studies, industry report drafts should be all but completed prior to departure the last days of April. Upon return, the primary industry report effort would be in adding findings from the international field studies, confirming or disproving hypotheses, refining the report, and preparing for cross-briefings and Distinguished Visitor briefings.

3.) Student cross-briefs must be of high quality and include significant seminar audience questioning and participation.

4.) Every industry report must address the implications for the subject industry of significantly reduced Defense spending in FY 2013 and beyond. In some instances, the industry studied may be substantially affected, in other instances only suppliers to primes may be affected, and in some cases very little effect may occur. It is important to provide that assessment, as well as recommendations, if appropriate, for government policy.

Please take the time to read this handbook, so you will know where to find answers to your questions as they arise throughout the course of the AY 2011-2012 Industry Studies Program. In particular, please note the format and organization requirements for the written report and oral briefings. Suggestions to improve the handbook are welcome. If you have any questions, please do not hesitate to contact me at briggsd@ndu.edu .

Don Briggs
Director,
Industry Studies Program

Table of Contents

	Page
Why ICAF Conducts Industry Studies	**1**
How ICAF Organizes Industry Studies	**5**
The Industry Study Seminar Sessions	**7**
Student Deliverables: Industry Study Products	**9**
Industry Study Report Sample Pages	**12**
Industry Study Awards	**20**
Travel Guidelines, Information, and Tips	**21**
Appendices	**29**
• **Appendix I-A: Markets, Competition and Industrial Analysis: Modern Views in a New Economy**	**31**
• **Appendix I-B: Methodology for Industrial Analysis for ICAF Industry Studies Program**	**59**
• **Appendix II: General Issues and Specific Questions for Consideration**	**73**
• **Appendix III: Factors to Consider: Structure, Conduct And Performance**	**79**
• **Appendix IV: Strategic Industry Analysis – What Makes an Industry Strategic? (The Technology Approach)**	**81**
• **Appendix V: Competitive Advantage – Porter's Prescription**	**85**
• **Appendix VI: Profile of Selected Indicators – A Menu of Things to Consider**	**87**
• **Appendix VII: Commercial Technology Insertion Questions**	**95**
• **Appendix VIII: DoD "Essential" Industry Capabilities Assessment Steps**	**99**
• **Appendix IX: The Life Cycle of an Industry**	**101**
• **Appendix X: Reference Books, Materials, and Sources**	**105**
• **Appendix XI: Industry Study Program Descriptions & Faculty Leaders**	**109**

Why ICAF Conducts Industry Studies

The study of the resources component of national security is a major element in the ICAF curriculum; indeed, it emerged from Bernard Baruch's original intent: "I should like to establish a little school ... to keep in touch with industry." Today, maintaining that scholarly link is largely undertaken within the Industry Studies (IS) Program, with the support in the spring term of the Acquisition and the Industry Analytics courses, as well as by the Defense Resources Symposium. Through the IS Program, ICAF expands upon Baruch's mandate by establishing analytical frameworks to use in assessing the state of a selected industry sector. As a result, one not only learns about a particular industry, but also *how* to learn about industry in general.

Purpose of the IS Program

The purpose of the IS Program is to contribute to the ICAF mission by providing students the opportunity to gain knowledge and experience in analyzing US and international industry from a strategic perspective. The IS Program combines rigorous learning in the seminar with practical experience through visits with industry. It provides students with multifaceted analytical tools needed to assess performance of firms and industries contributing to national security. Program objectives are to:

- Evaluate performance of industry in promoting economic welfare and serving national security needs.
- Examine the role of government policy or regulation and its effect on the capacity of industry to contribute to economic welfare and the national security strategy.
- Integrate the essential components of the ICAF core curriculum in an extended laboratory.

Value of IS Field Studies

The Field Studies portion of each industry study, together with school-wide lectures, seminar discussions, and processing, is an integral part of the curriculum and provides essential elements to achieving the objectives of the ICAF mission.

Meeting directly with industry provides unparalleled benefits for ICAF students and faculty. No other DoD school provides student seminars the opportunity to conduct field studies that promote experiential learning and comparative analyses, both domestically and globally. On-site, face-to-face meetings with industry provide for more interactions at every level, from labor to executives, with more range and depth, than would be achieved in the campus classroom.

Direct field study contact promotes willingness of firms and industry leaders to speak frankly, on their own premises, about information not in the public domain. Firms are more likely to discuss the strategic orientation of their company and their industry, and the challenges and strategies for dealing with risks and opportunities. Students are able to test and validate, on-site, classroom theories about the industrial base. Through direct field studies experience, students and

faculty are able to verify corporate assertions, as well as to validate marketing claims, online data, and annual reports. Direct observance and validation of claims of 6-Sigma implementation, just-in-time logistics principles, inventory control, actual production activities, tooling, and many more on-site observables are essential to understanding and evaluating the viability of the firm.

The field studies program enables outreach to hundreds of firms, and, in AY 2011 for example, 23 foreign governments. Visits by IS faculty and students to firms increase NDU/ ICAF presence, deepening and expanding IS's network of key industry stakeholders. Field study visits establish lasting relationships between students and industry leaders.

Each IS visits at least two foreign countries during international field studies. Students experience, compare, and evaluate in the field the global culture of business and industry. Field studies enable students to observe and compare "best practices" among firms as well as among regions and nations. Students are also able to experience directly diverse perspectives beyond those of the Washington "Beltway" or the "US viewpoint." First-hand observance also provides the faculty team the opportunity to conduct longitudinal studies of year-to-year changes in the firms and industries.

The IS Program, particularly as it is conducted through field studies, achieves Baruch's intent "… to keep in touch with industry." Through its field studies, the IS Program enables students to achieve the strategic perspective gained through evaluating US and international industry.

Relevant OPMEP Learning Area Objectives

The IS Program relates to at least 15 of the OPMEP Learning Area Objectives [CJSI 1800.01D, App G], the most prominent of which is

LA 1e: "Evaluate the capabilities and vulnerabilities of the US economy, industry, and infrastructrure in a global market and the relationship to resourcing a national security strategy."

Others include:

LA 1f: "Evaluate the impact of defense acquisition policies on the US economy and the industrial base …"

LA 2b: "Evaluate the national economy and the national budget process, focusing on how the President, Congress, and the industrial base influence and prioritize federal and private resources…"

LA 6c: "Evaluate critical, creative, and complex thinking and decision making by strategic leaders."

IS Program Goal and Learning Objectives

The IS Program's goal is to provide a program of study and academic framework that enables ICAF students to accomplish the following learning objectives [Learning Areas (LA) 1-4, 6, per CJSI 1800.01D, App G]:

- Comprehend the national security implications of the selected industry and assess its ability to meet national security requirements. [LA 1a-f; 2b-d; 3b,c; 4f; 6a-c]

- Understand the role of government in the selected industry, and how the government (legislative and executive) reaches decisions on the industry. [LA 1d-f; 4b; 3b, c; 6c]

- Develop skills in analyzing an industry or industrial sector that will be useful to a senior executive and strategist in dealing with industry and broadly with national resource issues. [LA 1a-f; 2b-d; 3b,c; 4f; 6a-c]

- Analyze an important industry or industrial sector of the economy. [LA 1a-f; 2b-d; 3b,c; 4f; 6a-c]

Operationalized Learning Objectives

In order to achieve these learning objectives, each IS seminar is engaged in activities that develop knowledge, skills and abilities in various aspects of the following:

- Understanding the role of government in shaping and regulating the industry to include coordination between various branches of government and the interagency role of government, who plays and how decisions are made. [LA 1d-f; 2b,c; 3b,d; 4f]

- Evaluating the current conduct, structure and performance of selected industries, including an assessment of their ability to satisfy national security requirements in peace and conflict. [LA 1a, e, f; 2d; 6c]

- Understanding the complex issues involved with maintaining an industrial base capable of providing efficient peacetime production and necessary additions to inventories in emergencies. [LA 1a, b, e, f; 2b-d; 3b, c; 4f; 6a, c]

- Analyzing the American and international economic environment within which the selected industries function. This includes the constraints to more efficient production, both in peace and war, as well as a specific evaluation of industrial surge and mobilization potential. [LA 1a-f; 2b-d; 3b,c; 4f; 6a, c]

- Evaluating the process of defining national security requirements and transmitting these requirements to industry. Analyses pay particular attention to the acquisition system's ability to respond rapidly to emerging commercial technologies of military interest. [LA 1a, d-f; 2b-d; 3b, c; 4f; 6b]

- Analyzing and evaluating the effect on productive capability of current and near-term industrial restructuring trends, including the increasing use of outsourcing and service contractors. [LA 1a, e, f; 2b, d; 6b, c]

- Recommending ways to improve efficiency and/or ensure attainment of national security objectives. [LA 1a, c-f; 2b-d; 3b, c]

- Evaluating the culture of business, including the ethical dimension of business leadership and ethical conduct, so that the student has a better understanding of ethical issues at the strategic level of thinking, and is better prepared to anticipate ethical problems and to reason and act ethically with regard to industry [LA 2d; 6a-c]

- Evaluating industry practices for their applicability within DOD to improve resource management and to become more efficient and effective in supporting the national security strategy. [LA 2b, d; 3b, c; 4c; 6a-c]

The IS Program is unique to ICAF, and the capstone of the curriculum. Through analysis of industry, students draw on all they have learned throughout the academic year in all of their core courses and electives. This practical application of economics, national security strategy, military strategy, acquisition, leadership, industry analytics, and more, gives each student broad experience in dealing with strategic issues common to all industries.

How ICAF Organizes Industry Studies

Students are organized into 21 Industry Study seminars that examine the industry sectors considered vital to US national security. Each seminar's study is organized around a series of classroom sessions and field study visits to both domestic and foreign industries that directly support the research and analysis the seminar is conducting.

For the AY 2012 IS Program, students are divided into 21 seminars concentrating on the following Industry Study areas:

Agribusiness
Biotechnology
Electronics
Environment
Health Care
Land Combat Systems
News Media
Reconstruction & Nation Building
Shipbuilding
Strategic Materials
Weapons
Aircraft
Education
Energy
Financial Services
Information & Communications Technology
Manufacturing
Private Sector Support to Operations
Robotics & Autonomous Systems
Space
Transportation

Each seminar's study is organized around a series of classroom seminar sessions: nine full days available for local field studies or extended seminars, a week of domestic field studies, and two weeks of international field studies. The classroom sessions vary in focus and content. The IS faculty team invites industry, government and academic authorities to meet with students in the classroom. Additionally, some of the seminar periods are used for student- or faculty-led discussions to focus the seminar's approach to industry analysis, to clarify or surface issues, and to go on information-gathering visits to local area government agencies, business establishments and other relevant sources.

The field studies of both domestic and foreign industries are an integral part of the Industry Studies Program, as described earlier. Students visit sites such as prime and subcontractor corporate headquarters, production facilities, government activities, labor union organizations, trade associations, logistics and distribution facilities, financial institutions and research facilities. The field study program provides a laboratory of direct exchange with line and staff executives and government experts about subjects students will have explored in the classroom. It also facilitates observation of functioning managerial processes in operational settings. The international field study adds the dimension of comparative industrial analysis, enabling students to make a realistic assessment of US industry's long-term ability to compete successfully in the global marketplace. Each IS visits at least two nations, and meets with many of the organizations listed above. Each visit usually consists of at least two hours of discussion, and often is accompanied by plant and facility visits, during which students observe first-hand the implementation of the firm’s strategies and plans. Depending on the length of the individual site-visit, from one to four visits are conducted in a day.

Three products mark the conclusion of the Industry Study Program. Each IS seminar develops a comprehensive Industry Report, which includes a ten-page Executive Summary and a series of "key industry and stakeholder issues". The latter is derived in part from the individual industry issue papers that each seminar member completes. Additionally, every seminar briefs other seminars, highlighting critical findings and answering questions. Finally, a formal briefing to invited distinguished guests caps off the IS experience. The report and briefings provide a comprehensive view of the overall status of the focus industries, as well as strategic policy implications at the executive level. It is important to note at the outset that all reports present industry composite information only; neither company-specific nor proprietary information is included.

The Industry Study Seminar Sessions

First Seminar Session

Purpose. To provide an introduction to the purpose, procedures and expected results from industry studies.

Relationship to the course. This session sets the tone for the seminar's efforts and establishes planning goals.

Lesson objectives.

- Introduction of the faculty and students.
- A discussion of the objectives and general methodology of the program.
- Specific instruction on seminar administration and field study procedures.
- Overview of the industry program relative to the ICAF curriculum.
- Statement of specific objectives, expected outcomes and individual and collective responsibilities.

Issues for consideration.

- How best to organize the seminar for success.
- How the available funds will best be utilized to provide for maximum learning.

Subsequent Seminar Sessions

Purpose. To build a body of knowledge and to develop analytic skills.

Content. Subsequent seminars will include:

- Tutorials, process and integration sessions designed to establish a common baseline from which students who have widely diverse backgrounds and interests may successfully proceed with their study.
- Development of an analytical framework and supporting methods that will be used to conduct the Industry Study.
- An assessment of the effect on the industry of declining defense budgets (p. iii).
- Congressional visits are highly encouraged.
- With the growing treat of cyber attacks, cyber threat and resilience assessments are also highly encouraged.

Issues for consideration. Areas of inquiry include, but certainly are not limited to the following:

- Effect upon your industry of the changing world events such as the Global War on Terrorism (GWOT) and other global security issues; effectiveness of your industry's and the government's response.

- Strategies of the industry to remain in the competitive lead (both domestic and international portions) far into the 21st century.

- Perceived strengths and weaknesses in the industrial base, for example, human resources, raw materials, technology, finance, and pacing items.

- Major problems, related goals, and strategies for optimizing performance in the industry under analysis.

- Future trends in the industry under study and the potential contribution of the industry to US national security.

- Problems involved in the acquisition process, such as burdensome regulations, declining budgets and transition to new and different warfighting scenarios.

- Problems involved in broadening the production base and planning preparedness for war production.

- Mobilization and surge potential and capability to respond to demand or reconstitution.

- Policy options for strengthening the production base and for improving the acquisition system's relationship with the base.

- International aspects of the industry and their effects on strategy and decision making. Role of economic, political and social factors.

- Strategic need for increased international trade and the effect of increased international competition.

- Constraints upon international trade and competition, including technology transfer policy issues.

- The ethical dimension of business leadership and ethical conduct and their effect on the ability of industry to fully serve the national secruity strategy.

Student Deliverables: Industry Study Products
(Industry Issues Paper and Industry Report Requirements)

Individual Paper: Industry Issue Paper

Every student is required to write a 10-page individual Industry Study issue paper. These papers require a thorough literature search to enable analysis of recent writings on topics of major interest to the industry sector under study. The individual paper is integral to the group's contribution to the body of knowledge on the industry. No one is excused from this effort. Papers are due **21 March 2012** which is prior to the start of the domestic travel that is scheduled for **2-6 April 2012**. The due date is selected intentionally so that students will have researched the major issues facing their industry prior to their domestic travel discussions with firms. Seminars may take the opportunity to have students report and discuss the the findings of their individual papers, particularly in regard to integration into the final Industry Report. Any change to the required due date requires IS program director approval. [*Note*: If a student (or students), as part of the IS program, is conducting substantive research resulting in a paper of comparable length for an outside source under the direction of the Industry Study faculty, this effort, with faculty approval, may be substituted for the required paper. See the section *Industry Study Written Reports* that follows.]

Objective. A primary goal of your year at ICAF is to help you make better decisions and give better national policy advice concerning the resource component of national security. The Industry Study paper is designed to give you an opportunity to practice those strategic thinking skills. Specifically, you will write an Issue Paper on a major policy issue related to the industry you are studying in the Industry Studies Program. In so doing, you will have an opportunity to sharpen your thinking about marketplace and public sector resource allocation in support of national strategy by analyzing a difficult issue facing a segment of the nation's industry base.

This is also an opportunity to produce high quality, potentially useful advice for senior-level decision makers, in that your ideas may be incorporated in your group's industry report that is published on the ICAF website and available throughout the defense community after you graduate.

Finally, this paper is a vehicle to educate yourself on some critical aspect of the industry you are studying before you embark on domestic and international field studies. By doing so, you will enhance your ability to interact with senior officials, domestic and international, in that industry. One way to consider this paper is as a literature search summary of a major issue facing your industry. The summary can then be further updated on the basis of ongoing seminar discussions, field study observations, and focus of your industry analysis.

Guidance. Your Industry Study faculty leader will discuss and/or distribute a list of candidate issues; you have the option of selecting an issue from that list or proposing a different one. For formatting, use the same Chicago style manual you've used for your other ICAF papers. Above all, you should communicate clearly and effectively. For clarity, we

suggest you consider using subsections that 1) provide a brief background, 2) develop viable alternatives, 3) evaluate options, and 4) build to a policy recommendation with supporting rationale. Additionally, individual papers of merit will include a strategic perspective of the industry issue and its relationship to national security, will include economic and resource aspects, will be well researched and documented, and will base recommendations on sound logic and analysis of industry metrics. In bringing to bear your entire year's experience at ICAF, you should ensure that you consider the political, social, economic, and military dimensions of the issue you address.

Finally, do not be unduly concerned if you consider yourself somewhat of a novice in assessing your industry and some critical issue facing it. Newcomers and "outsiders" often see facets of problems that internal "experts" overlook. Above all, make the paper a worthwhile learning experience for yourself and a resource for your seminar's written and oral report. The Lockwood Award (p. 20) will be given to the best individual Industry Study paper.

******REMINDER: DUE DATE – WEDNESDAY, MARCH 21, 2012******

The Industry Reports: Oral and Written

At the conclusion of seminar and field studies, each seminar collectively develops a professional quality briefing and a written report of publishable quality. Together, the briefing and the report provide a comprehensive view of the overall status of the industry studied and the policy implications for the defense executive. Both the written report and the briefings should address:

- Definition of the industry studied, its current condition, challenges and outlook
- Surge and mobilization issues and applicable policy recommendations
- Relevant government policy recommendations to enhance industrial effectiveness
- Assessment of appropriate government acquisition system changes to enhance DOD's ability to acquire and utilize rapidly the latest commercial technologies

Industry Study reporting responsibilities are both individual and collective. Reporting events will be accomplished in the following sequence:

Industry Study Briefings. Industry Study seminars will make professional quality oral presentations to a number of the other seminars and to selected distinguished visitors. All presentations will be in the form of a briefing to be given to the Under Secretary of Defense (AT&L). The student seminar leader has full authority and responsibility for developing this presentation under the guidelines contained in this Handbook and with the approval of the faculty. Each briefing is 30 minutes, followed by a 20-minute Q&A period. Each seminar member is expected to present or co-present in teams of two or three at least one briefing.

The seminar will prepare a written script plus a set of briefing notes for individual briefers to use. Briefers may use either the notes or the script, but the briefing is strictly limited to 30 minutes in order to allow sufficient time for questions and answers. There will be no "travelogue"

in the presentation or in the time before or between each presentation. Briefings may include suitable film clips, photos and anecdotes where they enhance the professional quality of the presentation and simultaneously add to the overall understanding of the material being presented. The bottom line is that the quality and depth of analysis is primary, not the quality or sophistication of the graphics. A detailed briefing schedule will be provided prior to international field studies. During the cross-briefs, students are expected to participate in the question and answer session and make positive contributions to the cross-brief processing.

Industry Reports. Each seminar will prepare a written report that will be posted on the ICAF website following DoD clearance review. Responsibility and authority for completion of the seminar's written report rests with the student seminar leader, but the faculty industry lead is to provide ongoing guidance as the report progresses and is the final approval authority. Industry reports should achieve a level of quality and rigor such that they are publishable. Industry reports should include thorough but concise analysis, using the approaches studied in the spring Industry Analytics course, those developed by the IS faculty team, and those approaches provided in the Handbook appendices. These approaches will be essential to integration of findings from the program of guest speakers, domestic and international field studies and individual and group research, developing conclusions and recommendations for consideration by appropriate government departments and agencies. The report will be cleared through OSD for public release.

Industry Study Report Format

ICAF has selected *The Chicago Manual of Style, 15th or 16th Editions*, as a practical format for ICAF academic papers, to include the Industry Study report. There is a copy of this book in each student room, along with *The Brief Handbook*, which also contains abbreviated directions for *Chicago* style. *(Note: Follow the templates that are provided in the sample report below for the report's preliminary pages. Use* Chicago *for the body text, citations and references.)*

The report will not exceed a maximum of 20 pages. Ten pages are the executive summary; the remaining ten pages include essays intended to address major issues facing the industry under study, including issues of importance to industry stakeholders. Collaborative agreements with organizations sharing mutual interests in the IS research may result in issue discussions included in this section of the industry report.

Essentially, the report follows *Chicago* guidelines, with some exceptions. For example, it is single-spaced (not double-spaced, as *Chicago* generally directs). Also, text margins are both right and left justified. The page limitation includes text, but not the title page, seminar participants, list of places visited or the reference pages, supplementary endnotes and appendices. Endnotes and appendices exceeding five pages, total, may be submitted as documentation, but will not be included in the OSD clearance process, nor posted to the Internet as the final report. *Please pay particular attention to the format examples that follow and check for completeness of citations.*

Sample cover sheet follows:

Industry Study Report Sample Pages

Spring 2012
Industry Study

Final Report
Electronics Industry

<u>The Industrial College of the Armed Forces</u>
National Defense University
Fort McNair, Washington, D.C. 20319-5062

Preliminary information pages.

Page i:

- Group name centered at the top of the page (bold, 18 pt)
- Skip one line
- **ABSTRACT**: (bold, 12 pt) Then text (non-bold, 12 pt)
  - Note: an abstract is a 60- to 100-word paragraph that details the bottom line <u>conclusions</u> of the report. This is <u>NOT a statement of what was studied or the method of analysis</u>. Rather, the idea is to convince the reader to read on by piquing interest in how the study arrived at these conclusions, and how these conclusions are supported with analysis.
- Skip one line, and then list the names of the participants in alphabetical order (centered, non-bold, 12 pt)

Lt Col Mary Jones, US Air Force
Mr. Sam Spade, Dept of State
COL Joseph H. Smith, US Army

(Note: spell out civilian agencies, but abbreviate department)

Skip a line before faculty list

Col Thomas Jefferson, US Marine Corps, Faculty Lead
Dr. Samuel F. Adams, Faculty

Page ii:

- At the top of the page, (centered, 12 pt, bold): **PLACES <u>VISITED</u>**:
- Skip a line
- **Domestic**: (bold, 12 pt) List will include Canada visits, unless they are part of international travel
- Skip a line
- **International**: (bold, 12 pt) List company name, city and country

ELECTRONICS 2011

ABSTRACT: The US has remained at the apex of the market since its inception, but that leadership is being challenged. Global currents, public policy, and intense global competition have led to a steady decline in the U.S. market share, lead in technological innovation, and attractiveness for the best workforce. These trends raise the question whether the US wishes to remain at the forefront of the semiconductor industry. The US government must recognize this decline and the serious economic and national security repercussions it will have. The government must develop a comprehensive strategy to address the causes and reverse the decline.

COL Hassan Alharbi, International Fellow - Saudi Arabia
CDR Clifford Bean, U.S. Navy
Lt. Col Christopher Boyle, U.S. Army
Mr. Darren Chambers, Dept of Air Force
Lt. Col Heath Collins, U.S. Air Force
COL Jeff Johnson, U.S. Army
CAPT James Liberko, U.S. Navy
Lt. Col David Lyons, U.S. Air Force
Lt. Col Melanie Mercan, USMC
CAPT Lourdes Neilan, U.S. Navy
Mr. James Norcross, IBM
Mr. Matthew Quick, NSA
Lt. Col Adrian Spain, U.S. Air Force
COL James Utley, U.S. Army

Dr. Maureen Crandall, Faculty
CAPT Fred Drummond, U.S. Navy, Faculty
CAPT John Meier, U.S. Navy, Faculty Lead

PLACES VISITED

Domestic:

Aberdeen Test Center (Aberdeen Proving Grounds, MD)
Allison Transmissions (Indianapolis, IN)
AM General (Mishawaka, IN)
Anniston Army Depot (Anniston, AL)
BAE U.S. Combat Systems (York, PA)
Force Protection Industries, Inc. (Charleston, SC)
General Dynamics Land Systems Hqs (Sterling Heights, MI)
General Dynamics Land Systems Anniston Operations – Stryker assembly plant (Anniston, AL)
Joint Services Manufacturing Center - Lima Tank Plant (Lima, OH)
Letterkenney Army Depot (Chambersburg, PA)
MTU Detroit Diesel (Detroit, MI)
Oshkosh Corporation (Oshkosh, WI)
U.S. Army Ground Combat Vehicle Office (USATACOM, Warren, MI)
U.S. Army Heavy Brigade Combat Team Program Office (USATACOM, Warren, MI)
USMC Expeditionary Fighting Vehicle Program Office (Woodbridge, VA)
USMC Joint Light Tactical Vehicle (JLTV) Program Office (Quantico, VA)
USMC Mine Resistant Ambush Protected (MRAP) Program Office (Quantico, VA)

International:

General Dynamics European Land Systems Steyr-Daimler-Puch Spezialfahrzeug (Vienna, Austria)
MAN Nutzfahrzeuge Österreich, Military Trucks (Vienna, Austria)
Krauss-Maffei-Wegmann (Munich, Germany)
MAN Nutzfahrzeuge, Commercial Trucks (Augsburg, Germany)
Renk Transmissions (Augsburg, Germany)
Rheinmetall-MAN Military Vehicles (Munich, Germany)
Iveco Defense Vehicles, Fiat Consortium (Bolzano, Italy)
Oto Melara (Finmeccanica) (La Spezia, Italy)

Body of the report.

On the next page, begin the text of the report in *Chicago* format. Pages from here on are numbered 1, 2, 3, etc. Each report should include the following components:

- INTRODUCTION: A short introduction detailing the purpose of the study and its methodology. Maximum one page.

- THE INDUSTRY DEFINED: Using either the classic structure and conduct definition or a technology definition, define, in the most precise terms possible, the industry under study. This portion of the paper should indicate to the reader the scope and bounds of your study. Maximum one page.

- CURRENT CONDITION: Using the analytic tools studied in your Industry Analytics course, Industry Studies classes, this Handbook, and elsewhere, describe the recent past and current performance and condition of your industry. In addressing the overarching issue of whether your industry can support the National Security Strategy, use data and analysis to answer questions you develop to use in engaging industry representatives, including the following questions, and those recommended by your Industry Study Leader.

    - What is the current competitive structure of the industry? Is it dominated by a few firms or fragmented among many? Where does competition among firms fall along the spectrum from pure competition to monopoly?

    - Are the key firms in the industry economically healthy? (Evaluate employment, revenues, profits, profit margins compared to the cost of funds, leverage/debt ratios, etc., both at the current point in time and trends over the previous five years.)

    - How important are the businesses/business units serving your industry to the firms they are part of?

    - Are there zero, one, or many, successful business strategies employed by the industry's key firms and the industry?

    - How serious are threats to these strategies from substitutes, suppliers, customers, or foreign competition?

    - What is the nature of foreign competition? What are the trends in productivity? How do they compare to international trends?

    - What is the opportunity presented by foreign producer and consumer markets? Are U.S. firms capturing these opportunities? Is the industry competitive internationally? (use import and export ratios) Are there subsidies, quotas, trade restrictions, calls for protection?

The bottom line of this section is an assessment of the current condition of the industry and an appraisal of the benefit to the nation of the industry's resulting allocation process. See the industrial analysis portion of this Handbook for additional questions. (Maximum three pages.)

- CHALLENGES: Use facts and the analytical frameworks you have studied to analyze the major challenges, economic and others, facing this industry. Indicate which challenges will be addressed more fully in the essay portion of the report. Your assessment of the adequacy of the industry's response to these challenges will be addressed in another section of your report. Also discuss your industry's reaction to changing world events (e.g., September 11th attack) including an examination of the efficacy of any subsequent government action to assist your industry. (Maximum two pages.)

- OUTLOOK: Project the future health of the industry. As a minimum, the report must address the implications for the subject industry of significantly reduced Defense spending in FY 2013 and beyond. In some instances, the industry studied may be substantially affected, in other instances only suppliers to primes may be affected, and in some cases very little effect may occur. It is important to provide that assessment, as well as recommendations, if appropriate, for government policy. The report should also address the following questions:

    - Can the industry under study support the national security resource requirements? What impediments exist preventing the industry from achieving its full surge and mobilization potential?

    - What is the short-term (1-5 years) outlook for the industry? What factors account for your projection?

    - What is the long-term (2012-2027) outlook? Factors?

    - What political and/or social factors impact the industry's short- and longterm outlook?

    - Is your industry positioned to maintain a preeminent position in the global marketplace? If not, what changes must the key firms in the industry undertake to improve the industry’s global position?

  This section should close with an assessment of the adequacy of the industry's response to the previously detailed challenges and the appropriateness of the industry's strategy to become or remain a preeminent force in the global marketplace. (Maximum two pages.)

- GOVERNMENT GOALS AND ROLE: What are the "proper" goals and role of the government relative to your industry? What, if any, response should the government

make to your outlook assessment and the industry's strategies? What policy issues are involved including those directed at surge and mobilization? Present and analyze specific recommendations and options including those related to the acquisition system's ability to rapidly acquire needed commercial advanced technological equipment. (Maximum two pages.)

- ESSAYS ON MAJOR ISSUES: This section (total not to exceed ten pages) should include essays intended to address major issues facing the industry under study, including issues of importance to industry stakeholders. Collaborative agreements with organizations sharing mutual interests in the IS research may result in issue discussions included in this section of the industry report. The author's name should appear at the end of each essay. A short title should precede the essay.

- CONCLUSION: A maximum one-page summary of the major conclusions of this study. If readers read no more than your abstract and your conclusion, they should understand your major findings and recommendations relative to your industry's ability to support the national security requirements of the United States.

- REFERENCES: This is the report section that demands, but rarely receives, a sufficiently dedicated effort by the seminar. Please ensure that all references and data in the report have appropriate citations. Pay particular attention to providing the appropriate page number and volume numbers for journal or periodical article citations. Tables and figures should be identified according to *The Chicago Manual of Style, 15th or 16th Editions.* In short, follow *Chicago* for all report references and for in-text citations.

Per *Chicago* format, endnotes may be used to explain or comment on information in your report and should be used to provide references for text in the report. An endnote consists of two linked parts: the note reference mark and the corresponding note text. You can automatically number marks or create your own custom marks. When you add, delete, or move notes that are automatically numbered, Word renumbers the note reference marks. You can add note text of any length and format note text just as you would any other text.

In summary, this is a generic outline that is to be followed where appropriate and modified as necessary. However, the level of analysis required by the outline must be maintained. Remember: the Industry Report is an executive summary, not a detailed road map through an industry. The twenty-page maximum (exclusive of title, abstract, authors, places visited and endnote pages) is non-negotiable.

A Suggested Quality Control Checklist for Your Industry Study Report

1. Is your report well written, balanced and suitable for presentation to the Secretary of Defense?

2. Do you define your industry?

3. Does your report analyze your industry in a global context? Does the analysis

provide a full S-C-P view of the industry and its key firms, using the Five Forces, Strategic Game Board, and financial analysis tools studied in your Economics of Industry and Bsuiness Strategy classes?

4. Do you state and answer the big questions about your industry?

5. Do you include descriptions and industry analysis reflecting both the domestic and foreign visits your group made?

6. Is there a reasonable report balance between description (usually too much) and analysis (usually too little)?

7. Do you address the national security implications of your industry's current and future condition, your industry's challenges, and governments role?

8. Are your policy recommendations realistic and achievable within our system of government? Are your recommendations based on facts and analysis provided in the analytical sections of the report?

9. Do you provide appropriate citations and references?

Administrative Requirements

Each seminar will provide their Industry Study faculty and the Industry Studies (IS) Program Director (Don Briggs) an electronic copy of the written report, the briefing script and/or the briefing notes, consistent with the following timeline:

DUE DATES:

- **21 March 2012:** Individual IS issue papers due to IS faculty team.
- **30 March 2012:** Lockwood Award nominees to IS Program Director (briggsd@ndu.edu).
- **24 April 2012:** Industry Report Draft to IS faculty team.
- **18 May 2012**: Email Industry Report to the IS faculty team and the IS Program Director for review by Antonelli Award Committee (briggsd@ndu.edu).
- **21 May 2012**: Email seminar briefings w/either script or notes to IS Program Director (briggsd@ndu.edu).
- **23 May 2012**: Email the publication-ready copy of the Industry Report, the DV briefing and briefing script and/or notes to the IS Program Director (briggsd@ndu.edu).
- **8 June 2012**: Send final versions of industry reports to NDU PAO to begin OSD security clearance.

Industry Study Awards

The Antonelli Award

The Association of the Industrial College of the Armed Forces established the Major General Theodore Antonelli Award for Industry Study Excellence in 1993. The award annually honors the Industry Study seminar whose written executive summary and oral presentation best represent the high standards of the Industrial College in this endeavor.

The award is presented at the awards assembly at the end of the academic year. The selection committee, comprising senior faculty with extensive industry study experience, chaired by the Director of the Industry Studies Program, views all oral presentations and reviews all executive summaries that have been nominated by the faculty leaders. Award criteria are based on the guidance contained in this Handbook, particularly pages 10-19, and the standard of excellence reflected in the industry analysis. In general, the greatest weight is assigned to the written report.

The selected seminar's name and the year of award are engraved on the Antonelli Plaque, which is permanently displayed at the Industrial College.

The Lockwood Award

The Lockwood Award is an endowed award sponsored by the Association For Intelligence Officers (AFIO) and recognizes the best individual Industry Study issues paper. The award is named in honor of Mr. Earl Forrest “Frosty” Lockwood, co-founder and former Chairman, President and CEO of Betac International Corporation, a systems engineering and information technology services firm that specialized in providing a wide range of systems integration, counterintelligence, and counterterrorism solutions to the Intelligence Community.

Each Industry Study group's faculty will nominate the best paper from that group as a candidate for the AFIO Intelligence Scholarship Foundation’s Earl Forrest Lockwood Award. A panel of faculty judges will select the winning paper from the candidates nominated. This award includes a plaque and a set of books or a bond. The award recipient will be announced at the annual ICAF Awards Ceremony in June.

Field Studies Travel Guidelines, Information, and Tips

Please remember that our field studies hosts are expending considerable time, energy and money on our behalf. We need to be regarded always as gracious and grateful guests so that those who follow us will be welcomed back.

- **Conduct:** At all times, conduct is to be professional. This includes site visits, travel to and between sites, and off-duty hours. The faculty leader, regardless of rank or position, is the person in charge of all aspects of field study and has the full authority of the Commandant to ensure a successful field study experience.

- **Non-attribution:** The ICAF non-attribution policy applies to field studies as well as classroom seminars and Baruch presentations.

- **Schedule:** Domestic field studies travel is scheduled for 2-6 April 2012; international field studies travel from 30 April -11 May 2012.

- **International Field Studies Visits:** As a matter of policy, ICAF groups will not travel to countries listed on the State Department Current Travel Warning List.

- **Orders:** Every Industry Study seminar member will travel on official travel orders for the period January through May 2012.

- **Group vs. Individual Travel:** NDU policy requires that all students travel to and from their study travel destinations with their study group. The Commandant must approve any deviations. Requests for exceptions should go to the Commandant through the appropriate IS faculty leader, the IS Program Director, and the Chief of Staff/Dean of Students.

Safety and Security Suggestions

- Travel light. You must be able to carry your own baggage. If you cannot carry your baggage quickly up the three flights of stairs at ICAF, you'll never catch the train at Stuttgart station.
- Lock valuables in hotel safes.
- Photocopy all important documents (passport, credit cards, etc.); leave a copy at home and take one with you in a bag other than your wallet or purse.
- Travel in groups at night; stay off back streets and away from dark areas.
- Vary your daily routine.
- Run or jog with a buddy.
- Leave your expensive watch and jewelry at home - take your cheap watch.
- Carry your blue passport if you have one, even if you are traveling with a red or black passport or on NATO travel orders. You may run into a situation in which you do not want to be identified as a military officer or government civilian.
- Do not carry any more cash than you can afford to lose; use your government credit card for cash from ATM's in country.
- If you need to take electric hairdryers, or shavers, remember to determine if you need a

current converter or plug adapter for the country you will be visiting. Most hotels catering to North Americans have 60-cycle, 115-volt outlets. Major countries such as China have hair dryers in most hotels.

- Faculty and students are not permitted to take ICAF-issued government laptops on international field studies. If a laptop is needed, one per seminar may be issued by the ICAF IM Office (see Ms. Carol Lambert, Rm 331). Upon return to ICAF, travelers MUST NOT connect the laptop to the NDU network. After contents have been written to a CD or off-loaded via a private Internet connection, the specially-issued laptops should be returned to the ICAF IM Office for "wiping" the hard drives. Seminar Faculty leaders are issued a Blackberry phone for emergency use and official government business.
- Try to blend in, where feasible.

- **Recall Information:** Prior to commencement of any travel, each Industry Study seminar faculty lead will provide the Director of Operations and the IS Program Director a complete seminar travel itinerary, showing dates, times, locations, phone numbers, points of contact, hotels, and so forth. Additionally, for each traveler, the IS faculty lead is to provide current emergency contact names and phone numbers.

- **Spouse Travel:** NDU policy prohibits spouses and family members accompanying or meeting students and faculty members on field studies. This policy is strictly enforced and exists to eliminate any possible perceptions that field studies are not a full-time, professional endeavor.

- **Sports Equipment:** NDU policy prohibits carrying golf clubs and other obvious sports equipment on field studies. If you want to play golf, pack your shoes and rent clubs at the course.

- **Travel Documentation:** The Foreign Clearance Guide (DOD 4500.54-G) maintained by the Air Force contains the definitive information as to what travel documents are required: passports, shot cards, and so forth. Generally, all travelers must travel with an official (red) passport. An electronic version is available through the ICAF Operations website.

- **Government Credit Cards:** All travelers (except industry and international students) must possess a government credit card. Department of Defense policy stipulates that DoD personnel use the government card to pay for all costs incidental to official business travel, including travel advances, lodging, transportation, rental cars, meals and other incidental expenses. If you are one of the few who have not yet applied for the card, please contact Ms. Kathy Chittams, 685-3907. Know your PIN and try your card before you travel. Note that use of government cards provides some insurance coverage for accidents and baggage loss. International Fellows and other foreign students will be issued appropriate travel advances upon request through their faculty leader.

  Your total government card charge limit and ATM withdrawal limit will be published prior to travel. If, however, you do encounter a payment problem when checking out of a hotel on travel, we recommend that you simply give the clerk a personal credit card. If you have any questions, please let your faculty lead know ASAP.

- **Security Clearances:** Obtain security clearance information from the NDU Security Office in Marshall Hall. This information may be required to gain admittance to host facilities. Advanced planning is often necessary. Passing security clearances: please refer to the NDU Handbook (http://www.ndu.edu/catalog/index.htm) for the policy and procedures for sending security clearances.

- **Anti-Terrorism Training:** DoD Instruction 2000.16 requires annual Anti-Terrorism (AT) Awareness Training within twelve months prior to overseas departure for all OCONUS-based DoD personnel, all Active uniformed members of the combatant commands and Services, all CONUS-based DoD personnel eligible for official OCONUS travel on Government orders, and all CONUS-based personnel if the CONUS terrorism threat level is promulgated above "MODERATE." The current on-line training is designed to fulfill that requirement for uniformed service members and government employees. The Level One Anti-Terrorism/Force Protection Computer-Based Testing website is linked to the ICAF Operations home page http://ndunet.ndu.edu/icaf/operations/training/att.htm. Faculty and students are able to complete from the convenience of their desktop computers the mandatory AT/FP training. The website can also be accessed at www.at-awareness.org. If there are any questions, please contact Joe Pallanez, Chief of Security at 685-3835.

  Upon completing the training, the program will issue a certificate of completion and certificate number. E-mail the certificate to "Security" (pallanezj@ndu.edu) and to the ICAF Operations Travel Coordinator, Ms. Soraya Gamblin (gamblins@ndu.edu), Room 110, 685-2489. A copy of the certificate will be documented in your security file and tracked in a separate database.

- **Travel Advisories:** Even in times of relative stability, it is important to monitor the countries you plan to visit. As a minimum, we suggest you or one of your group, regularly check the following State Department travel advisory website for the latest information: http://travel.state.gov. For those groups going to areas of potential problems, we suggest you also do a regular check of the classified country report in the NDU Classified Library.

- **Carlson Wagonlit:** All travel arrangements must be made through Carlson Travel and will be managed by the Industry Study faculty. Students in the IS should not make travel arrangements.

- **Electronic Ticket (E-ticket) Advisory:** Customary practice is the use of e-tickets for IS travel. The exception is when the cost associated with the issuance of a paper ticket is reimbursable in accordance with the Joint Federal Travel Regulations (JFTR) and the Joint Travel Regulations (JTR), such as when the airline must issue a paper ticket because of an airline carrier policy for certain categories of tickets or it is otherwise deemed appropriate by the government travel agent. In most cases airlines now charge a fee for issuance of paper tickets. Travelers who select paper tickets over e-tickets will be responsible to the airlines for the paper ticket fee. Further, the traveler will be charged a fee when the commercial travel office must issue a miscellaneous charge order for the issuance of a paper ticket.

- **MILAIR:** Opportune MILAIR lifts may be used to defer travel expenses, but please remember that we are very low on the MILAIR priority list.

- **Airline Upgrades:** Airline tickets issued by Carlson are group tickets, even though they appear to be individual tickets. Any changes to the tickets and seat selections must be coordinated through the faculty leader. An individual change may result in cancellation or unintended changes to all the other tickets.

- **Baggage:** Travelers may have one checked bag and one "excess accompanied bag" for a total of two checked bags within size and weight limitations imposed for the carrier for each bag. Note that foreign carriers sometimes have lower weight restrictions than U.S. carriers. Reimbursement for baggage is limited to two bags, within weight limitations of the airline. Military officers must use travel orders to preclude airline baggage charges.

- **Premium Class Air Travel:** It is government policy that coach (economy) class travel accommodations will be used for all passenger transportation for official government travel.

- **Rental Cars and Insurance:** The government contracted rental car rate includes insurance as long as the company subscribes to the U.S. Government Rental Car Program managed by the Defense Travel Management Office http://www.defensetravel.dod.mil/site/rental.cfm. All of the major companies -- Hertz, Budget, Avis, and so forth -- subscribe. The U.S. Government Rental Car Program rate may very well be higher than that quoted by the rental car company, listed on their website, advertised on TV, and so forth. That is not unusual. The government looks at many issues when negotiating contracts -- lowest cost is not always the result. All drivers should be reimbursed fully for their rental cars as long as they make arrangements thru Carlson. If you deal directly with a rental car company, you have to make sure they understand you are a government employee and require the U.S. Government Rental Car Program rate (which includes insurance and permits all U.S. Government employees with a valid drivers license to operate the rental car).

  Travelers are not reimbursed for rental car insurance coverage purchased in the United States or its territories and possessions regardless of the vendor from whom the rental car is rented. Travelers are reimbursed for mandatory rental car insurance coverage required in foreign countries. When a compact rental car (the "standard" for TDY travel) does not meet requirements, the faculty leader may authorize the size vehicle appropriate to the mission. Claims for damage to rental vehicles while being used for official business are reimbursable to the traveler or the rental car company, as appropriate, as miscellaneous transportation expenses if adjudicated as payable under the procedures set forth in the DoD Financial Management Regulation or appropriate Service regulations for the non-DoD Services. Reimbursement for personal funds for damage sustained by a rented automobile while being used on other than official business is not authorized.

- **Medical:**
  - The NDU physician will make shots available to those groups traveling to destinations requiring immunizations.

- Travel Medicine Kits for either US or foreign travel are available from the NDU Health & Fitness office, Room 118, Eisenhower Hall.
- If you wear contacts or glasses, take a backup pair of glasses.
- If you take medicine daily, carry enough for the full trip in the original container. Do not wait until the night before the trip to attempt to refill your prescription.

- **Hotel Safety:** *Joint Travel Regulations (JTR) Volume 2, paragraph C-1062*, which applies only to civilians, strongly encourages use of only "fire safe public accommodations" -- that is, hotels with sprinklers, smoke detectors and fire alarms. Personnel making hotel reservations should make a reasonable effort to ensure that all berthing facilities are indeed fire safe. This concern should also be extended to military personnel.

- **Dress:** Professional attire (coat and tie for gentlemen; comparable attire for ladies), including ICAF nametag, is required for all official visits. Although "dress professionally" is the rule, wear shoes you can walk and stand in all day. When in doubt, leave your leather soled shoes at home and wear/carry rubber soled shoes. The faculty leader may relax the professional attire rule during travel and when the seminar is not being met by a company or host government. Additionally, relaxed dress may be worn if the seminar is on a Normandy staff ride, touring a coalmine, and so forth.

- **Information Security:** As a part of a sound force protection program, personal information should not be disclosed or transmitted by unsecured email. Personal information includes but is not limited to social security numbers, home addresses, home telephone numbers, credit card information, and travel plans/itinerary.

  In addition to security issues, use and handling of personal information is protected under the Privacy Act of 1974.

- **Personal Phone Calls Policy:** ICAF will not reimburse or authorize personal calls. ICAF's 24-hour admin watch has been set up to handle emergencies. The admin watch should receive the first call to the US from the faculty when an emergency exists, so that all appropriate people may be notified and action taken. In the event of unusual circumstances, the Industry Study faculty leader has the local authority to authorize official call reimbursement on a case-by-case basis when the need arises. Official calls are authorized by the IS travel orders.

- **Mementos:** When funding is available, each seminar will be provided with mementos (to be determined) that bear the college logo. These items are for official use to be given to our hosts as a small token of thanks for our visits. In addition, thank-you certificates may be ordered at the ICAF Operations website for your hosts. Folders for these certificates are available from the IS Program Office. [ORF-provided mementos may only be given to non-government individuals. Recipient's names, titles, and organizations must be reported to the IS Program Director.]

- **Gifts:** CONUS hosts, especially defense contractors, generally understand government regulations regarding gifts and are unlikely to offer any. Other hosts, particularly overseas hosts, may not understand the rules and that the seminar is receiving per diem. If, however, all reasonable and gracious attempts to decline fail, accept with grace if to do otherwise would embarrass the US Government. The current limit on the value of gifts received from sources outside the government is $20. In any case, always document on the Report of Gratuities what has been received in terms of meals and items. Gifts to the College--such as aircraft models, plaques, and so forth -- must be turned over to the Industry Studies Director, on behalf of ICAF.

- **Thank You Letters:** Letters for the Commandant's signature must be initiated as soon as domestic and international travel is completed. This vital social grace is tracked to ensure all seminars send timely letters. Thank you letters to companies/activities are prepared by Ms. Jeanine Haran, Room 208, with your input. Ms. Haran has sample thank you letters she can e-mail to you upon request. One comprehensive thank you letter from the Commandant should go to the CEO or other high-ranking member of the firm or agency. This letter may as a courtesy mention all those who helped to make the visit a success and/or to recognize the point of contact who arranged the visit details. If the IS leader wants to send additional thank you letters on ICAF letterhead to specific individuals other than the CEO, they should be prepared and signed out at the IS team level by the lead faculty.

- **Meals:** Current policy allows full per diem when an Industry Study host provides a meal to ICAF students and faculty, at no cost to the individual or the Government. This policy is consistent with U4165 and U4167 and C4554 of the Joint Travel Regulation and the Joint Federal Travel Regulation. Accordingly, unless ICAF in fact pays for a meal, Industry Study travelers are entitled to full per diem during Industry Studies TDY travel.

  The Joint Ethics Regulation authorizes faculty and students to accept a meal from an Industry Study host in the United States so long as the value of the meal does not exceed $20, or a cumulative value of $50 in a year from a single source if more than one meal is provided by the host organization. Industry Study Leaders are responsible for ensuring that host organizations who provide meals as part of a working breakfast or working lunch understand this limitation on the value of the meal that may be accepted and make every effort to ensure that meals provided are within the authorized dollar limitation. This authorization to accept meals from Industry Study hosts applies to all host organizations, including those who have contracts with the Department of Defense. Separate dollar limitations apply outside the United States.

Travel Claim

- Travel vouchers are filed via DTS within five working days after the travel end date.

- Receipts must be electronically submitted by fax or “scan and upload” for all individual expenses over $75, and all lodging and airline/ rail costs, if paid by individual government travel credit card (GTCC).

- Do not claim charges if lodging and airline/ rail tickets were purchased using the

government corporate credit card. Do provide the invoices and receipts to IS Program Director, IS Program Office, Room 232A.

- If two travelers share a room, ask the hotel to split the bill so that each occupant has a separate receipt. If the hotel is unable to provide separate receipts, note the name of the second traveler at the top of the receipt. Travelers can only claim their portion of the room charge. Not following this procedure causes rates to exceed the lodging per diem allowance, slows the process, and causes problems with standardizing rates within the group.

- Convert currencies to US dollars (indicate the conversion rate used and the converted total).

    - Use an official rate of exchange from a credible source, such as the credit card statement. Do not use the hotel rate.

    - Recommended website: http://www.oanda.com/convert/classic . Select from the drop-down menu, "Typical credit card rate +2%."

- Refer to Appendix G of the JFTR/JTR for reimbursable expenses. http://ndunet.ndu.edu/icaf/operations/_docs/reference/travel-expense-appendix-g.pdf

- Other miscellaneous reimbursable expenses not identified in Appendix G must be approved by the Industry Study Program Director.

- Personal expenses, such as batteries, film, hotel concierge, workout room/ gym fees, Internet connection fees (other than official business conducted by the IS faculty leader or their designee), and pay TV, are not reimbursable.

- Travelers can check the status of their travel claim by accessing their DTS account.

Appendices
Industry Analysis: A Reference Compendium

This reference section is intended to supplement the materials, instruction and insights you received in your other courses. The tools provided in this reference are far from comprehensive. They have been tailored to be those deemed most helpful during your industry studies. However, the specific tools you and your study group will use to analyze your industry must be crafted by you to suit the industry under study. There is no one-size-fits-all set available. The information provided has been drawn from a wide variety of sources. It is intended to complement your entire course of study.

This reference has the following sections:

- **Appendix I-A: Markets, Competition and Industrial Analysis: Modern Views in a New Economy** **31**
- **Appendix I-B: Methodology for Industrial Analysis for ICAF Industry Studies Program** **59**
- **Appendix II: General Issues and Specific Questions for Consideration** **73**
- **Appendix III: Factors to Consider: Structure, Conduct and Performance** **79**
- **Appendix IV: Strategic Industry Analysis - What Makes an Industry Strategic? (The Technology Approach)** **81**
- **Appendix V: Competitive Advantage - Porter's Prescription** **85**
- **Appendix VI: Profile of Selected Indicators - A Menu of Things to Consider** **87**
- **Appendix VII: Commercial Technology Insertion Questions** **95**
- **Appendix VIII: DoD "Essential" Industry Capabilities Assessment Steps** **99**
- **Appendix IX: The Life Cycle of an Industry** **101**
- **Appendix X: Reference Books, Materials, and Sources** **105**
- **Appendix XI: IS Program Descriptions & Faculty Leaders** **109**

Appendix I-A

Markets, Competition and Industrial Analysis: Modern Views in a New Economy

Gerald Berg, August 2002
Reprinted with permission

I. Introduction

The MIT Dictionary of Modern Economics defines "market," as

> "(g)enerally, any context in which the sale and purchase of goods and services takes place . . . (and for which t)here need be no (corresponding) physical entity . . ." (MIT, 1993)

According to this definition, a market includes all offerings and transactions of goods and services regardless of form and place. These offerings subsume all that can be called "competition," which is vital to the economy's efficiency and prosperity. For this reason, markets are crucial to an efficient economic system. Understanding them is essential to understanding the economy.

Because of their importance and complexity, researchers have studied markets for about as long as they have studied economies. A difficulty in understanding markets is that they change constantly as the economy changes. New technologies, cheaper transportation, easier communications, network industries, expanded international trade, and the growth of services have all changed the fundamental nature of competition.

In this paper, I survey the modern literature on markets and competition. I review experts' opinions about conditions affecting competition, the means by which economic agents compete, the effects of competition, how the economy has changed, and the implications for industrial analysis and strategic thinking.

Why Analyze Markets?

We analyze markets in order to know what conditions are likely to produce desired results and what policies are likely to be beneficial. Conditions that affect results include endowments of nature, technology, laws and governance, business practices, and the strategies of those active in the market. The "results" of the market, or "market performance," include the benefits and costs to all affected parties.

This knowledge of market causes and effects is vital to understanding the economy and essential information to any policy maker or strategic planner. Those charged with managing the nation's resources to advance the national will must understand markets in order to know when

and how to manage them and when to leave them alone. An example of the value of economics in national strategy is provided by the Cold War. Many analysts credit the West's stronger economy for victory. Some believe that it was a deliberate policy of the Reagan Administration to engage in an expensive arms race to drive the Soviet Unions' fragile economy to destruction. Strong markets were the weapon of choice in a successful campaign against an "evil empire."

The world petroleum market provides another example. In the 1970s and at times since, many observers feared that the United States and other industrialized nations were becoming dependent on a dwindling world supply of fossil fuels that was and would continue to be controlled by a cartel of major exporters. An understanding of markets alleviates a good deal of the anxiety. First, markets facilitate a deft adaptation to incipient "shortages." Higher prices encourage conservation in consumption, expansion of output, and expansive searches for new sources of supply and substitutes. In addition, the cartel of petroleum exporters, OPEC, which produced a daily average of 23.3 million barrels of crude petroleum in 2001 or 30 percent of world output and a much higher percentage of world exports, is subject to the same strains as any cartel.[1] The nations in the cartel, now numbering eleven, vary in their costs of production and their need for revenues. Each has an incentive to exceed its production quotas. Exceeding the quota is hard to detect in the short run and hard to punish if detected. It is especially hard to punish if multiple members exceed their quotas at once, which has often happened. Agreements to limit production and raise price quickly break down under the powerful force of competition among suppliers in spite of the enormous joint benefits of cooperation.

Armed with an understanding of markets, the strategic thinker is far more effective.

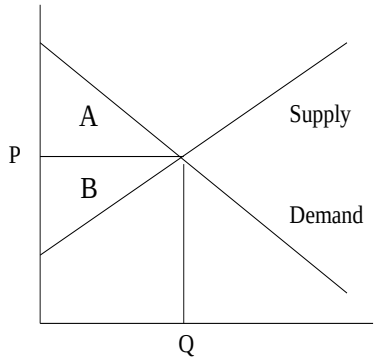
Market Performance

The "performance" of a market is the net value it generates. More net value — better performance. Net value is the collective benefits above costs generated for consumers and suppliers in the market, absent any external effects.[2]

---

[1]Source: U.S. DOD, Energy Information Administration. OPEC, the Organization of Petroleum Exporting Countries, includes Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

[2]In the short run and apart from any effects external to the market, the net benefits are the sum of net benefits to consumers, area A in the diagram below (the area below the demand curve and above price), and benefits to producers, area B (the area below price and above the market supply curve. "External effects," or "externalities," are benefits or costs affecting persons who are not a party to a transaction.



In most practical evaluations, supplier benefits are disregarded. Although not justifiable conceptually, this omission is made for two very practical reasons. The first is that benefits to consumers and suppliers are partially offsetting in the sense that each is partly at the expense of the other. Adding to this, consumer surplus is generally regarded as more important than profits and far more difficult to measure. Consequently, analysts often take high profitability as an indication that consumer surplus is lower than it could be. With some irony, profitability is considered more valuable as an indirect indicator of consumer benefits not obtained than as a direct measure of benefits to producers.

The second reason that analysts generally discount benefits to producers is that consumers are rarely strong enough as individual agents in the market or as collusive agents to extract from suppliers greater benefits than would obtain in a competitive market. Consequently, low profitability is not regarded as a concern. When it occurs, it is expected to be eliminated in time by the exit of capital from the market as capital-owners seek better returns in other markets.

Military procurement provides a valuable perspective on this issue and a somewhat contrary view. The rapid draw down of the military since the late 1980s with disproportionately large reductions in procurement has caused many military suppliers to leave military industries or to merge with other suppliers. Depleted numbers of suppliers of these highly capitalized systems has reduced competition to the point that it has become a major concern of those planning for an efficient defense. For many systems and subsystems there are only two active suppliers. For some--aircraft carriers, thermal batteries, specialty fuses—there is only one. Military planners worry about the loss of competitors and recognize that sufficient profits are needed to keep competitors in business. Fearing reductions in competition among prime contractors, DOD blocked the proposed mergers of Lockheed Martin with Northrop Grumman in 1998 and General Dynamics with Newport News in 1999. But blocking a merger does little to maintain competition if both parties are not profitable enough individually to remain in business.

II. Definitions and Meanings

Casual speakers use the words “market” and “industry” nearly interchangeably. Their meanings do overlap, but “industry” more precisely refers to the supply side of the market, to the suppliers and their operations. “Product market” is an antitrust phrase usually meant to focus on the products competing in a market and the geographic area of effective competition. Delineation of the relevant “product market” is often one of the most difficult and contentious parts of the process. Many cases rise or fall on this decision. Similarly in international trade law, the determination of the relevant domestic “like product” is crucial to the evaluation of injury and disposition of a case.

In defining terms, it is important to recognize that there are (at least) two different kinds of definitions. One kind is conceptual, the other discriminating. A discriminating definition distinguishes what is inside the category being described from what is outside it. The MIT Dictionary of Modern Economics definition given at the beginning of this paper is a conceptual definition. According to it, a “market” is in concept the institutions associated with the purchase

or sale of closely competing products or services, actions incident to those sales, and the agents making them. Building a discriminating definition on this concept is a daunting task. What is meant by "closely competing?" How close is close enough? How can competition be measured? Are we concerned with competition among buyers or among sellers or both? What tells us where borders lie between markets?

Traditional Approaches

A traditional approach to defining markets is based on the "law of one price." Nineteenth century economists Cournot and Jevons used this "law" to define markets. According to the law, two products that directly compete must sell for the same or nearly same price. If they do not, consumers would choose the cheaper one. Competition and arbitrage keep their prices in parity. Similarity of price is therefore an indicator of direct competition. More importantly, dissimilarity of price is a good indicator that two products are not closely competing and not part of the same market (Geroski, 1998).

The law of one price provides an exacting standard that defines industries narrowly. It does not allow for reasonably close competition among differentiated products. Tires, for example, vary a fair amount in quality and price, but perform much the same function. It is also possible that not competing products sell for the same price by coincidence. Still, the law of one price has a good deal of appeal and is sometimes still applied. Products that sell for different prices must be perceived by consumers to be different. Competition among them must be limited.

"Substitutability" is a measurable characteristic that adds precision to the concept "closely competing." Substitutability in consumption between products is measured with the cross-elasticity of demand, which is the percentage change in quantity demanded of one product that results from 1 percent change in the price of another (Carlton and Perloff, p. 165). Formally,

$$\varepsilon_{ab} = (\delta Q_a/\delta p_b) / (p_b/Q_a),$$

where ε_{ab} is the cross-elasticity of demand for product A with respect to the price of B,

Q_a is the income-compensated demand for product A, and

p_b is the price of product B.

The higher is the elasticity, $\varepsilon_{ab,}$ the more readily consumers substitute one product for the other as their relative prices change. How high the elasticity must be for two products to be considered part of the same market is a matter of judgment. There is no obvious threshold.

Antitrust Product Markets

Since late in the 19th century, the United States has instituted four major antitrust laws and a spate of modifications. The Sherman Act of 1890 addresses the creation or use of monopoly power and collusion by rivals. The Clayton Act, 1914, built on the Sherman Act by prohibiting price discrimination,[3] tying,[4] and exclusive dealing[5] that tended to be anti-competitive and limiting stock acquisitions by rivals and interlocking directorates. The Federal Trade Commission Act, 1914, outlawed "unfair methods of competition," notably exclusionary practices. The Celler-Kefauver Act, 1950, limited mergers. (Posner 1976, Carlton and Perloff, pp. 601-606.)

The purpose of antitrust policy is to promote the welfare of consumers. The strategy for achieving this embodied in the law is to promote competition in all markets. The tactics are to prohibit anticompetitive practices and prevent mergers that would reduce competition. Many high--profile cases pertain to monopoly and monopolization. These include Standard Oil (1911), Alcoa (1945), AT&T (agreement reached in 1982), IBM (suit withdrawn in 1982), and the ongoing case against Microsoft. Being a monopoly is not illegal, but establishing or maintaining one by proscribed means is. The government litigates many more cases against firms in oligopolized industries for alleged collusion than against monopolists. Additionally, a great deal of antitrust activity pertains to prospective mergers. Current law requires firms to notify the government in advance of an intention to merge. The law empowers the government to prevent mergers it believes would be likely substantially to reduce competition in any product market. Government merger determinations are subject to court appeal.

The vigor of U.S. enforcement of antitrust has varied a great deal since institution of the Sherman Act. Owing to changes in public and political opinion and varying interpretations by the courts, the United Sates experienced relatively lax enforcement, especially of anti-merger policy, prior to 1950, followed by vigorous enforcement from 1950-74, followed by more lax enforcement since then (Mueller, 1997).

A discriminating definition of the market is essential to effective antitrust policy. Antitrust laws govern competition. Competition occurs within markets. The antitrust authorities use the following definition of a product market. The courts have upheld it.

> "Absent price discrimination, the (government) will delineate the product market to be (the smallest) product or group of products such that a hypothetical profit-maximizing firm that was (sic) the only present and future seller of those products . . . likely would impose at least a 'small but significant' and 'nontransitory' increase in price (DOJ, 2002)."

This definition can apply to any product or service and is directed at the extremely difficult task of establishing a boundary to the market around that product. The definition stipulates that the relevant product market is the smallest product area for which a hypothetical monopolist would

[3] "Price discrimination" is selling the same or essentially same product or service to different customers at different prices. A price difference based on a bona fide cost difference is not considered discriminatory.
[4] "Tying" is linking the sale of one product or service to the sale of another.
[5] "Exclusive Dealing" is an arrangement in which one agent buys from or sells to only one other agent. For example, a retailer that agrees to sell the output of only one producer is an exclusive dealer.

charge significantly more than competitive suppliers. Usually, the government considers 5 percent or more to be a "significant(ly)" higher price within the meaning of its definition (DOJ).

The antitrust definition allows for the possibility of overlapping product markets as in Figure 1. As an example, product markets for global positioning system equipment and guided missile parts would both include GPS parts used in guided missiles. Each would also include other products.

Figure 1: Overlapping Markets

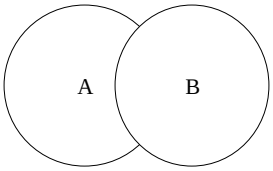
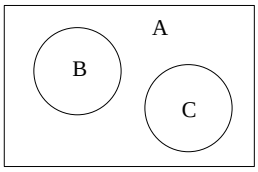


Figure 2: Market A with Submarkets B and C



The antitrust definition also allows for the possibility of narrow product markets nested within broader product markets, depicted in Figure 2. Each such product markets has the same legal status. The Supreme Court established the principle of nested markets long before the current antitrust guidelines were written. In Brown Shoe vs. the United States (1962) the Court found that men's, women's, and children's shoes each constitutes a product market within the broader product market of shoes. The Court upheld a lower court's prohibition of a merger between Brown and Kinney based in part on the analysis of the likely effects of that merger on competition in submarkets (Stelzer, 1981).

Modern Views

Modern views of markets and a useful definition for them reflect in part changes in the economy in recent years and in part a changed understanding of what was already there. There is no widely held alternative definition from what has been described. However, there have been some changes in widely held views of what a market is and some specific proposals for working definitions. Important modern views about markets include the following.

(1) Substitutability in supply is much more important than in the traditional view and substitutability in demand less important in defining markets.

(2) Technology is extremely important in some markets. Rapid changes in technology cause rapid change in these markets.

(3) Markets are regarded as less likely to share characteristics. As a result, market studies more often focus on individual markets.

Part of the reason for the changing views of markets is a body of analysis put forward mostly in the 1980s of what was called "contestable markets." This analysis focused on conditions of entry and exit. A contestable market was defined to be one for which entry is free in the sense that entrants bear no disadvantage compared with incumbents and exit is costless in the sense that the economic value of all assets can be fully recovered. According to this analysis, in a contestable market the potential entry of firms outside the market is sufficient to discipline the market and provide for competitive consumer welfare, efficient producers, and the most efficient market structure (Baumol, 1982).

At its peak, the theory of contestable markets rivaled, or perhaps improved, the theory of competitive markets in its application because it offered competitive results with fewer required conditions. In time, analysts came to the view that few markets are contestable within the requirements of the theory since an incumbent's exit from a market is almost always costly. The image of "hit and run" predators disciplining markets faded and the theory died a quiet death—or at least faded away. But the theory left behind the important legacy that the potential entry of firms outside a market can have a copious pro-competitive effect. Fewness of incumbents in a market does not necessarily imply a lack of competitive discipline. The potential for this effect implies that supply substitutability is a crucial part of market analysis and is an important element in defining markets.

For reasons besides market contestability, some recent researchers have concluded that traditional views are no longer useful for defining markets, especially those driven by technology (Geroski 1998, Pleatsikas and Teece 2001). Geroski observes that there are three kinds of market definitions, those based on "trading markets--" the law of one price and demand substitutability--, antitrust markets, and "strategic markets." He bases the strategic-market definition on corporate strategy for which it is useful to analyze. It focuses on the supply and supplier characteristics such as economies of scale, technology, identification of rivals, and network and distribution channels. In a similar vein, Pleatsikas and Teece found that technology-driven industries are very different from mature and relatively stable ones and therefore require different analysis. They found that firms in high-tech as compared with traditional industries compete more on the basis of quality, reliability, and service, and less on price, that product differentiation is generally greater and change more rapid. Because of these distinctions, they argue that the government's antitrust market definition is not useful. Instead monopoly power should be assessed on the basis of efforts at innovation, shifts in market shares and consumer preferences, and pricing responsiveness. Additionally, Geroski and Mata (2001) observe that most modern researchers analyze markets with case studies rather than cross-section analyses of multiple industries contemporaneously.

The United States Government, the United Nations, and other governments and organizations have developed systems of classification of economic activity. The traditional U.S. system is the "Standard Industrial Classification" (SIC). The government has recently replaced the SIC with the "North American Industry Classification" (NAICS). The government also uses the internationally based "Harmonized System" to classify exports and imports and to assess import duties. The NAICS system is described in section VI.

III. Market Analysis

There are two basic approaches to analyzing markets. The more traditional approach focuses primarily on market structure to explain firm conduct and structure and conduct to explain market performance. The second approach focuses on strategic behaviors of firms to explain market performance. The first approach is called "structure, conduct, performance (SCP)," generally written:

$$\text{Structure} \rightarrow \text{Conduct} \rightarrow \text{Performance}$$

It is sometimes simplified both in name and substance to "structure, performance." The second approach is called "strategic" or "game theoretic," and might be written as:

$$\text{Strategy} \rightarrow \text{Performance}$$

The two approaches differ a great deal, but are basically compatible with each other as analytical methods.

Structure, Conduct, Performance

SCP is a descriptive way of organizing information about a market or industry and a paradigm about how one works. Economists developed it in the middle years of the 20th century, a time when markets changed slowly and the technical tools for analyzing them were limited. According to the paradigm, a competitively structured market should lead to competitive conduct by suppliers in terms of pricing, quality, service, and efforts to innovate and to favorable economic performance. Uncompetitive structure could be expected to be less competitive and possibly lead to collusive conduct and poorer performance.[6] Market performance was described in section I. Market structure and conduct are described here.

Market Structure

The definition of "market structure," has drifted over time and is subject to some variation now. A good definition is that "market structure" comprises all conditions affecting the market that are fixed in the short- to medium-run. Because they do not vary, these conditions are said to be "exogenous" or outside the control of agents in the market in this time frame. They include the minimum efficient size of operation (economies of scale), legal restrictions such as

[6] This analysis is based on competition among suppliers. Lack of competition among consumers would also be expected to result in poor market performance.

patents or regulations affecting competitive behavior, barriers to entry to the market or costs of exit, and the size distribution of buyers and sellers. Some would add to this list product differentiation, meaning the degree to which products competing within the market vary in some characteristics. Wristwatches, for example, vary by quality and somewhat by the functions they perform. Retailers vary by location. A barrier to entry is any condition that imposes additional costs on entrants. Some would define "barrier" to be a cost not incurred and never incurred by incumbents (Carlton and Perloff, p. 77). Barriers include customer loyalty, uncompetitive access to inputs or channels of distribution, minimum efficient firm size, and, with the less stringent interpretation, advantages of learning by doing.[7]

Analysts generally use the size distribution of suppliers in the market as the metric for market structure. This size distribution is most often measured with the four- (C4) or eight-firm (C8) concentration ratio. This "ratio" is the percentage of industry sales or assets accounted for by its largest four or eight firms in a given time period.[8] These data are published by the U.S. Census Bureau. Market share with respect to sales is most often used. Alternatively, some analysts use the Herfindahl Index (or Hirfindahl-Hirshman Index). The Herfindahl Index is the sum of the squared market shares of firms in the industry.[9] Conceptually, it is a better measure because it is sensitive to more information and the exact market shares of the largest several firms. Concentration ratios and Herfindahl indexes correlate to a great degree and as a practical matter produce similar results in most studies for which comparison is possible (Carlton and Perloff, pp. 247-250).

It is worth noting that the size distribution of suppliers (or buyers) is probably the least fixed of the conditions that are included in market structure. Indeed, it is likely to be greatly affected over time by other structural conditions, such as barriers to entry and product differentiation, and firm conduct, such as advertising and innovation. This relative variability accounts for some of the difficulty with empirical SCP studies.

Conduct

[7] For a discussion of barriers to entry, see Agarwal and Gort (2001), Porter (1975), and Bain (1956).

[8] Mathematically, the concentration ratio is written $\sum S(i) / S$, where summation is over the largest 4 or eight firms and S represents sales or assets. The ratio is usually expressed as a percentage.

[9] Mathematically, the Herfindahl index is written $\sum S(i)^2$, where S is market share of the ith firm and the summation is over all firms in the industry.

Conduct refers to behavioral characteristics of firms that are variable in the short as well as long run. These include pricing, capital investments, research and development and other efforts to innovate, advertising, promotions, differentiation of products, and mergers and acquisitions between firms. The SCP paradigm suggests that market structure greatly affects firm conduct, and the two together determine market performance. For example, in a market for which a firm must be large to be efficient and customer loyalty is high, a firm trying to enter would probably try to do so on a grand scale and promote itself vigorously to win customers. Incumbents might vigorously oppose entry of a new competitor with promotions of their own. Or, depending on costs and the degree of customer loyalty, an incumbent might allow the entry to occur with little opposition and accept a gradual loss of its market share. This would be especially likely in an expanding market.

SCP Studies

Early work by Joe Bain in the 1950s and others was based on cross-sectional studies of industries. He found that highly concentrated industries tend to be more profitable—usually measured by rate of return on invested capital. Researchers found that firms in industries with C4 below 50 percent or C8 below 70 percent generally earned competitive rates of return whereas firms in industries with concentration ratios above these levels generally enjoyed higher than competitive rates of return. These concentration ratios themselves are highly correlated. The logic of this finding seemed clear—concentration has a threshold effect. Below the critical level, firms in the industry compete; above it firms recognize their interdependence and find ways to cooperate rather than compete. The result is higher profits and poorer market performance.

Recent studies have had different results. Most show none or only a weak statistical relationship between high profitability and concentration or other market structure variables. Some argue that the economy has changed, others that the early researchers on this issue used poor statistical techniques to analyze data (Carlton and Perloff, pp. 251-254, 257). This has obtained in spite of persistently high profitability in a number of industries (Mueller 1985, 1997).

There are a number of difficulties with doing SCP studies, some of which apply to all market studies.

- First among these is the difficulty in defining the market under study. If the relevant market is poorly specified, the analysis of pertinent data is likely to be flawed or misleading, as implied in the saying "garbage in—garbage out." Carlton and Perloff (pp. 249-250) observe that government data might overstate the degree of concentration in a markets by over-aggregating, or understate it by failing to take into consideration effective competition from outside of the defined market.

- A second major difficulty is that in some instances economic theory does not give a clear indication of the direction of causation if it exists. As noted, firm conduct might in the long run alter industry concentration or other structural conditions. Structure might affect conduct as SCP postulates or might be affected by it. That is, in some markets causation between structure and conduct might run in either direction or in both directions simultaneously, a condition called "simultaneous causality" or "simultaneity bias." If

causation runs both ways, the analyst errs in interpreting a statistical relationship as running only from structure to conduct. Similarly, the direction of causality is ambiguous between concentration and profits. High profitability might be a cause of concentration as well as the other way around (Carlton and Perloff, pp. 248-249, 259). Symeonides (2000) studying manufacturing industries in the U.K. for the period 1958 – 77, following the abolition of cartels, found that price competition tended to increase concentration in industries with large sunk costs and in advertising- and R & D-intensive industries. Arbatskaya (2001) studied low-price guarantees as a strategic behavior and found that in some conditions they can deter entry.

- Third, most studies do not take into consideration imports, giving a bias in domestic data towards higher concentration (Carlton and Perloff, p. 250).

Strategy, Performance

The basic paradigm of the strategic market analysis is that the strategies of firms (and possibly consumers) are the dominant force affecting market performance in all of its aspects. An analyst seeking to understand a market should focus on strategy.

It is important to note that the word "strategy" does not mean the same thing to market analysts and game theorists as it does in the national security context. In game theory, "strategy" is any action or plan for action intended to advance a player's objectives made in consideration of a possible response from a rival with whom there is interdependence. An action taken without consideration of rivals' response or in the absence of interdependence, as in a perfectly competitive market, is not strategic. As two authors put it:

> "Strategic thinking is essentially about your interactions with others . . . (G)ame theory is the science of rational behavior in interactive situations." (Dixit and Skeath, 1999, p. 3)

The strategic approach to market analysis developed gradually. By the 1980s it had become a major alternative to SCP. Prior to then, most analysis of imperfectly competitive markets was based on "oligopoly models" or specific scenarios posited for markets with few suppliers. These models provided useful insights into how markets work in given conditions. But they were inflexible, with each dependent on a particular set of assumptions. One model answered only a few questions; many were needed. Some of the more important models were based on the following.

- Each firm assumes that rivals will match a price decrease but not a price increase.
- Each firm assumes that its actions will not cause rivals to alter their output levels.
- One firm leads in setting the industry price; others follow.
- Two or more firms try to set the industry price.
- Firms differentiate their products in order to reduce competition.
- The firm or firms in a profitable industry deter entry by setting a sufficiently low price and sacrificing some amount of profitability in the short run.

- Firms in a profitable industry advertise intensively to increase the minimum efficient scale of operation and deter entry.
- Firms maintain excess capacity to deter entry.

And on and on and on and on. Each model allowed for only one set of strategies. Each new possible strategy required a new model. Something more flexible was needed that focused on the multiplicity of possible strategies of competitors and their implications.

Practitioners of what was then an obscure branch of applied mathematics were already developing a body of analysis that would do these exact things. Game theory focuses heavily on the possible strategies of players in a competition and their consequences. Additionally, it is readily adaptable to varying game or competitive conditions. Economists adopted game theory as a means to analyze markets and have contributed copiously to its development in the past quarter century. Additionally in recent years, game theory has drawn from and been applied to other disciplines such as evolutionary biology (Samuelson, 2002).

Games can occur in one time period or many or in an indefinite number of periods, have varying reward systems (zero-sum, not zero sum), sequential or simultaneous play, and have other distinctions. These variations are important, but not for understanding the most important concept and results of game analysis. All games have a basic form and structure, require "play" or decisions by players, and have an outcome dependent on these decisions. There must be interdependence among players, meaning that one player's actions affect other players. Otherwise it is not a game.

A great deal of the power of game theory as an analytical tool derives from one supreme act of insight made by John Nash over a half century ago. Nash observed that equilibrium in a competitive game is characterized by each player's strategy being optimal given the strategy of all other players (Dixit and Skeath, p. 82). The reasoning for this is compelling. If one player's strategy were not optimal, he would change his strategy sooner or later. His new strategy might then cause an opponent's strategy to become non-optimal and to change in turn. Adjustments would continue until none is needed. When that occurs, the Nash equilibrium, as it has come to be called, is achieved.

The Nash equilibrium tells a great deal with little initial information. Because a competitive system is likely to move to equilibrium and remain there, the players' initial strategies are not important. The outcome of the game in equilibrium depends on the equilibrium strategies, which can generally be derived from the structure of the game.

It should be noted that, as with many systems, a Nash equilibrium does not necessarily exist for a given game. If it exists it might not be unique. But, these contingencies still provide a great deal of information. For example, a system with no equilibrium is likely to be unstable with respect to players' strategies and the outcome.

For his work, Nash shared the Nobel Memorial Price in Economic Science in 1994 and had a novel written about his life, which was made into a movie in 2001, "A Beautiful Mind."

Strategy affects markets in two ways. It affects markets directly by affecting how suppliers and sometimes consumers compete and the market equilibrium. Indirectly and more subtly, strategy affects some markets through its effect on market structure. As noted, firms' strategies can alter market concentration over time. Efforts to innovate, for example, can change the products available and the relative efficiency of competitors, both with important implications for market performance.

Kim and Vale (2001) studied the banking industry in Norway. They found that bank branching is a "strategic" behavior of banks. Branching is a form of non-price competition that banks use to increase market share at the expense of rivals, not to increase the overall volume of bank assets. Banks make branching decisions in consideration of the response of rivals. Mathias and Koscianski (1997) found that U.S. titanium producers create excess capacity to deter entry into the market. Matrons (1999) noted that the modern view of market structure is based on the theory of competitive behavior. She found that in the global pharmaceutical industry, endogenous sunk costs have a substantial effect on market structure.

IV. Market Structures

I provide in this section a brief overview of market structures and their implications. A much more detailed treatment can be found in any microeconomics textbook.[10]

Perfect Competition

A perfectly competitive market has these four characteristics:

(1) The product is homogenous.
(2) All buyers and sellers have all relevant information.
(3) No buyer or seller is big large enough to affect significantly the market price or other market conditions.
(4) Entry and exit from the market are unencumbered.

Some would add to these requirements that there are no external effects from the market affecting those not participating in it, such as pollution.

In a competitive market, market demand and supply determine the price. All agents can buy or sell as much as they want at that price. Firms maximize profits by choosing the output level that equates the market price, which is also its marginal revenue, with its marginal cost of supply. If profits are higher than in the economy at large, firms can be expected to enter the market and drive down the price and rate of profitability. If profits are lower, exit will occur, driving prices and profitability up.

Besides the obvious high degree of economic freedom, a competitive market has the desirable characteristic that it tends to generate maximum benefits in the short run in terms of summed consumer and producer benefits.

[10] For example, see Baumol, William, and Alan Blinder, Economics/Principles and Policy, Eighth Edition, 1999, New York: Harcourt College Publishers, pp. 189 – 268.

Monopoly

In a monopoly, there is only one seller. All other characteristics might be the same as in perfect competition. If the monopolist can charge only one price, he, as all suppliers, maximizes profits by choosing the output level that equates marginal revenue with marginal cost. He sets the price by picking a price off the demand curve for his product, the maximum he can charge for his chosen output level. The monopolist is almost certain to charge more and supply less than suppliers in a competitive industry whose collective cost structure is the same as the monopolists.[11] This result gives two important effects of monopoly compared with an equivalent competitive industry. First, the monopolist supplies less than the quantity that would maximize net benefits. Because it sets price above marginal cost, the sum of consumer and producer benefits is less than would have obtained with competitive supply. Second, part of the benefits to consumers that would have obtained with a competitive price is transferred to producers in the form of profits. The former effect is an unambiguous loss of value and reduction in market performance, sometimes called an "efficiency" or "deadweight" loss. The latter effect, the transfer from consumers to the monopolist, is not a loss of value if the consumers' and producers' welfare are valued equally.

Two other possible effects of monopoly are worth noting. One is that because a monopolist incurs little competition—only that from potential entrants if they exist and producers of substitute goods—it is likely to be inefficient in its internal operations. This is called "X inefficiency." The other is that a monopolist might have less incentive to innovate or improve its product or provide the best quality it can in whatever form that might take. This failure might be called "complacency." Examples would be IBM's lethargy in developing personal computers and Ford's erstwhile refusal to make Model Ts in any color besides black. However, some analysts disagree. They argue that a monopolist is more likely than competitive suppliers to have the vision, the resources, and the will to be an aggressive innovator (Schumpeter, 1950).

The potential for negative effects has produced a presumption in favor of competition and against monopoly that is the basis for antitrust policy relating to monopoly.

This presumption has become more tentative in recent years. One reason is the view of Scumpeter and others that monopoly might facilitate greater research effort and a better organization of resources for the longer term. Another is that monopoly might be the result of a best firm dominating its market through successful competition. This dominance seems especially likely for markets with rapidly changing technology. An example might be Microsoft in personal computer operating systems. The rapid change of technology that makes monopolies in such markets also makes the monopolist's dominance tenuous. Researchers and casual observers have observed this instability. Some have given the name "leapfrogging," to the event of an initially secondary supplier in a market or a supplier not in the market at all developing a better product or process and replacing the leader. An example might be Wal-Mart, which has become the nation's largest retailer. Rosencranz (1997) using a model to study this issue found

[11] This is a rather extreme qualifying condition, but the only one that allows a direct comparison of a competitive market and one monopolized.

that in a wide range of circumstances the lower quality suppliers in a market have greater incentive to innovate than the dominant supplier, which tends to produce leapfrogging of leadership.

Further, it is public policy to reward a good innovator with monopoly rights to his innovation for a period of time. This is the reason for the legal sanction of patents with similar justifications for copyrights and trademarks.

Of course, a monopolist need not charge the same price to all customers. Many charge two or more prices for the same or virtually same product or service. If not based on a bona fide cost difference, this practice is called "price discrimination." The practice of price discrimination by monopolies and those possessing a greater or lesser degree of market power has become widespread. Senior citizens' discounts are one example. Highly differentiated airline fares based on nominal distinctions like length of stay at destination are another. In order to discriminate successfully, a supplier must face potential customers with differing willingness to pay, be able to distinguish among them, and be able to charge different prices.

Price discrimination has the effect of transferring additional value from consumers to producers. It also tends to increase the volume of supply, mitigating the efficiency loss. Benefits to suppliers can be considerable. But, the potential for efficiency gain means that the performance of the market overall might not suffer. In fact, those paying the higher price might not be worse off than if the monopolist charged only one price. One place where this shows up is "network industries" in which the value of the product increases with the number of consumers. Network industries are discussed in section V.

Price discrimination, even more than monopoly itself was once viewed with extreme suspicion, prompting Congress to outlaw the practice in the Clayton Act. However, it is now viewed much more benignly by analysts and the courts. In antitrust litigation, the courts now attach a "rule of reason" to price discrimination complaints.

Monopsony

In a monopsony, there is one buyer. It is monopoly in reverse. Instances are rare, but highly significant. They include government purchases of goods and services if it is the only buyer. Abstracting from foreign military sales, the U.S. government is a monopsonist for the purchase of military products.

The analysis of monopsony is nearly identical to that of monopoly in reverse. The lone buyer picks a point on the industry supply curve, the one that maximizes its welfare. In so doing, it extracts value for itself that might have been producer surplus in a competitively purchased market and the overall quantity is lower. There is a transfer of value favoring the consumer and there is a loss of overall net benefits because of the reduction in quantity purchased. Price discrimination by the buyer is not considered a major concern.

Bilateral Monopoly

In a bilateral monopoly, there is one buyer and one seller. The outcome of this market is indeterminate. Price and quantity could end up anywhere in the range from monopoly to monopsony. The result might depend on how skillfully the players bargain. It is possible that the players will agree on the competitive output level, which generates the maximum joint benefits. The military purchase of a weapons system for which there is only one supplier is an example of bilateral monopoly.

Monopolistic Competition

In a monopolistically competitive market, the product is not homogeneous. Each supplier's product or service is less than perfectly substitutable with that of its competitors. Their products are "differentiated." All other conditions are the same as in perfect competition. In this kind of market, suppliers compete, but each has a small amount of monopoly power. An example would be retail pharmacies that are differentiated by location. Many people prefer a conveniently located pharmacy, so location is a significant differentiating characteristic. Another would be the market for clothing, which is differentiated by style, fabric, and quality, although highly competitive. Small price differences do not result in complete shifts in purchases, although some shift is likely to occur.

This kind of market has some of the characteristics of perfect competition and some of monopoly on a small scale. Suppliers compete to a greater or lesser degree and probably drive prices and profits down to near competitive levels. However, firms do have some power to set price, to price above marginal cost, and possibly to price discriminate. Market performance, measured by summed consumer and producer surplus can be nearly as great as under perfect competition. Additionally, the inherent product differentiation might be beneficial to consumers.

Oligopoly

In an oligopoly, there are few suppliers and many buyers. How few? Few enough that at least some of the largest suppliers can affect the market, meaning that they can alter the price for themselves and others by bringing different amounts to sale. A firm's action that alters the market price might cause one or more rivals to react and that reaction will affect the original firm as well as others. The interactive nature of competition in an oligopoly gives firms an incentive to collude to do what is in their collective interest rather than compete. The potential for collusion and the consequent reduction in market performance is a great concern to policy makers and is the motivation for much antitrust law. However, collusion and inferior market performance are far from certain.

Oligopoly is not a single market structure but a category of them. That with the greatest potential for collusion is duopoly—a market with two suppliers. The incumbents need share the benefits of collusion only two ways. In addition, each is as well suited as possible to monitor the other firm's behavior to detect non-collusive behavior and to punish it when it occurs. Another market structure would be three or more large suppliers. Another would be one or two major suppliers with additional small suppliers, sometimes called a "competitive fringe."

Strategy and conduct vary a great deal among firms in oligopolized markets. A firm might aggressively try to expand sales and market share or try to charge high prices to obtain greater profits in the short run. A firm might try to set the price or accept the price set by rivals; it might price low or maintain excess capacity to deter entry; it might try to develop new technologies or imitate those developed by rivals; it might advertise to create customer loyalty or not; it might compete with quality, customer service, price, or a differentiated product. Each of these strategies has implications and their varied interactions among rivals in a market have implications for market performance.

Much like monopoly, opinions about oligopoly have changed a great deal over time. There is now recognition that the forces for collusion and poor market performance are often more than offset by concomitant competitive forces. This phenomenon is explained in game theory by the "prisoner's dilemma." The individual firm's (or prisoner's) incentive is to compete, which is directly contrary to the group's interest of restricted output and higher price. The Nash equilibrium is for all firms to compete.

Apart from the strategic implications of the prisoner's dilemma, several competitive forces are at work in an oligoplized industry. In some, technological conditions, such as economies of scale, might have given rise to the market structure. This is the case in many military industries where only a very few efficiently sized suppliers can operate in the market. A second is that in some markets only the most efficient firms are likely to be successful and command large market shares. A third is that the potential entry of firms currently outside the market might have a powerful competitive effect even if they never actually enter—the thesis of contestable markets. A fourth is legal restrictions on collusion, whether overt or tacit.

Cartels

A "cartel" is a collusive association among suppliers within a market. Its purpose is to increase the collective benefits of its members at the expense of consumers by reducing competition.

> People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.
>
> --Adam Smith[12]

A cartel can be a formal association with written or oral agreements or an informal one with no direct communication at all. What is important is that its members act cooperatively among themselves rather than competitively. Roughly, the purpose of a cartel is to act as a joint monopoly.[13]

In order for a cartel to be successful, it must:

[12] Quoted in Carlton and Perloff, p. 121.
[13] "Roughly" only because the collective cost structure of firms in a cartel might not be the same as that of a monopolist and the cartel might only partly collude.

(1) comprise firms with a common interest in restricting competition,
(2) agree on how each will restrict its own competitive behavior, and
(3) police the agreement by monitoring the behavior of members to detect cheating and punish cheaters.

Item (1) is easy. Firms operating in the same market can increase their collective profitability by cooperating instead of competing. Item (2) can be difficult, especially if firms have different cost structures. Firms with different costs want different outcomes and there is often no obvious or "fair" way to divide the benefits of cooperation. Item (3) is often extremely difficult, especially if there are many firms. It is generally difficult to know who is violating the cartel agreement when it occurs. Even if the violator is known it is difficult to punish him. In many cases, the only real punishment is to respond in kind, which drives price and joint output farther from the cartel's preferred levels.

Supplier cartels are a special case of what Mancur Olson has called a "distributional coalition." It is in the individual interest of each member or potential member of such a coalition to compete rather than cooperate, but individual competition is harmful to the group's collective interest. Because competition or violation of the group's code is hard to detect and to punish, successful distributional coalitions are far rarer than they are potentially beneficial to their members. Those that form successfully frequently break down in time unless they are enforced by government action (Olson, 1982).

Recent Oligopoly Studies

Cooper (1997) developed a model of duopoly price setting with costly information. He found that such markets have a unique equilibrium, which is for one of the firms to acquire pertinent information and set the industry price and for the other to follow the price and invest nothing in information.

Athey and Schmutzler (2001) also developed a model of leaders and followers using game theory with investment as the basis for competition. They found that investment strategies often lead to increasing dominance of the leader, especially if the market is characterized by network effects, learning by doing, or high advertising intensity. In some cases, the follower or "lagger" benefits more from his investment. They found that in some situations investment is a strategic tool in the sense that one firm might invest to decrease the investment of a rival.

Evans and Kessides (1994) did an empirical study of airline pricing. They found that airlines tend to charge higher prices for city-pair routes served by carriers with extensive inter-route contacts. They conclude that airlines that compete in multiple city pairs tend to refrain from aggressive pricing in any one pair for fear of retaliation in another.

Symeonides (2002) developed a model of multi-product firms. He found that if these firms compete by proliferating varieties of products to generate additional sales, collusion among them becomes more difficult and less likely.

Liao and Tauman (2002) modeled a market with competition among multi-product suppliers, each of which offers its products individually or “bundled” as a package. They found that in such an industry an equilibrium always exists and that consumers always select the outcome that maximizes net social benefits. Bundling, Liao and Tauman conclude, is a process that does no harm and might increase efficiency and benefits to consumers.

Jacobs (2001) studied international mergers that create oligopolies. He noted that there was a great increase in international mergers in the late 1990s. Some of these mergers created significant market power or increased existing market power in the global market. Jacobs observed that an important issue pertaining to such mergers is the buyer power they create and the potential to injure competition upstream.

Recent Studies of Corporate Mergers

The U.S. economy has experienced numerous "waves" of corporate mergers, going back a hundred years or more. Some observers have opined that mergers have been corporate America's response to antitrust laws--that is, their way around the law at any given time. The motives for mergers are controversial. One view is that mergers are intended to increase efficiency and profitability. Another is that mergers are intended to increase profitability, but not necessarily efficiency (Carlton and Perloff, pp. 19 – 22). Increasing profitability without increasing efficiency might be accomplished by increasing market power in one or more markets. This is the concern of the antitrust authorities. Mueller (1997) argued that mergers are an instrument of empire building by profitable corporations that has little to do with efficiency considerations.

The most recent merger wave, dubbed "merger-mania" by the media, began in the late 1970s and has continued more or less unabated until the present. In a recent study, Rodrigues (2001) found that the incidence of mergers depends on a number of conditions including the expected competitiveness of the market after the merger and the potential to economize on fixed costs. Mergers, he found, affect market concentration, although in different ways.

V. Technology and Network Industries

Nothing characterizes the modern economy more than the application of technology and rapid change. Technology has created important new industries and has changed traditional ones. Modern telecommunications, for example, affects nearly every market. The printing press, invented half a millennium ago was a new technology that revolutionized communications and the ability to store and disseminate information. The industrial revolution, which began in Great Britain in the late 18th century, was based on new technologies in the control of energy, transportation, and machine-based production. The 19th century brought the steam engine, the domestication of electricity, artificial light, elevators, automobiles, the sewing machine, photography, phonographs, telegraphs, telephones, Pasteurization, and much better machines to do just about everything. The early and mid-20th century brought radio, television, refrigerators, air conditioning, xerography, a revolution in synthetic materials and pharmacology, and computers. Still, the rate of technological advancement seems to have quickened in the last 30 years and with it has come many changes in the economy.

Gandal (2001) studied the market for Internet search engines. He found that early entrants, notably Yahoo, still have an advantage, although it has diminished over time. Yahoo's advantage is based partly on incumbency and partly on its provision of a superior service. Overall, barriers to entry are low in this market and many recent entrants have succeeded. Gandal's finding is similar to that of Agarwal and Gort (2001), mentioned earlier, that the advantage of first movers has decreased sharply in recent years because of the reduction in first movers' absolute cost advantage.

Faulhaber and Hagendorn (2000) studied the market structure of broadband telecommunications. They concluded that the growth of the Internet has created a market for a

telecommunications network. They found that oligopolistic competition is likely to emerge in this market with demand levels approaching today's cable television.

Like technology, network industries have existed for a long time. Awareness of them has increased as has their apparent importance in the economy because of synergies of technology. Economidas (1996) defined "network" as being "composed of links that connect nodes (p. 674)." Linkage is the crucial characteristic of any network. The complementary nature of components within the system is nearly as crucial. Nodes are the means of this connection.

I would define a "network service" as one that provides a connection to an indeterminate number of significant linkages. Because the number is indeterminate, so is the exact nature and value of the service. Examples of network industries include air and rail service, which are linked through hubs, postal and other delivery services, linked through central processing points, the telephone system, and computerized Internet and electronic mail services.

Two important distinctions among kinds of networks can be made. First, network linkages might be strictly connections to supplier services or it might be among consumers as with e-mail and the telephone system. The value of the network to consumers increases with the size of the network; in the case of consumer-based networks it increases with the number of consumers that purchase the service.

The second distinction is between single-node and multiple-node networks. In the latter case, a node might connect with a number of final supply points and also with one or more other nodes, creating a complex system. In the single-node or "simple" network, depicted in Figure 3, the node is indicated by the letter "N." Lines connecting to it represent linkages. The network depicted in Figure 4 has multiple nodes, indicated by "A," "B," and "C." Lines connecting to each of them are linkages. Anyone connected to A, B, or C at any point is also connected to all other ports connected to any of the three nodes.

The economics of networks is fairly simple according to Economidas' analysis. The linkages within networks generate positive externalities or "network externalities." This means that each additional linkage improves the network and therefore increases its potential value to consumers. Economidas describes networks as being comparable in market structure to vertically related industries with a production or consumption externality. This explanation seems to apply most appropriately to complex networks. Economidas shows that perfect competition fails to provide an optimal result in a network industry much as competition fails in the presence of an externality. Competition in a network industry will supply less than the socially optimum quantity of the service. He notes that a monopolist supplying a network service will supply even less than competitive suppliers if it cannot price discriminate. Presumably then, if it can price discriminate, it might supply more and provide a more efficient market than one supplied competitively.

Researchers have found other difficulties with network industries. Kristiansen (1998) found that network externalities might induce firms to introduce incompatible technologies early to protect individual market "turf," thereby raising overall R & D costs. Firms competing in this way might benefit themselves but increase net social costs by delaying the introduction of

compatible technologies. Lafront and Tirole (1998) found that competition among interconnected networks might not have a competitive equilibrium.

Clougherty (2002) studied U.S. airline mergers. He views the air transportation industry as a collection of networks. He concluded that mergers increase efficiency by improving these networks and significantly increase the international competitiveness of the U.S. air transportation industry.

Schmidt (2001) did a similar study of U.S. freight rail rates and came to similar conclusions. He found that large networks under single ownership are very efficient. Inter-line shipments are costly. Consequently, mergers among carriers are often desirable in spite of the resulting increase in overall market power.

VI. The North American Industry Classification System

Beginning in the 1930s, the U.S. Government developed and maintained a system of industrial classification for tracking and analyzing economic activity. The initial system was called the "Standard Industrial Classification" or "SIC." After adoption of the North American Free Trade Agreement in 1994, the government replaced the SIC with the "North American Industry Classification System," or "NAICS." NAICS expanded the scope of the system to the three economies in NAFTA and provided much more explicit coverage of services and newer technologies (U.S. Bureau of the Census).

Some U.S. government agencies and private enterprises still use the SIC. The U.S. Customs Service uses the international recognized Harmonized System to track internationally traded goods and services and as the basis for tariffs and other trade policies. Other systems are used by the United Nations and governments around the world.

It is important to note that the NAICS, SIC, and the Harmonized System are all systems of *classification*, not compendia of market or industry definitions. This fact is testimony to the difficulty of usefully defining markets or industries in a consistent way. The government collects supplier data every five years in its Census of Manufacturers and at other times. It classifies data by establishment, not by supplier. Sometimes data from a single establishment are broken down among NAICS codes if all needed information is available and it is appropriate to do so.

Some of the United States industries included in NAICS, that were not included under the SIC are the following:

- Semiconductor machinery manufacturing
- Fiber optic cable manufacturing
- Convenience stores
- Warehouse clubs and superstores
- Satellite telecommunications
- Paging
- Temporary help services
- Telemarketing bureaus
- Hazardous waste collection
- HMO medical centers
- Casinos

Within NAICS, economic activity is classified with six digits. The first two digits represent the broadest industry classification, which the Census Bureau calls "sectors." The twenty sectors are:

11	Agriculture, Forestry, Fishing, and Hunting
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing

41-43 Wholesale Trade
44-46 Retail Trade
48-49 Transportation and Warehousing
51 Information
52 Finance and Insurance
53 Real Estate and Rental Leasing
54 Professional, Scientific, and Technical Services
55 Management of Companies and Enterprises
57 Administration Support and Waste Management and Remediation Services
61 Educational Services
62 Health Care and Social Assistance
71 Arts, Entertainment, and Recreation
72 Accommodation and Food Services
81 Other Services, except public administration
91-93 Public Administration

Fifteen of the nineteen nongovernmental sectors are services. The distinction between a service and a physical product does become blurry in some cases. For example, construction is considered a service, but a completed building is not. However, rental of space within a building or its sale is a service. Retail trade is a service regardless of what is being sold. Nevertheless, fifteen of the nineteen classified non-government sectors are services, which about corresponds to the share of value added provided by services industries in the economy. Under the SIC system, the broadest classification included nine nongovernmental divisions. Of these, five and part of another were services.

After the first two, each of the remaining four digits adds progressively more specificity. For example, sector 52 is "finance and insurance." 523 is "securities, commodity contract, and other financial investments and related activities;" 5231 is "securities and commodity contracts intermediation brokerage;" 52312 is "securities brokerage," which has no further sub-categorization. 523121is also listed as "securities brokerage," and is described as "(E)stablishments primarily engaged in acting as agents….between buyers and sellers in buying or selling securities on a commission or a transaction fee basis."

All told NAICS comprises 1,170 industries in a combined North American economy of approximately $12 trillion (U.S. $). Dividing, one arrives at an average size of an industry classified in NAICS of about $10 billion. Many of the industry classifications are fairly broad--broader than under the SIC system which used seven digits and applied only to the United States at a time when its economy was much smaller.

Industries that support the military and specific parts of the military itself are generally much narrower than the most specific classifications for them in NAICS.[14] This lack of specificity means that the extensive data collected by the Census Bureau has limited value to

[14] These industries might be thought of as the "defense industrial base." This phrase has been defined various ways reflecting the complexity of a defense sub-economy within the larger economic system. For a discussion see Kyriakopoulos, Irene, and Donald Losman, "Economics of Mobilization in the Information Age."

military analysts. NAICS classifications that pertain to industries supporting the military include the following.

332995 Aircraft artillery manufacturing
336411 Aircraft manufacturing
332993 Ammunition (except small arms) manufacturing
336992 Guided missiles and space vehicle manufacturing
336415 Guided missile parts and space vehicle propulsion unit and propulsion unit parts manufacturing
336992 Military armored vehicle, tank, and tank component manufacturing
332993 Missile warhead manufacturing
332994 Rifle, except recoilless, manufacturing
336995 Rifles, recoilless, manufacturing
336611 Ships, shipyards, ship repairing
332992 Small arms ammunition manufacturing
332994 Small arms manufacturing
336611 Submarine building
336992 Weapons, self-propelled, manufacturing

The military itself is classified in NAICS as follows.

982110 National Security
Includes "government establishments of the Armed Forces," including the Air Force, Army, Marine Corps, Military courts, Military police, Military training schools (except the service academies), the National Guard, and the Navy.

611310 Colleges, Universities, and Professional Schools
Includes the military service academies.

926121 Regulation and Administration of Transportation Programs
Includes the U.S. Coast Guard and the Merchant Marine

ICAF and the National Defense University are included in industry 982110.

The Census Bureau NAICS website is naics@census.gov. A website for general information on industrial classifications is http://faculty.philau.edu/russowl/product.html.

VII. Conclusion: Analyzing Markets and Industries

A number of conclusions emerge from this analysis. Markets are a valuable concept and vital to understanding the nature and consequences of competition in the economy. They are also imprecise. They are imprecise because no definition gives a clear demarcation of where one industry ends and another begins or how specific they are. And no definition gives a clear

indication of who operates within a given market and who does not. Because of this imprecision, markets are difficult to analyze. In addition, the modern economy is one in which change is more rapid, markets are more segmented, and suppliers are more proactive in effecting change than in the past.

In analyzing markets, one is wise to define the question to be answered clearly, use all available pertinent information, and judiciously selects analytical methods. A wise analyst recognizes the limits of market analysis and draws conclusions cautiously.

An important part of ICAF's Industry Studies Program is the analysis of industry performance. A good approach based on the analysis reported in this survey would be the following method in five steps.

Step 1: Define the objective

Identify the characteristics of good performance for the industry. Among them, determine relative importance. A strategic planner might identify different performance characteristics or weigh them differently from an antitrust practitioner or someone else. Desired characteristics might include: (1) large net benefits for consumers, (2) sufficient profitability for suppliers at least to cover their opportunity costs, (3) rapid improvement of products or services, (4) the ability to surge in time of national crisis, and (5) enhancement of the performance of other industries to the extent feasible.

Step 2: Identify important characteristics

Determine the market and the industry, consumers, and suppliers. Determine market structure characteristics and suppliers' conduct and strategies. Determine objective characteristics of market performance such as profitability and the rate of product improvement.

Step 3: Interpret the information

Based on structural and other characteristics, determine the Nash equilibrium for the market. Compare it to actual performance. Determine the cause of market structure and conduct characteristics and their implications. Make reasonable predictions of how the market will perform in the future.

Step 4: Evaluate performance

Evaluate the performance of the industry in terms of how well it meets the characteristics for good industry performance defined in step 1.

Step 5: Consideration of public policy

Based on the evaluation in step 4, your knowledge of the industry, and your knowledge of how markets work, consider possible public policies that might improve industry performance. Assess specific policies and their likely effects. Identify how the industry is currently performing and how that would likely change if a given policy were adopted. Consider costs and possible risks. If you propose a change in policy, explain fully what you expect and why.

References

Agarwal, Rashree, and Michael Gort, 2001, "First Mover Advantage and the Speed of Competitive Entry, 1887-1986," Journal of Law and Economics, April.

Arbatskaya, Maria, 2001, "Can low-Price Guarantees Deter Entry," International Journal of Industrial Organization, November.

Athey, Susan, and Armin Schmutzler, 2001, "Investment and Market Dominance," Rand Journal of Economics, Spring.

Bain, Joe, 1956, Barriers to New Competition: Their Character and Consequences in Manufacturing Industries, Harvard University Press, Cambridge.

Baumol, William, 1982, "Contestable Markets: An Uprising in the Theory of Industrial Structure," American Economic Review, March.

Carlton, Dennis, and Jeffrey Perloff, 2000, Modern Industrial Organization, Third Edition, Addison-Wesley Longman, Inc., New York.

Clougherty, Joseph, 2002, "U.S. Domestic Airline Mergers: the Neglected International Determinants," IJIO, April.

Cooper, David, 1997, "Barometric Price Leadership," International Journal of Industrial Organization, May.

Dixit, Avinash, and Susan Skeath, 1999, Games of Strategy, W. W. Norton & Company, Inc., New York.

Economidas, Nicholas, 1996, "The Economies of Networks," International Journal of Industrial Organization, October.

Evans, William, and Ioanns Kessides, 1994, "Living by the 'Golden Rule: Mulitmarket Contact in the U.S. Airline Industry," Quarterly Journal of Economics, May.

Faulhaber, Gerald, and Christian Hagendorn, 2000, "The Market Structure of Broadband Telecommunications, Journal of Industrial Economics, September.

Fisher, Franklin, and David Rubinfeld, 2001, "U.S. vs. Microsoft—An Economic Analysis," The Antitrust Bulletin, Spring.

Gandal, Neil, 2001, "The Dynamics of Competition in the Internet Search Engine Market," International Journal of Industrial Organization, July.

Geroski, Paul, 1998, "Thinking Creatively About Markets," International Journal of Industrial Organization, November.

Geroski, Paul, and Jose Mata, 2001, "The Evolution of Markets," International Journal of Industrial Organization, July.

Jacobs, Michael, 2001, "Second Order Oligopoly Problems with International Dimensions: Sequential Mergers, Maverick Firms, and Buyer Power," The Antitrust Bulletin, Fall.

Kim, Moshe, and Bent Vale, 2001, "Non-price Strategic Behavior: the Case of Bank Branching," International Journal of Industrial Organization, December.

Kristiansen, Erik Guard, 1998, "R & D in the Presence of Network Externalities: Timing and Compatibility," Rand Journal of Economics, Autumn.

Lafront, Jean-Jacques, Patrick Rey, and Jean Tirole, 1998, "Network Competition I: Overview and Nondiscriminatory Pricing," Rand Journal of Economics, Spring.

Liao, Chun-Hsiung and Yair Tauman, 2002, "The Role of Bundling in Price Competition," International Journal of Industrial Organization, IJIO, March.

Massachusetts Institute of Technology (MIT), 1992, "The MIT Dictionary of Modern Economics," Fourth Edition, David Pearce editor, The MIT Press, Cambridge, Massachusetts.

Mathias, Stephen, and Janet Koscianski, 1997, "Excess Capacity as a Barrier to Entry in the U.S. Titanium Industry," International Journal of Industrial Organization, April.

Matrons, Catherine, 1999, "Market Structure, R&D, and Advertising in the Pharmaceutical Industry," Journal of Industrial Economics, June.

Mueller, Dennis, 1985, Profits in the Long Run, Cambridge University Press, Cambridge.

Mueller, Dennis, 1997, "Merger Policy in the Unites States: A Reconsideration," Review of Industrial Organization, December.

Olson, Mancur, 1982, The Rise and Decline of Nations, The Yale University Press, New Haven.

Pleatsikas, Christopher, and David Teece, 2001, "The Analysis of Market Definition and Market Power in the Context of Rapid Innovation," International Journal of Industrial Organization, April.

Porter, Michael, 1975, "Note on the Structural Analysis of Industries," in Competitive Strategies: Techniques for Analyzing Industries and Competitors, The Free Press, New York.

Posner, Richard, 1976, Antitrust Law/An Economic Perspective, University of Chicago Press, Chicago.

Rodrigues, Vasco, 2001, "Endogenous Mergers and Market Structures," International Journal of Industrial Organization, September.

Rosencranz, Stephanie, 1997, "Quality Improvements and the Incentive to Leapfrog," International Journal of Industrial Organization, April.

Samuelson, Larry, 2002, "Evolution and Game Theory," Journal of Economic Perspectives, Spring.

Schmidt, Stephen, 2001, "Market Structure and Market Outcomes in Deregulated Rail Freight Markets," International Journal of Industrial Organization, January.

Schumpeter, Joseph, 1950, Capitalism, Socialism, and Democracy, Harper and Row, New York.

Stelzer, Irwin, 1981, Selected Antitrust Cases, Richard Irwin, Inc., Homewood, IL, pp. 183-197.

Symeonides, George, 2000, "Price Competition and Market Structure: The Impact Of Cartel Policy on Concentration in the UK," Journal of Industrial Economics, March.

Symeonidies, George, 2002, "Cartel Stability With Multiproduct Firms," International Journal of Industrial Organization, March.

U.S. Department of Commerce, Bureau of the Census, North American Industry Classification System.

U.S. Department of Justice (DOJ), 2002, "Product Market Definition," 1997 merger guidelines, www.usdoj.gov/atr/public/guidelines/horiz_book/11.html.

Appendix I-B

METHODOLOGY FOR INDUSTRIAL ANALYSIS FOR ICAF INDUSTRY STUDIES PROGRAM

Prepared by Dr. Gerald C. Berg,
ICAF Professor of Economics
July 2006
Reprinted with permission

I. Introduction

The mission of the Industrial College of the Armed Forces (ICAF) is to educate prospective military and civilian leaders in the formulation and execution of national strategy and the management of resources for that purpose. ICAF's Industry Studies Program contributes to this mission by providing students with in-depth industry knowledge and skills for analyzing industry from a strategic perspective. This document provides a methodology for that analysis.

The industry analysis has two objectives. These are (i) to evaluate the performance of the industry in terms of promoting economic welfare and serving national strategic needs and (ii) to determine what, if any, change in government policy would improve the industry's performance. This methodology provides a basis for achieving these objectives focusing on product markets. Within markets, firms compete and economic benefits obtain. Within markets, government policy towards industry affects economic performance.

Markets, Industries, and the Industry Study

In common discourse, the words "market" and "industry" are used nearly interchangeably. However, there are distinctions between the two that are important for industry analysis. For this purpose, "market" is defined as the institutions and activities associated with buying and selling one or a group of closely competing products or services and the agents that buy and sell them. This definition is general, allowing the analyst discretion to delineate markets in terms of breadth and geography. This generality is endemic to market analysis, notably anti-trust and unfair international trade actions, in which the determination of the relevant "product market" or "like product" often has considerable effect on the outcome of litigation. "Industry" is defined as the suppliers in a specified market.[15]

In nearly all cases, an ICAF Industry Study will comprise more than one market and more than one industry. The terms "IS group" or "industry group" might be used to refer to all of the industries comprised in a given Industry Study. For example, the aircraft Industry Study

[15] For more detailed definitions and discussion of these terms see Gerald Berg, 2002, "Markets, Competition, and Industry Analysis: Modern Views in a New Economy," published in ICAF's Economic Notes and in the Industry Studies Handbook.

comprises markets and industries for large commercial jet aircraft, smaller jet aircraft, military aircraft, tankers, airlift, and helicopters, among others.

Information Useful for Industry Analysis

In the course of the Industry Study, students will uncover a great deal of information on their industry. Some will be useful for analyzing the industry including the numbers and sizes of consumers and suppliers, the kinds of goods and services produced and sold, product characteristics and uses, firms' financial histories, methods of competition, the forms and degree of product differentiation, research and development effort, the pace of innovation, cost characteristics of firms in the industry, profitability, stability of incumbent buyers and sellers, exogenous factors that affect competition such as government regulations or barriers to entry, and "business models" or strategies. It will be helpful to keep close track of this information and to analyze their implications.

Example 1—Large Commercial Aircraft

In the global market for large commercial jet aircraft, there are only two competitors, Boeing and Airbus. Economic researchers have found that two competitors might compete as fiercely as in a market with multiple competitors, but might also compete only weakly or even collude.[16]

To the extent that two incumbents in a duopoly supply highly similar products, there is potential to compete on price, quality, and service. To the extent that they supply differentiated products that are not highly substitutable in consumption, there is less potential for these forms of competition and greater likelihood that each enjoys substantial market power in its respective submarket. Knowledge of product characteristics and business strategies are helpful in determining how closely they compete.

In the case of Boeing and Airbus, there is substantial, although not perfect, overlap of the kinds of aircraft they supply and missions these aircraft can perform. Boeing and Airbus compete strongly for sales of large commercial aircraft and expend considerable effort to improve their products.[17]

Firms' financial statements might be helpful for analyzing their operations and strategies. These statements reveal a great deal about costs, operating margins, methods of financing, and firm strategy. For example, firms with large non-operating costs need substantial margins to cover these costs. Firms that raise large sums of new capital are either investing a great deal in research and development (R & D) or physical capital or are having trouble covering costs from operations. Firms that borrow a great deal, hence are highly leveraged, are putting themselves in riskier positions than those that raise capital by issuing equity. Firms engaging in speculative activities, like developing new technologies, are likely to have limited access to pure loans. As a result, they will probably have to raise capital by issuing new equity and creating new claimants on any future profits.

Template for Analysis

[16] For a discussion of competition with few competitors, see Berg (2002).

[17] For a discussion of the competition between Boeing and Airbus, see ICAF Industry Study Papers 2005, Industry Study Paper, "The Aircraft Industry."

The methodology presented in this paper can be thought of as a template for industry analysis. It is organized into three broad stages. These stages are (1) determination of the markets in which the IS operates and the means by which competition occurs, (2) assessment of industry performance in each market in terms of economic welfare and propensity to respond favorably in a national emergency, and (3) evaluation of possible changes in public policy. The first stage provides the foundation for the second; the second provides the foundation for the third. Within each stage are several steps. The stages and steps of the methodology are described in the following sections.

II. Markets and Competition

Because nearly all competition among firms occurs within markets, determining the markets in which the IS operates is the first step in analyzing the industry. Once done, the remainder of the industry analysis is based within these markets. The remaining steps in this stage of analysis include determining the economic structure for each market, identifying firms' strategies, and determining the means by which firms and sometimes consumers compete within markets.

Determining Markets

Market determination, or more precisely market delineation, is crucial to all of the analysis that follows. Market delineation has important legal implications as well. In antitrust litigation, the determination of the relevant "product market," can have a critical effect on how a case is decided.

Example 2—Cellophane

In the 1950s, the U.S. government sued DuPont for monopolizing the cellophane product market. Cellophane is a transparent wrapping material that tends to hold its shape and retains moisture and odor. DuPont claimed that cellophane is not a separate product market, but rather a part of a larger product market of flexible wrappers. In a controversial Supreme Court decision, DuPont won its point and the case.[18]

Similarly, in international trade litigation, the determination of the domestic "like product" that has standing to petition the government for relief from import competition is often critical to the determination of domestic injury and consequently the disposition of a case. And, in regulated markets, market delineation determines the applicability of regulations and consequently how firms do business.

The defining characteristic of a market is the similarity of products marketed within it. Similarity is assessed and sometimes measured by "substitutability," meaning the degree to which consumers regard one such product for sale as being an acceptable substitute for another or in some cases suppliers regard them as substitutable in supply. In general, products in the same market are highly substitutable; products in different markets are less substitutable.

[18] Crandall, Maureen, 2005, "Antitrust in the Digital Age: an Overview" in ICAF's Economic Notes.

Consumption Substitutability Quantitatively, consumption substitutability is measured as the relative change in the quantity demanded between two products resulting from a change in their relative prices. Formally, this is called the "cross elasticity of demand" and defined by the equation below.[19]

$$\eta_{xy} = \Delta Q_x/Q_x \div \Delta P_y/P_y ,$$

where η_{xy} is the cross elasticity in consumption between goods x and y,
$\Delta Q_x/Q_x$ is the percentage change in consumption of good x, and
$\Delta P_y/P_y$ is the percentage change in the price of good y.

No one expects you to solve this equation, but it might serve as a useful guide in your analysis.

Production Substitutability Economists refer to this as "transformation" in production. It is generally defined in terms of a firm's cost of transforming or converting from the supply of one product for another. The "marginal rate of transformation" is quantified as the ratio of the firm's marginal costs for the two products. There is no formal theory or measure of product supply substitutability for industries.

Example 3—Biotechnology

Biotechnology has been defined as "(A)ny technique that uses a living organism, or parts of organisms, to make or modify products, to improve plants or animals, or to develop microorganisms for specific uses."[20] Techniques or products produced include pharmaceuticals, a variety of other medical devices, improved agricultural seeds and fertilizers, and weapons. These products are not substitutes in consumption. But they are substantially substitutable in production because many were developed and are produced with the same or similar technologies and skills. For this reason, it is reasonable to consider biotechnology an industry.

As a technical guide, you might apply the rule used by the Federal Trade Commission and Department of Justice in U.S. antitrust law.[21] This rule is that a product market is a product area over which a hypothetical monopolist's price would be at least 5 percent higher than the price that competitive firms would charge. In the absence of technical tools to measure this hypothetical price differential, you will have to make an assessment. A market space can be considered a market if there is a high degree of similarity of products and services within it and low degree of similarity within it from outside of it.

Market Structure

Once the market or markets in the IS group are defined, it will be useful to classify each by the kind of market, sometimes called "market structure," and to the extent possible determine structural characteristics. Market structures include perfect competition, monopoly, monopsony,

[19] Mansfield, Edwin, 1982, Micro-Economics/theory and Applications, Fourth Edition, W. W. Norton and Company, New York, p. 119.
[20] Office of Technology Assessment, 1991.
[21] A detailed explanation of market determinations is provided in Berg (2002).

bilateral monopoly, monopolistic competition, and oligopoly. These are discussed at length in Berg (2002), Baumol and Blinder (2006), and many other standard economics texts. Within each of these classifications, there might be many variations. For example, "oligopoly" comprises many possible industry variations with the common characteristic that each has few suppliers with recognizable interdependence.

Regarding specific structural characteristics, a good explanation is provided by Berg (2002):

> *"('M)arket structure' comprises all conditions affecting the market that are fixed in the short- to medium-run. Because they do not vary, these conditions are said to be "exogenous" or outside the control of agents in the market in this time frame. They include the minimum efficient size of operation (economies of scale), legal restrictions such as patents or regulations affecting competitive behavior, barriers to entry to the market or costs of exit, and the size distribution of buyers and sellers. Some would add product differentiation, meaning the degree to which products competing within the market vary in some characteristics. Wristwatches, for example, vary by quality and somewhat by the functions they perform. Retailers vary by location. A barrier to entry is any condition that imposes additional costs on entrants. Some would define "barrier" to be a cost not incurred and never incurred by incumbents . . . Barriers include customer loyalty, uncompetitive access to inputs or channels of distribution, minimum efficient firm size, and, with the less stringent interpretation, advantages of learning by doing."*

It will be very helpful to observe information on market structure in the course of the Industry Study. This information will be helpful in determining broad market structures for the industry and understanding forms of competition within the industry.

Example 4—Electronics

ICAF's Electronics IS covers semiconductors, which are widely used in defense and consumer products. The industry group comprises four product markets, namely: memory, micro-processors, logic, and analog. Each entails specific products that complement and are not substitutes for the others. All are vital to the production and delivery of information services. Each market has suppliers that specialize in its products and its own market structure. Micro-processors, for example, has two major suppliers, Intel and AMD. Operating in a virtual duopoly, these firms compete aggressively in some, but not all aspects of their business.

Firms' Strategies

A firm's strategy, or "business model," is its plan for competing in markets and making money. A firm spokesman might tell you what it is, but be aware that what s/he tells you is for public relations.

Michael Porter (1980) analyzed business strategies in depth. He identified three general strategies for firms with high profit-making potential. These are (i) overall cost leadership, being the lowest cost producer in the market, (ii) product differentiation, supplying a product that is different in some significant way, limiting consumption substitutability with rivals' products, and (iii) focus, concentrating on a particular buyer group or geographic market. Focus itself is subject to some variation and there are overlaps among the three broad strategies.

Business strategies have a direct and often major effect on the forms in which competition occurs and ultimately on market performance.

Example 5

A market contains three major suppliers. All three try to differentiate their products and avoid direct price competition with rivals. Each prices somewhat conservatively to discourage new entry and encroachment of rivals into its "turf." This industry is likely to perform like a weak oligopoly. Profitability is likely to be somewhat above competitive levels and the pace of innovation slow.

If instead, two of the suppliers try to establish themselves as cost leaders while the other differentiates, competition is likely to be much stronger with prices more or less competitive, but with some variations in characteristics and quality of products supplied.

Forms of Competition

Forms of competition include specific actions and patterns of behavior of firms intended to advance their business strategies. These include pricing, advertising and promotions, research and development, innovation, and any efforts to differentiate their products. It will be helpful to observe the forms of competition in the course of the Industry Study. They might reflect in some manner market structure. They might also go part way towards determining market performance.

Example 6

A market contains a large number of small suppliers who supply a limited range of products but engage in a great deal of research and development for patentable new products. They finance their R & D with large issues of equity and borrowed venture capital. In all likelihood, many will fail, but some might successfully develop viable new products and earn large profits. Short-term profits might be high for some. The pace of innovation and change in the industry is likely to be rapid.

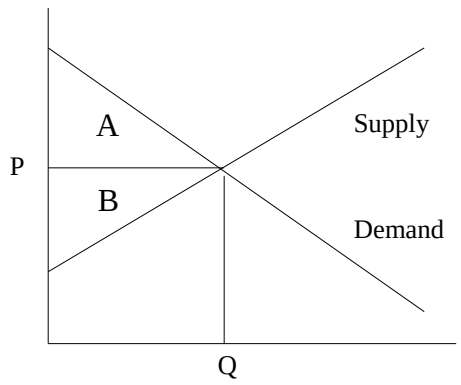
III. Industry Performance

For the purpose of ICAF's industry analysis, industry performance has two components. One is general economic welfare or net benefits generated in the economy in normal times. The second is how well the industry responds or can be expected to respond to special or acute needs that might arise from a national emergency. I will call this performance component "national emergency response and adjustment," or "strategic response." The components are considered in turn.

General Economic Welfare

The economic welfare generated in a market is the net value it generates. Net value can be defined as the benefits to consumers minus costs of production, absent any external effects.[22] Breaking this down further, net value is the sum of benefits to consumers in excess of the price they pay and the revenue obtained by suppliers in excess of supply costs.

Figure 1. Net Value Generated in a Market



Net value is depicted in Figure 1. The height of the demand curve represents the marginal value of the product to consumers over the range of quantities depicted. If quantity Q is consumed at price P, the net value to consumers is the area under the demand curve down to P and out as far as quantity Q. This area is region "A." The supply curve in a competitive market represents industry marginal cost over the range of supply depicted. The net value acquired by producers is the area above the supply curve up to P and out as far as quantity Q. This area is region "B." This analysis abstracts from fixed costs not subsumed in the supply curve and any

[22] An external effect or "externality" is a benefit or cost incurred by someone not a party to the market transaction of the good or service in question. For example, burning coal releases the toxic gas sulfur dioxide into the atmosphere that is then breathed by everyone nearby. Externalities are difficult to measure because they are not represented in market observations. For further discussion, see Gwartney, Stroup, Sobel, and Macpherson (2006), pp. 113 – 118.

external benefits or costs. Given these conditions, a good approximation of the short-term net benefits generated in the market depicted is the sum of areas A and B.

In the likely event that you do not have all of the necessary information to perform this analysis quantitatively, it can still serve as a useful guide in your thinking. You might be able to make a qualitative assessment of net welfare generated in a market by considering price and sales, quality, service to consumers, product variety or differentiation, and the rate of product innovation. Ask yourself if firms are pricing at about average cost. Are they making normal profits or more or less? Are they making reasonable efforts to innovate and improve their products? Are they trying to resolve shortcomings of their products and service to customers? You might be able to draw inferences form the degree of competition. A highly competitive market in the absence of externalities is likely to generate maximum net benefits, at least in the short run.

In this analysis, suppliers' measured profits can have conflicting interpretations. On its face, profits are a positive part of net value, as shown in Figure 1. This is a reasonable interpretation as long as profitability does not exceed the normal level in the economy—that is, the opportunity cost on invested capital at similar risk levels. However, profitability exceeding this level is a sign that the industry is less than perfectly competitive, favoring the suppliers. If this is the case, net value to consumers is almost certainly less than it would be in a competitive market.

Before this analysis is complete you might find it helpful to review your conclusions about market structure, conduct and strategy, and industry performance with the two standard economic paradigms that link them conceptually. These paradigms, "Structure-Conduct-Performance," and "Strategy-Performance," are explained in Berg (2002).

National Emergency Response and Adjustment

An industry provides value by its capacity to support the nation's response and adjustment to a national emergency. An event such as a terror attack, or the outbreak of war, or a pandemic, might create a significant immediate or near-term disturbance to the economy that is sometimes called a "shock." As described in Berg (2004), an economic shock is a sudden change in economic capability or demand requiring a significant and possibly costly adjustment. Events that might be considered include the following.

(1) A war or increased threat of war requiring an increase in military capital and manpower requirements.

(2) A terror or other attack within the United States or elsewhere that causes acute damage or leads to a significant response.

(3) An outbreak of a pandemic such as avian flu.

(4) A natural disaster requiring a major response such as occurred in 2005 with Hurricane Katrina.

This is not an exhaustive list. You can probably think of other events that would produce a need for a substantial adjustment within your IS with important consequences for national well being. As a practical matter, it will probably be sufficient to consider one or two important shock-inducing events and analyze how your industry would respond. As an example, consider a sudden increase in the size and budget of the military of 21percent. It makes little difference for this analysis what the reason is for this change. What is important is how great the increase in demand for the industry's output would be and how the industry would respond.[23] The industry might support such a military buildup directly or indirectly. Combat and munitions systems would support it directly. Other industries, such as transportation and health care, might do so more indirectly.

The effect of an increase in military spending on specific industries can be quantified with a sector-based economic forecasting model. Oxford Economics, which also does macroeconomic forecasting, has such a model, as do some other professional forecasters. The question to ask would be how great of a change in demand for the industry's output would result from a given disturbance such as a general economic buildup of a given percentage. Then consider how well the industry would respond to the change in demand. In particular, could it change the quantity it supplies commensurately and if so at what change in costs? The answer to this question provides a sound basis for assessing the industry's capacity to respond to such a disturbance.

Example 7—A 20-Percent Military Buildup

Consider the disturbance created by a 20-percent general increase in military spending in one year. The first step would be to estimate the effect of this disturbance on the quantity demanded of the product or service provided by the industry in specific markets with constant prices. This would be based on a sector-based forecasting model. Then evaluate the cost of supplying this change in demand beyond the existing average cost of supply.

Suppose that an immediate 20-percent military expansion were forecast to result in an 8-percent increase in demand for the industry under study. Suppose that an 8-percent increase in the quantity supplied in one year would increase average costs by 10 percent. Then the cost in this industry of supporting the military expansion would be 10 percent times 108 (10.8) percent of the costs of supplying the military in the baseline year.

[23] In the years 2000 – 2006, real U.S. military spending increased every year and usually by more than five percent. See Economic Report of the President, 2006.

IV. Government Policies to Improve Industry Performance

Ordinarily, no change in government policy is warranted if an industry is performing as well as it can. If it is not, a change in policy might be warranted, but only if it improves performance by enough to outweigh costs the change imposes. Not all performance failures can be improved; not all improvements are worth the cost.

Possible policy responses to a performance failure for general economic welfare and emergency response are considered. A proposed policy change should ultimately be analyzed in terms of its combined performance effects on all aspects of the industry's performance and the cost.

General Economic Welfare

A competitive market generally produces maximum net benefits in the short run, absent an externality. This result of optimal performance and process by which a competitive market achieves it is described at length in Berg (2002) and Baumol and Blinder (2006). The competitive process promotes both technical and allocative efficiency, meaning that the industry produces what it does in the cheapest possible way and that the size of the industry is optimal. It would be almost impossible for a government policy to improve on the performance of a competitive market, except in the presence of an externality. However, a market might fail to produce maximum net benefits if competitive conditions are not met or if there is an externality.

Based on your newfound learning of economics, the guidance provided in this methodology, and other references available to you and your growing knowledge of your IS, you will need to determine if your IS industry provides the maximum possible net benefits or fails to do so. If it fails, you can consider a change in policy to improve performance. Traditionally, government policies to address market failure include the following.

(1) Direct government provision, as with public goods.
(2) Antitrust legislation and enforcement, promoting rules of conduct in the private sector.
(3) Regulation, usually of prices, forms of products or services, or means of competition.
(4) A tax or change in the rate or form of taxation.

Regulation comprises a wide array of government requirements on the form of the product or service, the method of producing it, or the means of sale and delivery to the consumer. For a proposed regulation, it is important to consider the full costs and consequences imposed on the public, which might require careful thought because some of the effects of government intervention are indirect—difficult to identify or measure and sometimes to foresee.

Example 8—Gas Shortages and Gas Lines

World political and economic events led to sharp increases in the world price of crude petroleum in 1973-4 and again in 1979-80. If markets in the United States had worked unimpeded, these events would have led to sharp price increases for downstream and competing products such as gasoline and heating fuel. Finding this to be impolitic, the United States Government instituted price controls. Limited price increases in the presence of much higher

costs naturally led to shortages prompting the Government to allocate the available supply of gasoline to specific regions and markets. Demand exceeded supply at the controlled prices and by varying amounts in different places. Absent an effective rationing of the supply of gasoline at the pump, American motorists queued up in long lines, sometimes for hours, to buy gasoline. It was rationing by inconvenience and very inconvenient and inefficient it was.

In 2004 – 2006, when crude oil prices again rose copiously, and especially in 2005 after Hurricane Katrina disabled a sizable share of U.S. oil refining capacity, gasoline prices spiked. This time, the Government did not regulate prices or impose regional supply allocations. Prices rose a great deal. Motorists grumbled, but only a little, and drove less. There were no queues. The system worked efficiently.

If you detect a performance failure, consider a policy change that might improve performance. Consider possible remedies from the list above. A policy that addresses the cause of the performance failure most directly usually produces the best result. Most important, consider the probable benefits and costs of any proposed policy change.

Strategic Response

Following your analysis, if you believe that the industry would respond less well than it could, consider a policy change that might improve its potential response. A few very general possibilities include the following:

(1) Stockpile a product or resource that might be needed in a national emergency. The national strategic petroleum reserve is a case in point.

(2) Create incentives for the desired behavior or capability. DOD sometimes pays more for immediate procurement to maintain at least two national suppliers of a vital product in the belief that in the long run this increases competition and efficiency and lowers cost to DOD.

(3) Secure priority access to a product or resource that might be vital to the government in a national emergency.

As always, consider costs and benefits of any proposed policy before endorsing it, including the effects on general economic welfare in normal times. A change in policy is in the national interests only if its benefits, properly considered, outweigh its costs.

Example 9—The Jones Act

Following the poor performance of U.S. industrial mobilization in World War I, Congress undertook two major actions to help improve the nation's responsiveness in a national mobilization. One was to create the Army Industrial College (later renamed the "Industrial College of the Armed Forces"). The other was the Jones Act.[24] The Jones Act requires that all water-borne cargo moving between U.S. ports be carried in ships built in the United States, manned entirely with U.S. citizens, and flying the U.S. flag. The purpose of the Act was to promote a domestic merchant fleet that could support the nation's shipping needs during a national emergency. The Jones Act remains on the books today.

The increased costs to the U.S. economy because of the Jones Act have been estimated in the billions of dollars annually. In the eighty-six years since its enactment, there are few recorded instances in which Jones Act ships made a significant contribution in war or other emergencies. Although the copious overall costs of the Jones Act are obvious, some interests benefit from the Act and lobby tirelessly against its repeal whenever the issue is raised.

[24] Formally, the "Merchant Marine Act of 1920."

References

Baumol, William, and Alan Blinder, 2006, Economics/Principles and Policy, Tenth Edition, Thomson South-Western.

Berg, Gerald, 2002, "Markets, Competition, and Industry Analysis: Modern Views in a New Economy," published in ICAF's Economic Notes and Industry Studies Handbook.

Berg, Gerald, 2004, "Major Economic Shocks and Their Effects on National Security," ICAF Instructional Paper.

Crandall, Maureen, 2005, "Antitrust in the Digital Age: an Overview" in ICAF's Economic Notes

Gwartney, James, Richard Stroup, Russell Sobel, and David Macpherson, 2006, Economics / Private & Public Choice, Eleventh Edition, Thomson South-Western.

Mansfield, Edwin, 1982, Micro-Economics / Theory and Applications, Fourth Edition, W. W. Norton and Company, New York.

Office of the Deputy Under Secretary of Defense (Industrial Policy), 2004, "Defense Industrial Base Capabilities Study: Battlespace Awareness."

Porter, Michael, 1980, Competitive Strategy / Techniques for Analyzing Industries and Competitors, The Free Press, New York.

U.S. Congress, Office of Technology Assessment, 1991, "Biotechnology in a Global Economy," OTA-BA-494, October.

U.S. National Defense University, ICAF, 2005, Industry Study Paper, "The Aircraft Industry."

U.S. The White House, 2006, Economic Report of the President.

Appendix II

General Issues and Specific Questions for Consideration

- Assessment of long-term competitive position of US firms in the international market place. Assess the firm's strategies for competitive preeminence into the 21st century.

- Identification of conditions; e.g., market factors, emerging technologies, government actions affecting industry's ability to supply defense requirements.

- Determine the extent and condition of planning by government, industry and firms to identify defense requirements and to meet these requirements including an assessment of the acquisition system's ability to capitalize upon emerging commercial technologies with high military potential.

- Assess the capability of industry to respond to current and credibly projected defense requirements for peacetime production, production surge and wartime sustainability conditions.

- Develop realistic policy options available to the government for enhancing industry response to defense requirements.

- Suggest preferred options available to selected industries to improve peacetime production, production surge, and wartime sustainability.

- Identify the bottlenecks and pacing items for peacetime, surge and sustained production.

- Determine the potential for assistance from foreign facilities under mobilization or surge conditions.

- Consider the effect of current US policies on the national and international industrial base and develop recommended changes complete with supporting rationale.

- Assess the implications of the European Community or other regional trading blocks to the specific US industrial base element under study.

- Visit related financial institutions (e.g., investment bankers) to learn about sources and costs of capital investment and five-year trends.

- Visit related political, social and economic institutions to understand the pressures, policies and trends that will impact your industry over the next five years.

- What are the long-term effects of rationalization/downsizing?

- What are the views of the industry concerning the government's policies of prototype vice production and its reliance upon reconstitution to support national defense? What is industry's view of the government's ability to rapidly acquire commercially available advanced technological equipment?

GENERAL AREAS OF INTEREST AND SPECIFIC QUESTIONS

The national science, technology and industrial base must support the materiel requirements of US strategy through efficient peacetime production, production surge capabilities to accelerate needed additions to inventory in emergencies and preparedness for indefinite wartime sustainment.

This goal provides three broad areas of interest to our Industry Study Program:

(1) The current peacetime status of each industry including an evaluation of its operating efficiency and ability to remain viable economically, politically and socially in the face of declining military budgets and increased international competition;

(2) Planning within the government and between the government and industry to identify national security requirements and to communicate these requirements to members of the industrial base; and

(3) The ability of the industry to develop and produce national security requirements effectively and efficiently in peacetime and to satisfy requirements for crisis involving surge and mobilization.

The following subjects represent the nature of the interest and the types of questions students ask during their domestic field studies and, to the extent they are appropriate, during international field studies. Clearly, the list is not complete, nor do all items necessarily apply to any one visit. Before a visit takes place, the faculty leader or student representative develops, with the activity being visited, mutually agreed areas of interest that may or may not be identified here.

For this academic year we are particularly interested in the following themes:

(1) The impact upon your industry of the September 11th attack and how effective has been your industry’s and the government’s response?

(2) The trends in international trade and competitiveness.

(3) The possible industrial strategies to ensure competitive preeminence far into the 21st century.

(4) The impact on the productive base of increased reliance upon outsourcing and service support contractors.

(5) An assessment of the acquisition system's ability to take timely advantage of emerging commercial technologies of interest to defense with particular emphasis on insertion of commercial technologies.

(6) The impact of information technology on the industry's productive capacity and ability to compete globally.

BUSINESS AND INDUSTRY

Domestic Business Environment

- What is your assessment of the current economic environment? How does the declining US military budget and increased competition affect your industry? What strategies are you employing to cope with these problems?

- Forecast the trends in sales and profitability of your company and of the industry in which the firm operates.

- What long-range policies is your company implementing to remain competitive nationally?

- How are you using information technology to increase productivity and international competitiveness?

- What are your supplier resource constraints/scarcities and how dependent are you on imports?

- What policies exist within your corporation to moderate or eliminate the adverse impacts of known resource constraints?

International Business Environment

- What countries provide competition to and cooperation with US firms in your industry? How viable are US firms in worldwide competition? What strategies are you using to respond to this competition?

- What factors influence the strength of this foreign competition? Wages? Sales? Technology? Government assistance?

- Do US firms in your industry have foreign subsidiaries? What foreign firms are established in the US?

- Forecast the future of joint ventures with foreign firms.

- To what extent have allied or bilateral co-production efforts impacted upon your industry? What do you forecast?

- To what extent are "offsets" impacting your current and projected international business environment?

- What are your firm's concerns regarding technology transfer and US government policy/restrictions?

Finance and Financial Institutions

- What is your company's principal source of capital? What financial institutions do you use?

- How does your company's ability to obtain financial resources compare with the ability of foreign competitors to attract funds? How does this affect the competitiveness of US firms vis-à-vis foreign competition?

- How does the current economic environment affect the performance of your industry? What are your projections?

- Have any innovative financial practices been introduced recently, which would improve your ability to attract venture capital?

- What is the impact of government regulation on the financial institutions, and therefore, your industry?

Government-Industry Interaction

- How do you describe your company's relations with local, national and international governments? What mechanisms do you employ to present your case?

- What possible strategies can the US government pursue (enact) to assure the survival of your industry and its international competitiveness?

- What changes to the defense acquisition system would allow it to take timely advantage of emerging commercial technologies of interest?

- What is the impact of government regulations on your company's operations?

- What problems arise in connection with government procurement practices and procedures?

- How do your profits on government business compare with profits on other business?

- What impact does your company feel as local government copes with increasing costs of government services?

- What tax relief or economic assistance is provided to you through local, state and Federal programs and what problems are associated with these programs?

Research and Development

- What is your industry's record of investment in research and development? What are your projections for the future? How does your investment level compare to your major competitors?

- What has been your experience in bringing an item from R&D to successful production for the market?

- Is your industry devoting sufficient resources to R&D? If not, what changes should you make?

- What role, if any, has been played by government funded independent Research and Development (R&D) programs?

- How would you compare the technology of the company versus its foreign competitors?

- What R&D consortia does your company support?

- What international R&D cooperative programs is your company involved in?

Work Force/Labor

- How well does the US public education system provide the skills you need in today's technology oriented, international business environment?

- How does your company select, train, retrain, and retain people?

- Do you have a Total Quality Management (TQM) program? Are you using its principles in a similar program?

- What critical skills (management, engineering, scientist, production, etc.) are you losing as a result of defense cutbacks and restructuring?

- What has been your experience in labor matters?

Surge, Mobilization and Preparedness Planning

- How has Federal policy and planning enabled you to know what you might be asked to do to meet surge and mobilization demands for defense?

- What is your assessment of your capability to meet these demands?

- What would be your critical resource constraints? Where would the major bottlenecks occur in expanding production by a factor of 2? A factor of 4? To meet surge or mobilization demands?

- What options are available to overcome the bottlenecks or problems?

Source: Caves, Richard E., 1992, 7th ed., American Industry: Structure, Conduct, Performance; Englewood Cliffs, NJ: Prentice Hall.

Appendix III

Factors to Consider: Structure, Conduct and Performance (The Classical Approach to Industrial Analysis)

STRUCTURE: the market environment that influences rivalry among buyers and sellers

# of sellers/producers (monopoly, oligopoly or free market?)
- domestic/foreign
- concentration ratio (top 4 = what % market)

# of buyers (monopsony, free market?)
% sales to Fed/DOD (other gov't influence/leverage?)
Entry barriers:
- high R&D costs or capital costs/size
- specialized/skilled labor
- high technology
- patents/secrets/gov't protection
- other players - 3rd party insurance ?

CONDUCT: pricing policies and product characteristics that influence market transactions

Pricing policies (who and how is price set?)
Buying practices of consumers/gov't acquisition policies
Management practices
Labor practices (labor or capital intense?)
Research and development: who does, who pays, who benefits?
General attitude (traditional US arrogance?)
Capital investment

PERFORMANCE: an appraisal of the quality of the resulting allocation process

Trends in sales/shipments adjusted for inflation
- # firms in the trend (growth=strength?)
- look for mergers/consolidations/bankruptcies

Profitability - return on assets or net worth
Productivity - Labor Statistics (output per man-hour)
Quality of products/services - consumer reports/preferences
Cost of products - trends (electronic down, chicken down, defense up)
Export competitiveness
- Export Ratio = exports/US production (this should be large or growing to indicate strength)
- Import Ratio = (imports/total new supply) - (imports/US production + imports) [this should be small or declining to indicate strength]
- Wage scale and benefits - high or low?

Appendix IV

Strategic Industrial Analysis: What Makes an Industry Strategic? (The Technology Approach)

STRATEGIC INDUSTRY DEFINED: An industry that is a primary cause of significant economic growth at a given time. Historically such industries include the railroad industry in the 19th century United States, the cotton industry in early 19th century England and the chemical industry in late 19th and early 20th century Germany. The information industry might be a current strategic industry. The issue of strategic industry analysis is relevant to the current and ongoing debate on the proper goals and role of government in setting industrial policy. The idea of a strategic industry suggests that economic growth can be stimulated by an economic "lever" without the need for comprehensive government intrusion into the industrial marketplace. Many disagree with this position. The following analysis technique drawn from the work of Julian Gresser is offered as a framework from which the question of industrial policy may be addressed from a less anecdotal perspective.

Step 1. Defining the Industry - how to define the boundaries of an industry. It is suggested that we must rethink our basic notions of an industry as defined by product lines or marketplace arrangements and begin to focus of inter-industry relationships and inter-industry technology flows. In essence, the challenge is to define the technological boundaries of the industry. These boundaries often change over the life cycle of an industry.

For ICAF purposes, this systems approach should be balanced by the more traditional industry definitions embedded in the government's North American Industrial Classification system (formerly called the standard industrial code or SIC). If balance is not used the twenty industry studies will claim a total percent of gross domestic product output far in excess of the real total. For example, agribusiness using the suggested systems approach may "claim" all farm output, all food processing (manufacturing) output, transportation's share of food products moved, retail's share of restaurant meals sold, etc.

With this caveat in mind, it is suggested that from a strategic industry perspective industry can no longer be defined as a set of companies who share certain methods of production and product properties. Rather an industry should be defined as a set of companies interconnected as suppliers and market, committed to diverse processes and products but over-lapping in the end use functions they fill and the technologies they employ. Industries are increasingly dependent in achieving high rates of productivity growth upon skills and resources external to and, perhaps, unfamiliar to themselves.

Step 2. Assessment of the standard economic indicators of the industry:

General indicators and trends

(1) growth in shipments or sales
(2) exports
(3) employment
(4) productivity

Research, invention, innovation and a substantial commitment to:

(5) research
(6) high levels of investment, defined as a current use of resources which increases future output
(7) high rates of innovation and invention (innovation defined as the commercial realization of invention)

Economic Production:

(8) sharply increasing scale - defined as increasing output/factor production as a function of scale
(9) specialization
(10) scope
(11) the learning curve and product life cycle (life cycle defined as the relationship between labor costs and output as a function of experience) Product life cycle tends to be shorter in strategic industries.
(12) vertical integration - strategic industries tend to become vertically integrated

Step 3. Technical Indicators:

(1) dual use - most strategic industries have technologies with both civilian and military applications
(2) core technology - level of uniqueness and its economic role in the industry
(3) knowledge (information) intensive, convergence of technology, complementary use of technology, synergism, interdependence

Step 4. Social and Political Indicators:

(1) generalizable pattern of production: mass, one off, etc.
(2) generalizable pattern of commerce: business practices that extend beyond the industry
(3) national perceptions of wealth, prestige and power
(4) scale ratios of society: impact on society - increased life expectancy, etc.; greater educational achievement; reduced crime, etc.

Step 5. Secondary and Tertiary Effects:

(1) high multiplier: use of industry revenues outside the industry
(2) deep "penetration" of the input-output matrix: impact on other industries to significantly reduce costs/prices
(3) forward and backward linkages: economic and technical connections with other industries that also encourage rapid economic growth
(4) high rate of feedback and alteration: technical influence in down stream or up stream suppliers - drive for quality includes subcontractors, etc.

Step 6. High External Benefits, High External Costs:

Strategic industries confer large benefits to society in general far exceeding the market value of their products or the industry. Costs - externalities - may also be large as a strategic industry is rapidly growing - for example, the pollution costs attendant with the rapid growth of railroads and the supporting steel industry.

Source: Gresser, Julian, Partners in Prosperity, New York: McGraw-Hill Book Company, 1983

Appendix V

Competitive Advantage: Porter's Prescription (International Competitive Advantage)

...The only meaningful concept of competitive advantage at the national, industry and firm level is productivity. Productivity requires constant upgrading.

...A nation can improve productivity by specializing just as a firm does, but nations do not compete - firms do.

...Analyze competitive advantage against the very best worldwide competitor. Generally those with competitive advantage have sustained and substantial exports and significant outbound capital investment.

...Structural analysis: competitive position is a function of industrial structure or the underlying technical and economic characteristics of an industry. The threats from new entrants, rivalry of competitors, the bargaining power of suppliers and threats of substitution all drive improvements, not calls for protection.

...Two basic types of competitive advantage: lower cost through productivity improvements and product differentiation from quality, performance, etc.

...Innovation is the key to competitive advantage - constant improvements in technology and better ways of doing things.

...Typical innovations that shift competitive advantage include new technology, new and shifting buyers, emergence of a new industrial segment (biotechnology, robotics, etc.), shifting input costs (off shore assembly with cheaper labor) and changes in government policy (lower corporate taxes).

...Sustaining competitive advantage depends on sustaining the source of the advantage and, most importantly, sustained and constant improvement.

...Review Porter's diamond of national advantage: (1) factor conditions - labor, infrastructure; (2) demand conditions - home and export market; (3) related and supporting industries - Are they world class?; and (4) firm strategy - the nature of domestic and foreign rivalry.

Source: Michael Porter, *The Competitive Advantage of Nations*. New York: The Free Press, 1990.

Appendix VI

Profile of Selected Indicators: A Menu of Things to Consider

Report data and always include trends where available by industry average and/or representative firm - for example use the best U.S. firm and compare to best foreign firm. Suggest the method of comparison include, as a minimum, comparison of the U.S. industry to first-rate foreign competition.

(1). INDUSTRY STRUCTURE

Issue	Indicator
A. Contribution to GDP	-value added (VA) by industry sector -VA as a percent of GDP -VA as a percent of total sector VA (i.e. the aircraft industry VA as a percent of manufacturing or durable goods VA) -distribution of VA among components of income (wages, interest, rents, taxes, profits, etc.)
B. Distribution of Industry Product	-value of gross domestic output -% to final demand -% to immediate demand -% to consumption, investment, government, foreign -five largest intermediate markets
C. Input Sources	-five largest suppliers -assessment of capacity of suppliers (utilization rate)
D. Production Function	-technical input-output coefficient -trend in efficiency
E. Competitive Characteristics	-dominant form of market organization -producer or consumer dominated? -major competitors
F. Concentration	-five largest domestic firms - % of gross output -five largest worldwide firms - % of gross output
G. Conglomerate Activity	-tendency toward extension: vertical, horizontal discontinuous?

(2). EMPLOYMENT AND LABOR RELATIONS

Issue	Indicator
A. Contribution to Total Employment	-industry employment level and trends -industry % of total employment; % of sector employment -% employment by five largest firms -% of production workers and trends vs. non-direct labor and overhead -comparison to major foreign competition
B. Labor Force Characteristics	-age, skill/education distribution - trends -demographic characteristics and trends
C. Union Representation	-largest trade or craft unions -union employment % of total employment -local, regional or national representation -trends in union membership % of industry employment
D. Collective Bargaining	-pattern of negotiations, strikes, lock-outs -length of contracts -unique work rules, etc.
E. Compensation Patterns	-wages and trends -benefits and trends -compensation compared to other industries and foreign competition
F. Dislocation Factors	-automation/technology/innovation impacts -capital intensity - trends -comparison to foreign competition

(3). PARAMETERS OF PERFORMANCE

Issue	Indicator
A. Profitability	-profit as a % of sales or shipments -profit on gross assets/ return on investment -profit maximization practices -profit compared to other industries and foreign competition
B. Liquidity	-current ratio=current assets/current liabilities -composition of working capital -acid test ratio = (current assets-inventory)/current liabilities
C. Leverage	-debt/total assets -composition of debt -terms of debt; trends in debt
D. Cost Structure	-fixed/variable cost -unit labor costs -costs trends and comparisons with foreign competition
E. Productivity	-output/man-hour -output/total inputs -sales/employee -trends and comparison with foreign competition
F. Security Prices	-prices of equity-debt instruments -price/earnings ratios -instruments most used in new financing -cost of capital; foreign comparisons
G. Sources of Capital	-requirements -markets -investment instruments -government subsidization -foreign comparison
H. Financial Strength	-debt/equity ratio -credit position -asset position -trends and foreign competition comparison

(4). PRODUCTION/TRANSFORMATION PROCESS

Issues	Indicator
A. Dominant Method of Production	-descriptive -capital expenditure pattern -modernization/efficiency trend
B. Impact of Technology	-descriptive - degree information technology has or is changing industry -impact on development and production process -labor displacement -productivity changes - output/man-hour or output/total inputs
C. Degree of Capital or Labor Intensity	-capital/worker - trends -capital/unit of output -comparative international trends
D. R&D Expenditures	-as % of sales -basic/applied R&D % -government or company supported
E. Energy Dependency	-embargo or price escalation planning or response -sources and location of energy inputs -cost and impact of price escalation
F. Location Determinants	-geographic concentration -trends
G. Degree of Market Dependency	-concentration relative to major markets -transport cost as % of price -adequacy of transport facility

(5). IMPACT OF OUTPUT FOR DEFENSE

Issue	Indicator
A. Contribution to National Security	-% of sector output for defense – trends -criticality to defense of industry product as direct or secondary input -availability of alternative sources
B. Organization of Sector	-private or government ownership % -capacity requirement for national security: peace, limited war, general war -status of production base: cold, war, hot or standby -level of foreign dependency -alternatives to foreign dependency
C. Defense Contract Performance	-technical performance level: R&D, production -cost growth experience -level or government oversight -level of contractor investment in development -history of relationship with government -profit as % of sales/gross assets/equity
D. Sensitivity	-sensitivity/reactions to variations in defense expenditures: exit, merger, downsize -change in % of sales to DOD -composition of product line & alternatives -financial viability -government cooperation to decreased orders
E. Surge/Mobilization Capacity	-time to produce (D to P) -capacity utilization rates - how measured, how much surge available -impediments to rapid increases in output -impact of advanced manufacturing technology and just-in-time inventory methods on surge
F. Planning	-adequacy of government mobilization planning -currency of the requirements -industry reaction to defense planning

(6). SURGE DEMAND/MOBILIZATION AND PREPAREDNESS PLANNING

Issue	Indicator
A. Requirements	-major resource inputs -material content of output -energy content of output -dependency on critical raw materials -dependency on water
B. Resource Geography	-location of major inputs - foreign? -resource competitors -potential for substitution or expansion
C. Resource Technology	-trends in resource exploration/availability -depletion outlook - substitution -R&D efforts to minimize dependency -environmental constraints on availability or substitution -outlook for improved efficiency of resource use
D. Preparedness Planning	-conformity to government planning assumptions -assessment of planning quality -assess mobilization potential - full/partial -assess industry responsiveness -industry vulnerability to attack/sabotage -alternate sources
E. Stockpile	-availability of needed materials in government stockpile -availability of needed materials in private sector inventories
F. Capability to Support National Security Needs	-descriptive assessment -assess continued interest in defense orders -outlook of capacity availability

(7). STRATEGIC ASPECTS OF THE INDUSTRIAL SECTOR

Issue	Indicator
A. Dependency on Foreign Markets	-% output exported -comparative prices with foreign competition -trends share of global market -major foreign competitors
B. Dependency on Foreign Sources: US or foreign	-% inputs imported -% input imports from own firm's foreign subsidiary -vulnerability of sources to expropriation, embargo
C. Contribution to US Trade Position	-size/% of trade balance -net balance on the current account
D. Direct Investment	-level of outflow - where to -level of inflow - from whom -trends
E. Foreign Competition in U.S. Market	-foreign share % of US market - trends -five largest foreign firms - % US market
F. Multinationals	-five largest multinational firms - % of global market country of ownership, location of production -organizational form of the world leaders -determinants of leadership - output volume, price quality, wage rates, management, technology, growth rates
G. Policy Conflicts	-industry position - free trade, protection -impact of economic nationalism vs. multinationalism -comparative advantage -trends in cartels -impact of NAFTA, EU and other trading zones
H. Foreign Military Sales	-marketing strategy -level of government support -FMS as % of output -effect on economies of scale -potential for mobilization -pricing policy -coproduction agreements, impact of offsets -technology transfer issues

Appendix VII

Commercial Technology Insertion Questions

DOD is seeking to utilize the best available technologies, from whatever source, in both future acquisitions and in the support for existing military systems. The insertion of best available technologies sometimes, but not always, results in an improvement in technical performance. An equally important result is some measurable reduction in cost at one or more points in the life cycle of the system.

One key element in this effort is the identification of commercial technologies that provide opportunities for insertion. DOD plans may rely principally on contractors for this technology identification function. These following questions deal with:

The ability of defense contractors to thoroughly survey possible opportunities, understand technical and business-related barriers that would impede their use, and harness potential incentives to overcome barriers and actually use the best available technologies.

The ability of commercial contractors to understand defense needs and technical and business-related barriers and incentives to supporting those needs.

Normalizing questions (if not asked elsewhere).

- What percentage of your firm's products is sold directly to the Department of Defense?
- What percentage of your firm's products is sold to Department of Defense contractors?
- What percentage of your firm's products is sold directly to commercial customers?
- What percentage of your products is sold as components? Is your company foreign or domestic?

Questions for contractors with current defense sales.

(1) How do you keep abreast of commercial (domestic and foreign) technology developments that may be applicable to your defense interests or to your commercial interests?

(2) How do (would) you use the information from (1) above for the improvement of defense systems? - New systems? - Existing systems? Systems that you are now involved with in some way? Systems that you are not now involved with? Under what circumstances would you make recommendations to use such a technological development to your current defense customers? Under what circumstances would you try to cultivate new defense customers? What else might you do with the information? Why? Is there a difference if the source of the technology is domestic vs. foreign? If yes, what are the implications of both?

(3) To what extent does a decision to "make something" vice "buy something" affect how you would use the defense-related information from (1) above? How do you approach make/buy decisions? What are the most important variables and constraints in this decision process?

(4) How do performance versus life cycle cost tradeoffs affect the course of action for Question (2) above?

(5) What is the business case for the course of action selected in (2) above? How do technical risks enter into the equations? How does cost risk enter into the equation? What are the differences between a foreign and domestic technology?

(6) What problems have you faced in using (or attempting to use) a commercial technology in a defense application? A foreign-sourced technology? How has this experience affected your attitude regarding the use of commercial or foreign-sourced technology?

(7) If the commercial technological opportunity for a defense system comes from a lower tier, are there disincentives to you in introducing that opportunity to your customers? How are such disincentives affected if the source is a current supplier? Not a current supplier? A foreign company?

(8) What can be done to overcome those disincentives?

Questions for suppliers of commercial technology.

(1) How do you keep abreast of commercial (domestic and foreign) technology developments that may have an affect on your business interests?

(2) Are you able to assess the implications (better performance, reduce life cycle costs, etc.) of your technology developments for defense customers, if you were to decide to market to the military or to military contractors?

(3) Assuming you are able to discern value of your technology to defense, are there barriers for you to overcome in marketing to a defense contractor in that regard? Marketing directly to the Defense Department? Other than the commonly termed acquisition reform-related ones, what are the barriers that must be overcome? Are these barriers from your point of view, barriers from the point of view of the defense contractor, or Defense Department? How can these barriers be overcome?

Possible shorthand versions of the preceding questions follow:

(Note – the same normalizing questions would apply.)

Questions for contractors with current defense sales.

(1) How do you learn about the latest commercial technology developments?

(2) How well are you able to assess the value of these developments for DOD?

(3) Given an assessed value, what are your options for marketing the technology development to defense (either DOD directly or defense contractors) and what are the variables that affect your decision on which option to take?

(4) What are the barriers to making the decision to market to defense?

(5) What are the barriers to getting the technology in defense systems? How can these barriers be overcome?

Questions for suppliers of commercial technology.

(1) How do you learn about the latest commercial technology developments?

(2) How well would you be able to assess the value of these developments for DOD, *assuming you would want to market to DOD*?

(3) Given an assessed value, what are your options for marketing the technology development to defense (either DOD directly or defense contractors) and what are the variables that affect your decision on which option to take?

(4) What are the barriers to making the decision to market to defense?

(5) What are the barriers to getting the technology in defense systems? How can these barriers be overcome?

Appendix VIII

DOD "Essential" Industry Capabilities Assessment Steps

a. Verify the military requirement:
   (1) Supply and equip force structure?
   (2) Readiness and sustainment?
   (3) Design, develop, and manufacture next generation products?

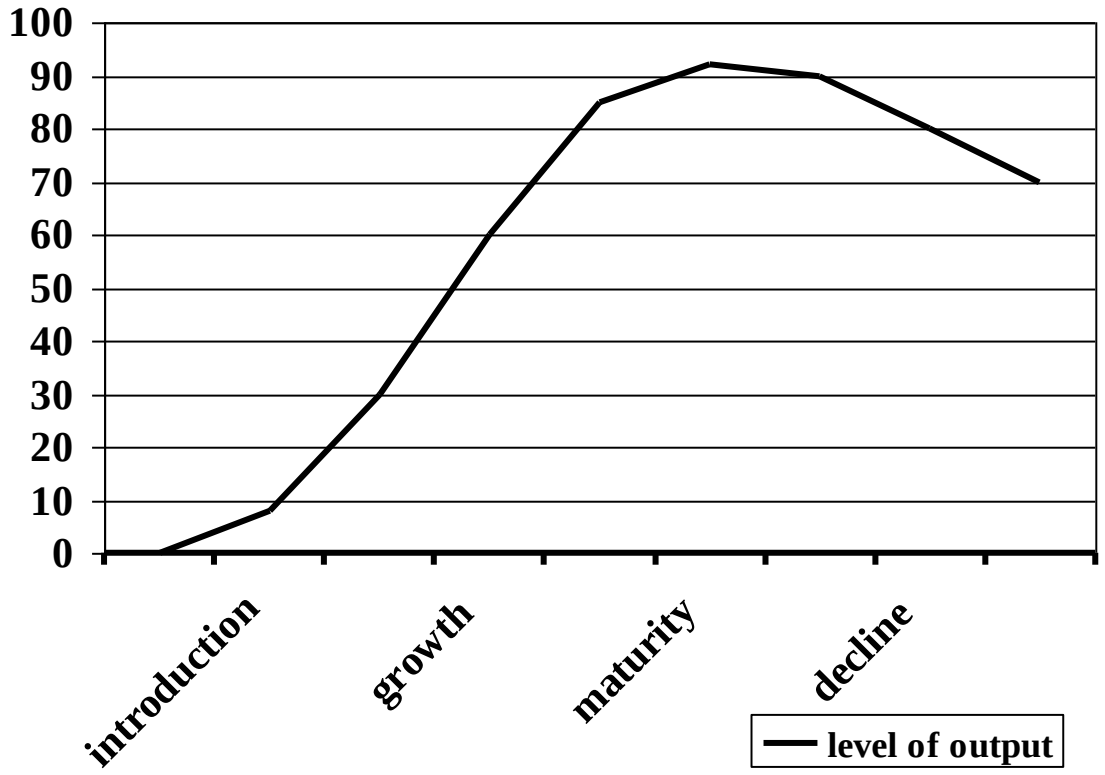
b. Is capability truly unique?
   (1) Exists in single product line or supplier, or very limited set of suppliers?
   (2) Related products use similar capabilities?
   (3) Loss would impact defense products?

c. Will capability be lost?
   (1) Due to supplier or product line profitability?
   (2) Due to reduction or interruption of development or manufacturing?

d. Evaluate alternatives:
   (1) Substitutes?
   (2) Buy out needs?
   (3) New technology?
   (4) Maintain production?
   (5) "Smart" shutdown?

Appendix IX

The Life Cycle of an Industry



CHARACTERISTICS OF LIFE CYCLE LOCATION

	INTRODUCTION	GROWTH	MATURITY	DECLINE
Buyers & buyer behavior	High income purchaser	Widening buyer group	Mass market	Buyers are sophisticated
	Buyer inertia	Consumer will accept uneven quality	Saturated market	
	Buyers must be convinced to buy the product		Repeat buying – choice among brands	
Products and product change	Poor quality	Products have technical and performance differentiation	Superior quality	Little differentiation
	Product design and development key	Reliability key for complex products	Less differentiation	Spotty quality
	Many different product variations; no standards	Competitive product improvements	Less rapid changes	
	Frequent design change	Good quality	More trade-ins	
	Basic product designs			
Marketing	Very high advertising sales ratio	High advertising, but lower % of sales	Market segmentation	Much lower advertising costs
	Creaming price strategy	Advertising and distribution key to non-technical products	Efforts to expand the life cycle	
	High marketing costs		Broaden the line; service deals more prevalent	
			Advertising competition	
			Lower advertising to sales ratio	

	INTRODUCTION	GROWTH	MATURITY	DECLINE
Manufac-turing and distribution	Overcapacity	Under capacity	Some overcapacity	Significant overcapacity
	Short production runs	Shift to mass production	Optimum capacity	Mass production
	High skill content	Scramble for distribution	Increasing stability of manufacturing process	Specialty sales channels
	High production costs	Mass sales channels	Lower labor cost	
	Specialized sales channels		Long stable production	
			Pare down lines to improve margin	
Trade	Some exports	Major exports	Falling exports	Few exports
		Some imports		Major imports
Overall strategy	Best period to increase market share	Practical to change price or quality image	Bad time to increase market share if a low share company	Cost control is key
	R&D, engineering are key	Marketing the key function	Competitive costs are key	
			Marketing critical	
Competition	Few firms	Many firms if easy entry	Price competition	Firms exit; few left
		Mergers and casualties	Shakeout & increase in private brands	
Risk	High risk	Risk covered by growth	Cyclicality sets in	Damage control

	INTRODUCTION	GROWTH	MATURITY	DECLINE
Margins and Profits	High prices and margins	High profits	Falling prices; lower profits	Low prices and low margins
	Low profits	Highest profits	Lower margins	
	Price elasticity to seller not as great as maturity	Fairly high prices	Lower dealer margins	
		Lower prices than at introduction	Stable market share	
		Recession resistant	Poor acquisition climate	
		High profit/earning	Lowest prices and margins	
		Good acquisition climate		

Source: Michael Porter, *Competitive Strategy*

Appendix X

Reference Books, Materials and Sources

GENERAL INDUSTRY INFORMATION (that can be acquired through NDU Library and/or online)

Standard Industrial Classification Manual
http://www.census.gov/epcd/www/sic.html

North American Industry Classification System http://www.census.gov/epcd/www/naics.html

US Industry & Trade Outlook
http://www.ita.doc.gov/td/industry/otea/outlook/webnotice.html

Encyclopedia of American Industries
Uses both SIC and NAICS Codes

Encyclopedia of Emerging Industries. Relatively new industries. Has a SIC to NAICS Conversion Guide.

Standard & Poor's Industry Surveys. Individual profiles, housed in binders, updated periodically.

STATISTICAL SOURCES

Statistical Abstract of the United States
http://www.census.gov/statab/www/

Main Economic Indicators, OECD. This includes statistics for OECD-Member countries, and is in English and French.

Economic Report of the President online from 1995 to present. This is from the Council of Economic Advisors.
http://w3.access.gpo.gov/eop/

Business Statistics of the United States. Arranged by subjects and industry groups, uses SIC and NAICS Codes.

Handbook of Labor Statistics. Includes salaries and projections.

International Marketing Data and Statistics

Finding Statistics Online

COMPANY DIRECTORIES

D&B Principal International Businesses. Arranged by Country and SIC Code

Hoover's Handbook of Emerging Companies

Standard & Poor's Register of Corporations

The United States Government Manual

INDUSTRY-SPECIFIC REFERENCE BOOKS (not comprehensive, please check NDU IQ, or the Reference area for others)

Agricultural Statistics
http://www.usda.gov/nass/pubs/agstats.htm

Aerospace Facts & Figures

Aviation and Aerospace Almanac

Education Statistics of the United States

Handbook of Industrial Robotics

Jane's International Defence Directory

Oil & Gas Journal DataBook

Minerals Yearbook
http://minerals.usgs.gov/minerals/pubs/myb.html

Health, United States, 2002 (with chartbook on Trends)
Located in Government Documents

Health Care Policy and Politics

The Facts on File Dictionary of Biotechnology and Genetic Engineering

Plunkett's InfoTech Industry Almanac

PriceWaterhouseCoopers Technology Forecast. Mobile Internet: Unleashing the Power of Wireless.

PriceWaterhouseCoopers Technology Forecast

Internet Security Dictionary

Ward's Motor Vehicles Facts & Figures

INDUSTRY-SPECIFIC PERIODICALS

American Machinist
American Metal Market
Automotive News
Chemicalweek
Coal Age
Commercial Carrier Journal
Engineering News Record
FDIC Quarterly Banking Profile
IEEE Micro
Marine Log
Modern Metals
Petroleum Economist
Progressive Railroading
Telecommunication
Traffic World
Transportation Journal

Several of these publications have an annual yearbook, sourcebook, or industry directory.

Appendix XI

Industry Study Program Descriptions & Faculty Leaders

INDUSTRY STUDY GROUP	FACULTY LEADER	OFFICE	PHONE
AGRIBUSINESS	CAPT (ret) Jim Lepse	Room 237	685-4782
AIRCRAFT	Dr. Sorin Lungu	Room 492	685-4192
BIOTECHNOLOGY	Dr. Faye Davis/ Mr. Michal Lawrence	Room 141 Room 131	685-4483 685-2544
EDUCATION	Dr. Mark McGuire	Room 234A	685-4474
ELECTRONICS	Col Jerry Traughber	Room 387	685-4363
ENERGY	Dr. Richard Prevost	Room 354	685-4359
ENVIRONMENT	Dr. Greg Foster	Room 339	685-4166
FINANCIAL SERVICES	Dr. David Blair	Room 336	685-4496
HEALTH CARE	COL Bruce Haselden	Room 365A	685-1786
INFORMATION & COMMUNICATIONS TECHNOLOGY	Mr. Feza Koprucu	Room 265	685-4325
LAND COMBAT SYSTEMS	Dr. Rich Shipe	Room 385	685-4265
MANUFACTURING	Dr. Steve Basile	Room 423	685-4794
NEWS MEDIA	COL Jorge Ascunce	Room 498	685-4202
PRIVATE SECTOR SUPPORT TO OPERATIONS	Col (CF) Doug McCarthy	Room 437	685-4218
RECONSTRUCTION & NATION BUILDING	Dr. Andrew Leith	Room 390	685-3985
ROBOTICS & AUTONOMOUS SYSTEMS	Dr. Steve Ford	Room 333	685-4185
SHIPBUILDING	Dr. Mark Montroll	Room 132	685-4346
SPACE	Dr. Scott Loomer	Room 465	685-4520
STRATEGIC MATERIALS	CAPT (ret) Jeanne Vargo	Room 237B	685-4286
TRANSPORTATION	Ms. Kelly Morris	Room 271	685-4465
WEAPONS	Dr. Shannon Brown	Room 415	685-4388

AGRIBUSINESS: American agribusiness is in the midst of a global competition that is re-defining the role of U.S. agriculture in the world marketplace and the domestic economy. Factors shaping the industry today include an accelerating pace of change and unprecedented levels of complexity in what has been considered a traditional, simpler commercial sector. These factors are driven by increasing demand in both the quantity and variety of foods amongst worldwide consumers that shows no signs of leveling off. This powerful dynamic is further magnified by both domestic politics and international diplomacy. This study fully explores the industry by approaching it from a variety of perspectives and data sources. We will examine the entire value chain, beginning with research and development and continuing through the major participants and processes that add real and perceived consumer value. Food production is not a continuum; the business varies widely by product, market, and locale. We will therefore examine the domestic industry both by commodity and by region, contrasting the challenges and outlooks

for these components of the industry. The study will also examine a wide array of issues that directly impact agribusiness, including: environmental concerns; water availability and management; land use and encroachment; biotechnology; food safety; agro terrorism; diseases and invasive species; growing labor and immigration issues; the effects of globalization; sustainability; food security; world trade issues; rural social and economic impacts; and U.S. government farm legislation. Of note, the 2012 Farm Bill will be a topic of legislative focus this year, which should be especially interesting to follow given the current fiscal environment and the fact that Farm Bills are only passed every five years.

AIRCRAFT: The Aircraft Industry Study (AIS) addresses the strategic importance of the U.S. aircraft industry to national security. The AIS seminar focuses on the U.S. and international aircraft industry, including commercial and military fixed-wing and rotary-wing aircraft, and related propulsion systems. Based on discussions with senior executives and information acquired during field visits and through industry analysis methodologies, the seminar analyzes and evaluates major issues facing the industry, including corporate planning and management strategies, modern manufacturing techniques, and government-to-corporate organizational relationships to increase aircraft industry competitiveness. During discussions with industry, emphasis is placed on the structure, conduct and performance (SCP) of the industry, and government policies and decisions that affect the industrial base. Key questions to be addressed this year include:

- existing and emerging patterns of governance in the in the U.S. and global aircraft sector and implications for U.S. national security;
- the impact of national and regional business-governments relations on (U.S., European Union, China, Russia, India and Brazil) on the aircraft industrial sector's key SCP parameters;
- government (direct and indirect) subsidies to commercial aircraft manufacturers and their effects on international competition and high-technology trade;
- the global nature of the aircraft industry supplier base and the emerging possible and probable risks to national security;
- the growing role of unmanned air systems (UAS/UCAS) in both military and civilian applications; and,
- the state of fighter aircraft, helicopter, air refueling and military transport production.

BIOTECHNOLOGY: This industry study conducts a strategic level examination of biotechnology--- an industry vital to national prosperity and security. The biotechnology industry study (BIS) will examine the opportunities, challenges, issues and risks **associated with commercializing new or evolving scientific and technological discoveries.** As such, this study focuses student effort toward applying critical thinking skills to: (1) analyze structure, conduct and performance within the various sectors of the biotechnology industry; (2) assess the capacity and capability of firms within the sectors to deliver globally competitive products and services; and (3) evaluate the performance of the biotechnology industry in promoting economic welfare and serving national security interests. The BIS will address the industry's life sciences foundation which supports unprecedented advancements in medicine, in agriculture, in industrial

manufacturing, in health care, in national defense, and in environmental management. The BIS will evaluate strategic importance of this industry in resolving US national security issues; assess the health of the industry; and recommend approaches to formulate public policy for the industry.

EDUCATION: Traditionally, the U.S. has depended upon an enlightened public to participate in its democratic processes, to support its economic progress, and to maintain technological competitiveness as an element of its national security. Policymakers at national, state, and local levels have proposed and implemented various initiatives for enhancing education and training excellence to offset a perceived decline in educational performance. This perception is reflected in such things as low relative international standing of U.S. students on achievements tests, continuing achievement gaps for minorities, and a perception that U.S. workers lack the skills to keep America technologically and economically competitive. The Education Industry Study analyzes the condition of education and training with emphasis on: general education (elementary, secondary, and post-secondary, both public and private); vocational/technical education; and education and training in the workplace. We will talk first-hand with policymakers and practitioners; headmasters, principals, teachers, and students. We'll visit both high-end and challenged school systems. And, we'll discuss the difficult issues in this industry: learning standards, testing, teacher recruitment and retention, equity and equal access, student learning and performance, student interests in science and mathematics, the administration's Education Plan, and many others.

ELECTRONICS: *"Moore's prediction of microchip transistor doubling has held true in the four decades since, and has even sped up, now doubling every eighteen months. Showing how far we have come, Tradic, the first computer using transistors, built in 1955, had eight hundred. Almost sixty years later, Moore's old company Intel released the Montecito, which has 1.72 billion transistors in just one chip. Computers powered by these microchips have gotten more and more capable, again in an exponential way rather than an additive one. For example the circa 2005 Dell computer I typed this book out on is already antiquated, but it has roughly the same capacity and power as all the computers that the entire Pentagon had in the mid-1960s combined."*

P.W. Singer, *Wired for Wire*

Advances in the electronics industry, enabled largely by semiconductors (also referred to as "chips" or "integrated circuits (IC)), have increased productivity and led to numerous innovations in defense, education, healthcare and other industries across all sectors of the global economy. U.S. leadership in the industry has enhanced innovation, economic growth, and the development of advanced defense technologies and capabilities.

The "electronics industry" consists of numerous sectors and product categories, ranging from aerospace, automotive and medical to consumer and defense electronics. Additionally, the "defense electronics" sector includes such diverse applications as radar, sonar, communications, lasers, guidance and navigation and electronic warfare systems. While surveying a wide variety of applications within the defense electronics sector – and to a limited extent, commercial applications – the Electronics Industry Study (EIS) will use the semiconductor sector of the electronics industrial base as a focal point.

While historically the Department of Defense has played a significant role in technological innovation and the advancement of the electronics industry, its influence has diminished as the electronics industry increasingly operates in a commercially-driven global market. The EIS will seek to examine and assess the electronics industry, from both a domestic and international perspective, in supporting U.S. national security capability requirements with respect to a global electronics industry.

A technical background is not required for this seminar! Students from all backgrounds will be able to participate fully in the learning experience.

ENERGY: *"As we recover from this recession, the transition to clean energy has the potential to grow our economy and create millions of jobs −but only if we accelerate that transition. Only if we seize the moment."* President Barack Obama

There is no document that is called the U.S. National Energy Policy. Should there be? The Obama Administration points to the following actions to demonstrate that it is both engaged and dealing with the primary energy issues of the day.

- Supported and signed into law the American Recovery and Reinvestment Act which included more than $90 billion in clean energy investments
- Proposed a goal of generating 80 percent of the Nation's electricity from clean energy sources by 2035
- Proposed reducing foreign oil imports by one-third by the year 2025
- Increased, for the first time in more than a decade, the fuel economy standards for Model Year 2011 cars and trucks and directed greater mileage standards for the year 2025
- Approved the first nine commercial-scale solar energy projects for construction on public lands, including the world's largest solar power plant
- Directed the Department of Energy to implement more aggressive efficiency standards for common household appliances, like dishwashers and refrigerators.
- Through the Recovery Act, deployed $4.5 billion for Smart Grid investments, demonstrations projects, and capacity building
- Unveiled a program to develop renewable energy projects on the waters of the Outer Continental Shelf that produce electricity from wind, wave, and ocean currents
- Proposed to eliminate tax breaks for the oil and gas industry. The President's proposed 2012 Budget eliminates $46 billion in tax subsidies for fossil fuel production over the next decade
- Increased funding for energy research through support of the National Science Foundation.

Are these the proper roles for the federal government? Should a comprehensive national energy policy seek to use competitive market mechanisms to promote production of domestic supplies of energy? What would be the "reasonable price" for this energy? What are the tradeoffs between

fostering domestic energy production versus accepting production from the entire global market? These are but some of the issues we address.

This industry study considers security, political, global, economic and environmental issues as they pertain to energy. We examine the component industries of oil, natural gas, coal, nuclear, renewable sources and electricity generation and distribution. The participants assess vulnerabilities, the role of government, company strategies, supply and demand outlooks, anticipated regulatory and environmental futures (including global warming), pricing, and international trade and development issues. Emphasis is placed on the functioning of the industry under the current national energy framework. We consider the Administration's stated goals to diversify America's energy supply, increase energy efficiency and provide for energy security. We also look at the emergence of defense-related fuels, convergence of energy markets, issues affecting introduction of new technologies, competition, and regional and global integration. We conduct a comparative analysis of the current U.S. strategy for security of energy supply and the energy strategies in one or more foreign countries. Finally, we seek the seminar's consensus in producing a high level group report on the state of the nation's energy and recommendations for national energy policy.

ENVIRONMENT: The Environment Industry Study examines the extraordinarily varied and complex network of actors, processes, legal and regulatory mechanisms, and perspectives that converge at the intersection of environmental concerns, economic performance, and security. Markedly unlike traditional industrial sectors, the environmental industry consists of those revenue-generating goods and services associated with environmental protection, assessment, compliance with environmental regulations, pollution control, waste management, remediation of contaminated property, design and operation of environmental infrastructure, and the provision and delivery of environmental resources. This highly fragmented industry includes air, water, and soil pollution control; solid and toxic waste management; site remediation; and environmental monitoring and recycling. One of the fastest growing sectors in the world economy—a roughly $600 billion market for goods and services—the environmental industry has evolved in response to growing concerns about the risks and costs of pollution and the enactment of pollution control legislation in the United States and around the world.
The Environment IS will give due attention to the full range of organizations and perspectives that could affect the performance of U.S. and international business in the environmental sector and will address itself to the following questions: What is the relationship between the environment and security? How strategically important are environmental priorities and technologies? How do environmental concerns and measures interact with the economy? What is the relationship between environmental protection/stewardship and economic competitiveness? How, and how effectively, is the U.S. government organized for environmental affairs? What domestic and international organizations (governmental and non-governmental) have an important impact on this sector? What domestic and international environmental laws, regulations, and standards affect the performance of industry? How is the environmental industry organized? What other private-sector organizations focus on the environment? How capable is the U.S. environmental industry of responding to domestic and international emergencies? How competitive is the U.S. environmental industry vis-à-vis that of other countries?

FINANCIAL SERVICES: This course of study seeks to identify, analyze and assess the structure, conduct and performance of the financial services industry in the United States and in the global setting. Topics include examination of key trends in size and composition of the industry; trends in concentration, regulation, technological advancement, evolution of the industry in the age of electronic transactions; evolution in nature, quality and form of industry's output; issues concerning public/private security and privacy; analysis of the impact of government policy on industry's performance; trends in international financial interdependence; financial sector/banking reforms, privatization and development of financial markets in newly emerging markets. Particular emphasis is placed on the pivotal role and functions of commercial banks during recent financial and terrorists crises.

HEALTH CARE: The overall health of the U.S. population and the manner in which the health care industry operates greatly influence national security and national defense in myriad and substantive ways:

- A healthy U.S. population is essential to effectively support all industries, including defense.

- One trillion dollars, or nearly 17 per cent of our nation's GDP, is spent annually on health care -- and the cost is rising each year. Our nation is rapidly losing its flexibility to invest in other government functions, like critical infrastructure and defense requirements due to burgeoning health costs.

- As a worker benefit, health care represents a double-digit business expense; one that negatively impacts the corporation's ability to invest in areas such as modern equipment, research and development.

- Over 32 million U.S. citizens have no health insurance and will likely become cost burdens for the public health care system due patterns of seeking care in emergency rooms when their medical condition becomes severe.

- The health of our military force at home, as well as in international settings where health threats, standards and practices in deployed areas vary greatly, substantively impact our ability to project and sustain military power to achieve national objectives.

The U.S. health care industry provides exceptionally high quality services but there are many challenges remaining to ensure access to care for millions of people and containing overall costs specifically for items such as pharmaceuticals, and the steadily worsening standing of the U. S. when compared to other nations in regard to national health statistics.

This industry study will undertake a comprehensive review of the health care industry -- both civilian and military, national and international, from the perspectives of the

provider, consumer, payer, advocate and regulator. We will focus on the ability of the major industry components (such as pharmaceuticals, hospitals, manufacturing, insurance, distribution, and research and development) to support the national military strategy and national security strategy. We will conduct a comparative analysis of U.S. and other national, and international, health care policies and systems for both defense and non-defense environments. The ultimate objective is to develop "informed" leaders/students who have comprehensively assessed the complex health care industry and have acquired a strategic-level view of the strengths, weaknesses, opportunities and threats facing the industry and the impact this may have on our nation and national security.

INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT): Information and communications technology (ICT) is the transforming medium and enabler of the global economy. It affects the lives of citizens of the world on a daily basis. The health and global competitiveness of U.S. ICT firms are essential to national security and national power. The ICT industry is marked by extraordinarily rapid growth and blistering technological change, making strategic decisions by industrial competitors and governments most difficult. Within this dynamic and exciting arena, this seminar will examine primary sectors of the ICT industry: telecommunications service providers (including internet providers and networking firms), operating system and application software publishers, data services and system integration firms, and ICT equipment manufacturing companies. In the course of that examination, key topics will be addressed such as market competitiveness, public and private governance, national security concerns, cybersecurity, protection of individual privacy, intellectual property protection, electronic commerce challenges, international trade, access to broadband services, and maintaining a competitive national workforce. The study concludes by assessing and recommending necessary changes to federal enabling policies.

LAND COMBAT SYSTEMS (LCS): This seminar will focus on studying the various actors, firms and organizations—both on the demand and supply side—that comprise the combat and tactical vehicle systems sector of the US defense industry. The seminar will study how differences in structural variables (ownership, market structure, policy, technology, decision processes, constraints, etc) influence conduct which in turn determines industry performance in efficiently satisfying national security requirements.

The US LCS industry is somewhat unique in that (1) it produces what are essentially public goods, (2) the US Government is the primary buyer of US produced LCS products (domestic monopsony), (3) demand for LCS products is determined by a public policy decision making process, (4) suppliers are able to influence consumption decisions via participation in the political decision making process, (5) the demand for LCS products can change dramatically depending on national security needs (*i.e.*, low demand in peacetime and high demand in times of conflict) and (6) the customer (government) regulates to whom industry can sell their products (arms and technology export regulation)

Given this type of industry structure, can the government rely on a policy of unfettered competition to regulate the industry? If not, how should the government use its regulatory tools

(*i.e.*, acquisition strategies, budget decisions, anti-trust policies, ownership of assets, operation of government facilities and sponsorship of new entrants) to manage the LCS industrial base? The US government owns a significant amount of LCS production assets and also operates some important technology development activities. Why does the US Government own and in some cases operate LCS enterprises? What are the conduct and performance characteristics of government owned enterprises? Should the US government continue to own and operate LCS enterprises or should it develop a strategic plan for divesting itself of these assets? The number and size of LCS product development and production centers in the US is heavily influenced by both national security and political considerations. Maintaining capacity excess to national security needs imposes significant costs on society and strains the defense budget. Conversely, maintaining too little capacity in the face of uncertain demand may compromise national security. Is the capacity of the LCS industry too small or too large for national security needs? What actions can DoD take to better manage the size of the LCS industrial base?

The seminar will also compare and contrast the structure, conduct, and performance of the LCS sectors of the European and US defense industries and evaluate European efforts to reform its defense industry.

MANUFACTURING: Manufacturing is a strategic national security asset. It not only provides the physical implements of national security, but manufacturing makes the highest contribution to US economic growth of any sector. This year's study will address the following question: "What new policies or actions would strengthen the ***defense*** manufacturing base, promote job creation, and improve the ability of U.S. defense manufacturers to compete in world markets?" To help answer this question, we will examine U.S. defense manufacturing within a global context. The following issues are of specific interest: trends in government and manufacturing sector investment in R&D including government direct and indirect support; trade policy and regulations as they relate to the sector; and the availability of skilled labor to include science and technology professionals. Students will be provided an opportunity to compare and contrast and evaluate U.S. government policies and programs regarding manufacturing to those of selected other countries in an effort to develop an understanding of the strategic importance of manufacturing and to lead to specific recommendations to improve U.S. defense manufacturing. Internationally, we will examine government manufacturing policies of countries which have had recent or continued success in creating and sustaining a defense manufacturing sector. We will also examine the role of U.S. state and local governments and the European Union as a supra-government entity.

NEWS MEDIA: The First Amendment of the Constitution states that, "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press." Our founding fathers clearly understood the value, and the critical role, of news media in our democracy. The news shapes and influences our national will and helps set agendas. Today, more than ever, the American people need and expect the media to be the guardian of truth and the watchdog over tyranny and corruption. The media informs the decision making of policy makers and the citizenry, both domestically and internationally. It notifies, advises, and educates across a wide spectrum from security issues to economic ones. No policy agenda escapes what we see and hear in the news.

The study of this industry is particularly relevant in light of its dramatic, ongoing transformation. Newspapers are rapidly becoming archaic, with circulation and readership declining rapidly. International conglomerates threaten to monopolize the story being told and, in some cases, are willing to go to any lengths to scoop, or fabricate, a story. The demand for news is no longer major networks and newspapers, but blogs, Facebook, Twitter feeds, Glenn Beck and John Stewart. News in the final analysis is big business.

Our study will analyze news media in a dynamic time of great innovation, as the industry attempts to re-craft a profitable and sustainable business model in a highly competitive industry. It will address the necessary balance between "making a buck" and fulfilling the role the authors of the Constitution envisioned as the "fourth estate" and protector of the public good. It will also consider potential government policies to improve the functioning of news media and its essential role in US national security. We will compare how the media helps us see the world and how the rest of the world sees us, by examining the role of news media in other countries. All this will be done within the exciting context of determining what's making the news and what is truly news worthy.

PRIVATE SECTOR SUPPORT to OPERATIONS: The PSSO industry study examines and recommends policy to improve or mitigate the effectiveness, efficiency, risks and challenges of contractor support to President of the United States (POTUS) declared operations, at home or abroad, the success of which are critical to U.S. national security. It will examine domestic and international private firms that provide myriad services to the Department of Defense (DoD) and other U.S. government agencies, in particular Departments of State and Homeland Security, in support of these operations. This will include logistics support, military training, consulting, law enforcement training, intelligence, and security services.

Since the end of the Cold War, many military and interagency functions have migrated into the private sector, largely as a function of perceived cost savings. While "good for business" for some companies, the conflicts in Iraq and Afghanistan have exposed the increasing demands being placed on military and interagency acquisition and contracting systems, command and control arrangements, readiness requirements, and daily operations. Areas of doctrine, policy, organization, culture, as well as both interagency and coalition coordination have simply not kept up. Recent activities of some contractors in the ongoing wars, particularly private security personnel, also demonstrate that neither U.S. nor international legal regimes have kept pace with the realities of contractors on the battlefield.

The PSSO industry study seeks to understand the strategic impact of using commercial firms to provide support across the spectrum of domestic and international contingencies. We will examine and assess the historic effectiveness and efficiency of contractor support in recent operations, and identify areas for improvement. We will challenge the notion that certain capabilities and functions are "inherently governmental," and assess the impact of expanding private sector involvement in contingency operations. Our field studies we will allow us to anchor our studies with academic rigor through discussions with some of the world's foremost experts in this industry, and will include visits to major domestic and international companies who operate in nearly every hot spot in the world. We also plan to engage U.S. strategic leaders who deal with the political realities associated with contractor performance. Finally,

international travel will allow students to examine and learn from the experiences of government, military, trade union and industry leaders of key allies (Canada, the United Kingdom, France and NATO HQ) with a range of perspectives and experiences in the use of contractors in support of contingency operations. While in France, students will use Operation Overlord (Normandy) as an historical case study on the use of contracted support to operations.

RECONSTRUCTION AND NATION BUILDING: Since the end of the Cold War, the United States has engaged in a new post-conflict rebuilding operation every 18 months on average. The demands on the United States to respond to the needs of failing states, countries emerging from conflict, or regions recovering from natural disasters are likely to continue.

The overarching goal of the Reconstruction and Nation Building (RNB) Industry Study is to conduct a strategic-level examination of the industries involved in reconstruction and nation building, and how these markets and industries impact the US National Security Strategy. While the RNB industry is extremely diverse and complex, involving both the public and private sectors, the industry itself can be viewed within three distinct markets: post-conflict reconstruction, such as the rebuilding of Iraq and Afghanistan following combat operations; development of failed or failing states, such as the nation-building efforts in Sub-Saharan Africa and Central Asia; and humanitarian relief following a crisis (e.g., natural disaster), such as the ongoing efforts in Haiti and Pakistan.

For this year, the RNB Industry Study will focus primarily on the first two markets of the industry: post-conflict reconstruction and development of failed or failing states. However, during international travel, students will also be exposed to a broader array of overseas industries and markets that support reconstruction efforts and economic development.

ROBOTICS AND AUTONOMOUS SYSTEMS:

Computers seem overwhelming enough, but over the last few years I became more and more convinced that my generation was living through something perhaps even more momentous. From the robot vacuum cleaner that patrols my floors to the unmanned planes that my friends in the air force use to patrol Iraq, humanity has started to engineer technologies that are fundamentally different from all before. Our creations are now acting in and upon the world without us.

P.W. Singer, *Wired for Wire*

Many observers agree with P.W. Singer's assessment above…Robotic technology and engineering are changing the way we live and fight wars. The Robotics and Autonomous Systems (RAS) industry study will examine this proposition as well as the strategic importance of the RAS industry to US national security. RAS industry study participants will identify, analyze, and assess the structure, conduct, and performance of RAS markets, both in the US and abroad. Topics include: Market structure and its impact on innovation, sustainment of RAS, R&D investment, ethics and accountability issues, and overall health of the US RAS industry. The RAS industry study will visit these (and other) topics with primary focus on the US and Asia. Ultimately, RAS industry study participants will provide an empirically-based answer to the question – Does the RAS industry support US national security requirements today? Will it in the future? The study will also attempt to answer such questions as:

- How does the current US export control policy help or hinder the US RAS industry?
- What are the ethical considerations associated with employing RAS on the modern battlefield? Does the increased use of RAS make the decision to use force "easier" for US leaders?
- Who is better suited to repair, upgrade, and sustain RAS: organic organizations, such as depots, or contractor entities? Is sustainment even an issue given the nature of the underlying technology? (Do I throw away my robotic system and simply buy a new one?)
- Who is providing the capital for R&D investment in RAS-related markets? Is the answer the same for defense and commercial RAS markets? Why or why not?
- How do RAS firms make investment decisions? Is the process the same for defense and commercial firms? Why or why not?
- When will the use of RAS lead to significant personnel cost savings for the US military?

SHIPBUILDING: The goals of this year's Shipbuilding Industry Study Program are to develop the capabilities to analyze the industry's ability to support our national security requirements in both the near and long term, and to develop and present a set of policy options and recommendations for improvement at the national level, based on an understanding of the complexities of the structure, conduct and performance of the U.S. shipbuilding industry, in the domestic as well as the international context. The study will specifically require the students to understand the current health of the industry, and critically assess and evaluate what the future resource constrained environment holds. The students will be required to develop a set policy options and recommendations for the Defense Department, congress and industry that would ensure that the shipbuilding industry is available to support national security and global stability requirements now and in the future. We will attempt to answer such questions as:

- What are the strengths and weaknesses of the industry?
- What is the industry doing to posture itself for the future?
- Is this industry truly a critical defense industry and why?
- What role, if any, is and should the federal government playing in the industry?
- What impact will decreasing national budgets have on this industry's ability to support our national military and security strategies?
- Who are the world leaders and how have they achieved success?
- How have/will rapid technological advances & the information age impact the industry?
- Will the industry be able to continue to provide warships for the U.S. Navy in 20XX?
- Will the industry be able to continue to provide advanced ships to support emerging national security requirements in an environment of decreasing national resources?

SPACE: Forty-two years ago, on 20 July 1969, the first humans set foot on another celestial body. With the landing of Apollo 11 on the Moon, US Astronauts Neil Armstrong and Buzz Aldrin represented humanity as reflected in the inscription on the plaque mounted to the Lunar Lander Eagle: "HERE MEN FROM THE PLANET EARTH FIRST SET FOOT UPON THE MOON JULY 1969, A.D. WE CAME IN PEACE FOR ALL MANKIND." The landing was the culmination of nearly a decade of intense effort by the United States to fulfill President John F. Kennedy's stirring challenge to the nation to "…to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, …"

It has been more than 35 years since the final lunar landing. While there is now a permanently manned International Space Station in low Earth orbit, the space industry seems to have settled into a mature phase of modest operations, limited competition and little innovation. Or has it? The United States has announced our intent to return to the moon and travel beyond to Mars. Several other nations including China and India have announced similar plans. Is the Space Race of the 1960's and 1970's on again, or are we entering a new era of internationals cooperation in space?

This year the Space Industry Study group will investigate the nature of the space industry both in the U.S. and around the world with an emphasis on emergent technology and players, both commercial and national. We will examine the strategic workings of the industry, assess the status of the global space industry, make cogent assessments of global trends in the industry into the next century and forge recommendations for U.S. space policies and programs to ensure national security and maintain U.S. interests in a global context. Throughout the study, we will focus on critical relationships and interconnections among many and diverse entities, such as those among: U.S. military, civil and commercial space programs; international military, civil and commercial programs; entrepreneurs and large, established space companies. Some of the major sectors of the space industry that we will address include: rocket production and launch capabilities, satellite payload development and operations capabilities; scientific, civil and commercial uses of space; and dissemination, integration and exploitation of various types of data from space (remote sensing, communications, position/navigation, etc.).

STRATEGIC MATERIALS: Everything is made of material, which means that a study of "materials" is potentially boundless. So, what then constitutes a "strategic" or "critical" material? There have been many answers to this question, and the definition has changed over time. Government policy about its role with regard to securing access to strategic materials has also changed significantly. For a long time, this nation maintained a stockpile of materials that we thought we should have on hand in the event of another protracted land war. Now the National Defense Stockpile (NDS) keeps only one critical item (beryllium) and some quartz. But this approach may be changing as the NDS transforms into the Strategic Materials Security Program (SMSP) to permit a quicker response to world market conditions and to assure availability of critical materials required for both defense and national security needs.

The global economy and continuing technological innovation have increased our interest in ensuring access to some special use materials that we need in order to produce a host of things from communication devices (like cell phones and advanced sensors) to airplanes (titanium and

new superalloys) to rechargeable batteries (lithium). There is also much more competition for mineral resources from fast-growing countries like China and India. New anxieties about potential supply interruptions or access problems grow out of import dependence, hostile trade and export controls, and new ownership patterns in minerals industries. While the DoD concluded last year that global markets can supply what we need for defense articles in most cases, others insist that we need to protect domestic metals and minerals industries and take steps to spur domestic minerals production as well as obtain assured suppliers abroad. The latest "hot issue" getting everyone's attention is access to Rare Earth Elements. Several bills in congress called for government loan guarantees and other inducements to support a domestic supply chain for these important minerals critical to high performance defense and consumer articles. The metals and metal powders are not produced in the US, and the ores and oxides are for now a Chinese monopoly. We can expect lively debates to continue into 2012 on all these subjects.

This year's Strategic Materials Industry Study will visit a variety of metal processors and manufacturers in the US that use titanium, tungsten, molybdenum, rhenium, beryllium, copper and steel. We will also visit mining specialists, trade associations, and academics and business analysts who follow minerals industries closely. Site visits to titanium sands (Virginia) and deep-rock molybdenum (Colorado) mines will give us perspective on US mining technology and our regulatory environment. We will also visit metals manufacturing sites during domestic field studies in Colorado, Pennsylvania, and Ohio. For basic information on minerals, we will spend time with the world-renowned specialists at the US Geological Survey, professors at the Colorado School of Mines, and experts from the Mining and Metallurgical Society of America (MMSA). On the Government side, we will meet with a DoD specialist who can help us master acquisition rules for materials, such as the Berry Amendment, Specialty Metals clause, and Buy America laws. We will check out the CFIUS process (Committee on Foreign Investment in the US) as it affects materials industries. We will also talk to a metals industry specialist from the Commerce Department; and get to know the materials experts at DoD in AT&L and Industrial Policy.

Our planned international field study this year will be in Chile and Peru, two of the world's foremost mineral producers. We will spend several days meeting with government and industry mining officials as well as other private sector minerals specialists, touring mines and processing plants, and learning about the dynamics of these very mature minerals industries and the impact that politics plays regarding their governance and taxation policies. Places we will visit include: the world's largest open pit copper mine, the most productive copper mine in the world, the deepest copper mine, a huge molybdenum mine, rich lithium carbonate deposits, and one of the world's few rhenium roasters. A short stop in Lima, Peru, on our homeward leg will allow us to compare the legal, regulatory and investment climates for minerals industries in this neighboring resource exporter. The industry study faculty seeks fluent Spanish-speaking students who can assist in translation during our South American studies.

TRANSPORTATION: The transportation industry is the backbone of global commerce and enables America's political, informational, military, diplomatic and economic influence in the global community. The industry study will look across the broad and ubiquitous field of transportation that moves people, goods and services, employs millions of workers, generates billions of dollars in revenue, and consumes vast resources. The study will also focus on the

importance of the transportation industry on the swift mobilization of the military and support to the sustainment of the armed forces during current and emerging conflicts.

The Transportation Industry Study will examine domestic and foreign freight and passenger transportation and all the principal modes – aviation, maritime, trucking, highways, railroads, inland waterways, pipelines, and transit – that comprise the transportation network. Emphasis will be on group study and analysis that will focus on the infrastructure required to support the transportation industry, locks, ports, airfields, highways, rail lines and pipelines, and the relationship between the public and private sectors administration and control of those facilities and investment considerations. Students will examine the role of government in the industry in terms of policy, execution and compliance. The study will address issues that cut across all the modes, such as economics, operations, technology, systems, infrastructure, regulations, leadership, institutions, and sources of capital. We will meet with the private- and public-sector organizations that operate the components of the transportation system, as well as customers, associations, and the government agencies that regulate transportation. We will also visit a variety of transportation facilities.

The growth of globalization and of the world economy has placed strains on the transportation network, and we will look into the issue of congestion and explore possible ways to increase effective capacity. Transportation security has become a major issue since 9/11. We will meet with public- and private-sector organizations responsible for transportation security. Command and control issues in each of the modes of transportation will be examined and compared. Intermodal transportation (a/k/a containerization), which involves coordination between ocean shipping, ports, trucking companies, railroads, and multimodal parcel delivery companies, has grown tremendously in recent years. We will examine the role it plays in supporting the growing global supply chains. Throughout the study, we will examine the capability of the transportation system and the individual modes to support DoD requirements for mobilization, deployment, and sustainment.

WEAPONS: It is common knowledge that precision-guided weapons, and the precise battlefield effects they create, have helped the United States achieve tremendous military successes. Our success is not only attributed to precision targeting and delivery, but also to the warheads themselves. From nuclear to non-lethal, today’s technology provides a panoply of weapon choices allowing the military the potential to select the most appropriate means toward the desired end. A neophyte might think that we already have discovered all we need to know about warheads and energetics; however, not only has the technology improved dramatically, but we also seem to continue to find new and innovative ways to employ the latest smart munitions. This industry study will look at the sensor-to-shooter cycle examining the strategy, utility, procurement, production and lifecycle issues associated with effective use of weapons in today's environment.