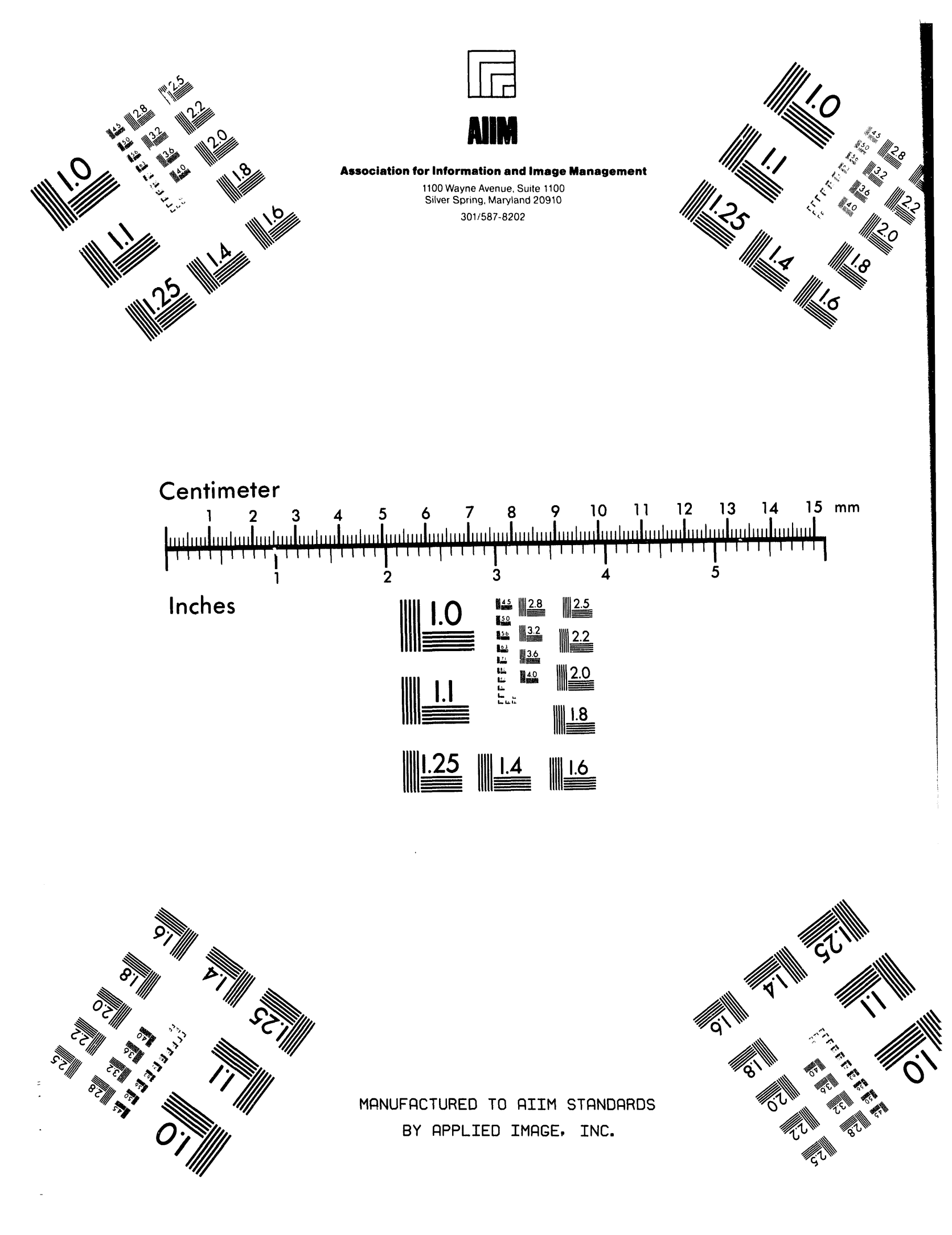
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PROSPERITY GAMES PROTOTYPING
with the Board of Governors of the Electronic Industries Association, January 20-21, 1994

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ABSTRACT

Prosperity Games are an outgrowth and adaptation of move/countermove and seminar War Games. Prosperity Games are simulations that explore complex issues in a variety of areas including economics, politics, sociology, environment, education and research. These issues can be examined from a variety of perspectives ranging from a global, macroeconomic and geopolitical viewpoint down to the details of customer/supplier/market interactions in specific industries. All Prosperity Games are unique in that both the game format and the player contributions vary from game to game.

This report documents the Prosperity Game conducted under the sponsorship of the Electronic Industries Association. Almost all of the players were from the electronics industry. The game explored policy changes that could enhance US competitiveness in the manufacturing of consumer electronics. Four teams simulated a presidentially appointed commission comprised of high-level representatives from government, industry, universities and national laboratories. A single team represented the foreign equivalent of this commission, formed to develop counter strategies for any changes in US policies.

The deliberations and recommendations of these teams provide valuable insights as to the views of this industry concerning policy changes, foreign competition, and the development, delivery and commercialization of new technologies.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

EXECUTIVE SUMMARY

We currently live in an economic environment that is highly competitive and global in nature. Alliances and interactions among industry, government, university, and laboratory groups could develop synergies that may not be possible under existing competitive conditions and prevailing policies, laws and regulations. However, the diverse interests and constituencies of these groups do not easily lend themselves to recommendations agreed to and understood by all parties. Prosperity Games, adapted from move/countermove and seminar war games, provide a method to explore the interactions among these groups and the marketplace. These games can be a useful tool for addressing the complex problems of national economic competitiveness.

The prosperity game concept is new and still under development. To improve the game's rules, processes, and utility, we have initiated a testing and development program. The consumer electronics industry was chosen as an initial focus of the development effort. The Board of Governors of the Electronics Industry Association graciously volunteered to participate in a prototype session, which was held in conjunction with their annual meeting on January 20-21, 1994, in Palm Springs, California.

In the prototype, four Blue Teams were assembled to act as presidentially appointed commissions to recommend policy changes that would enhance US competitiveness in consumer electronics manufacturing. Blue Team membership is assumed to be comprised of high-level representatives of government, industry, universities and national laboratories. In the game, EIA members played all four roles, supplemented with a few other players from government and laboratories. Similarly, a Purple Team represents the foreign equivalent of the Blue Team, formed to develop counter strategies for any changes in US policies. A Green Team represents the marketplace, and provides an assessment of the possible outcomes of the policy recommendations.

In the initial session, three of the Blue Teams (I, II, III) formulated similar strategies stressing the need for the US government to reduce business taxes and to reform business and trade policies and laws. They perceived that an adversarial relationship between government and business is adversely affecting US economic competitiveness. The teams recommended that the US government should become a partner with industry and an advocate of business both nationally and internationally. Specific suggestions included elimination of taxes on long-term capital gains and double taxation of corporate dividends, tax credits for investment and R&D, easing anti-trust laws to allow for more industry partnerships, and taking the initiative in promoting exports. The importance of education was also stressed from both sides of the business equation: a better educated work force will lead to innovation and increased productivity, and will also enlarge the market for high technology consumer electronics products.

Initial discussions concerning the future of the national laboratories produced divergent views. Two Blue teams wanted to restrict labs to focusing on basic research and defense; funds freed up by shrinking the labs should be used to support industry research and development. One Blue team thought the laboratories could become a major source of innovation and incremental improvements for industry. They suggested that the labs be re-engineered to pursue national

initiatives in consumer electronics. The Purple Team saw the freed up talent at the labs as a potential disadvantage for them; their strategy was to hire those engineers and scientists with appropriate abilities for their own companies' R&D efforts.

The Purple Team developed great enthusiasm in playing their roles of the foreign competition. They saw the combination of current US laws, culture, business philosophy, and taxation policy as being highly favorable to foreign competitors. Their primary strategy was to keep the US on its current course.

The morning after the first session, teams were provided with memoranda and "intelligence reports" about the deliberations of the other teams. The Prosperity Game suddenly resembled a war game in which the enemy had "fired the shots heard 'round the world." Blue teams received the Purple briefing with shock: "This is the same as war." Blue discussions moved dramatically from complaining about the US government to how best to compete against foreign businesses. On the other hand, the Purple Team treated the Blue strategies with derision. They believed that many of the Blue recommendations would actually help Purple businesses. The reduction of funding for government laboratories was seen as "crazy." The Purple response was primarily to congratulate themselves on their initial wisdom, and to further refine their strategies.

The remarkable change in the second round may be a typical response. Americans may respond better in reaction, rather than anticipation or "proaction." If this assumption is valid, then the Prosperity Games would be extremely helpful in stimulating proactive behavior before problems become crises. Benefits may also accrue from being forced to take a much longer-term view than American businesses are accustomed to do.

The prototyping did not provide enough time for the Green Team to provide feedback. Their input would have provided additional stimulation to rethink and rework the proposed strategies. The Green Team gave the Purple Team the highest score for its business-as-usual approach -- confirmation of the actual success foreign companies have enjoyed over the last decade. The next highest score was assigned to the strategy involving broad tax incentives and reductions; however, a concern was raised over the time required to pay back the public investment represented by lower taxes. Lower scores were assigned to strategies related to trade leadership and reform. Modifying laws to allow more business collaboration and partnerships received an intermediate score, but raised concerns about perceived fairness.

Several potentially interesting strategies were proposed, but not assessed because of insufficient time. These included treating software leadership as a differentiating opportunity for US businesses; forming a panel to guide re-engineering the national labs to increase their utility in gaining industrial competitiveness; developing an industry-led technology roadmap-making effort; using government to set international standards; and removing barriers to building the National Information Infrastructure.

Significant progress was made in accomplishing the objectives of the game. A poll of the players showed very strong support for conducting future games with real players adopting the roles of the four groups. The EIA players also thought that the game stimulated thinking, helped develop an

understanding of the different roles, initiated the development of relationships, and encouraged the industry players to explore the long-term consequences of their strategies. They also believed that the game format could lead to roadmap-making initiatives in industry. The efforts of the game staff were warmly applauded. The EIA players and the support staff also suggested areas for improvement: allocate more session time; improve the introductory briefing; revise the Players' Handbook; and improve procedures, guidelines and tools for keeping the games running smoothly.

Diversity as a business concept is a major topic of current discussion. It incorporates the idea that a heterogeneous group can outperform a homogeneous group if two principles are adopted: inclusivity and the acceptance and management of conflict. Prosperity Games seek to include all the key elements of economic competitiveness: industry, government, education, and laboratory research and development. The games also provide an environment in which conflict is both expected and encouraged. Out of this conflict could arise a committed team, united and focused on accomplishing a mission of increasing US economic competitiveness. We are proud to be a part of this effort.

INTRODUCTION

A prosperity game is a new type of forum for exploring complex issues related to industrial competitiveness. The concept originated in a meeting with the staff of New Mexico Senator Jeff Bingaman in which many penetrating questions were raised. Attempts to find the answers led to a phone call with Lee Buchanan of the Advanced Research Projects Agency who replied that he did not know the answers but knew a potentially good way to ask the questions. Lee had just returned from Naval Reserve Duty and was considering adapting War Gaming to Defense Conversion issues. Lee suggested we look into this type of forum. Prosperity Games were born.

Prosperity Games were born

The new forum was first prototyped with a small group of directors at Sandia National Laboratories. The results were encouraging but limited in scope and in the experience of the players. Peter McCloskey, President of the Electronics Industries Association (EIA), inquired about prototyping the Games with the Board of Governors of the EIA and courageously committed the group after a series of reviews. The results are reported in this document.

Game Objectives

Prosperity Games are adapted from seminar war games and explore the interactions among government, industry, laboratories, and universities to enhance national economic competitiveness. Prosperity games encourage dialogue and connections among the participants, can discover success factors for improving the international competitiveness of the United States industrial base, and can stimulate ideas that could later be crafted by the participants into valuable guidance and policy. The games are not vehicles for advising the government nor will there be any attempt to generate consensus.

Prosperity Games ... can discover success factors

These games provide a safe (not for attribution) environment with knowledgeable and committed players representing all aspects of the problem through move and counter-move simulated actions.

With an initial focus on digital consumer electronics (DCE), this Prosperity Game was designed and prototyped to fulfill the following purposes for the various customers and stakeholders:

- Stimulate thinking in a focused and directed fashion to help develop new insights regarding future technology policy;
- Facilitate the development of synergistic relationships among key individuals from the four entities (industry, government, national labs, and academia);
- Develop an understanding of the roles and relationships of, and the interactions among the four identified groups;

- Explore the value of using a long-term (10-20 year) time horizon when thinking about and crafting technology policy;

- Lay the foundation for a road map to economic competitiveness in the digital consumer electronics industry;

- Provide informed input to individuals for developing possible legislation;

An important objective of the EIA prototyping session was to evaluate how well the game format facilitates the accomplishment of the above goals. Lessons learned from this session will be applied to improving the games in the future.

Game Theory

In mathematics, game theory is the study of strategic aspects of situations of conflict and cooperation. "Game Theory approaches conflicts by asking a question as old as games themselves: How do people make 'optimal' choices when these are contingent on what other people do?"[1] Game theory originated with the mathematician John von Neumann as early as 1928. The collaboration of Von Neumann on theory and Oskar Morgenstern on applications to economic questions led to the seminal book *The Theory of Games and Economic Behavior* that first appeared in 1944, and was later revised in 1947 and 1953. Game theory is an approach to developing the best strategies in areas such as economics and war to beat a competitor or enemy. [Of course, one possible strategy is to convert an enemy into an ally, or a competitor into a partner!]

How do people make 'optimal' choices when these are contingent on what other people do?

A game is defined by a set of rules that specify the players, their desired goals, allowed interactions, and a method of assessing outcomes. There can be one or more goals with different levels of importance. The players adopt strategies, and the interactions of the "moves" based on those strategies lead to outcomes which may or may not be consistent with the players' goals. Complex games should involve look-ahead strategies that address the different possible moves that an opponent could make. It is important to try to understand an opponent's goals in order to maximize the probability of a favorable outcome. Games can be sequential, with player interaction allowed between moves.

[1] From Steven J. Brams, "Theory of Moves," *American Scientist*, **81**, 562-570, November-December 1993.

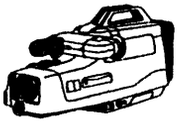
PROSPERITY GAME DESCRIPTION

Players - General

There are four basic teams involved. Two Blue Teams represent presidential commissions empowered to develop and recommend policies to increase the competitiveness of US industries. Their primary goals are to increase jobs (quantity and quality), profits, and tax revenues. They are composed of representatives from four US entities: industry, government, universities, and national laboratories. The Purple Team represents foreign interests and is composed of the foreign counterparts of the four groups. Their primary goal is to maintain or increase their market share. The Green Team represents the market or "reality"; its composition is as broad as required. The Green Team assesses the Blue and Purple recommendations against a set of criteria or metrics which they develop at the the beginning of the game. Team deliberations are guided by *facilitators*, and *recorders* document the team decisions in the form of memoranda. *Analysts* independently observe and document the proceedings. A control team and director guide and monitor the overall game.

Mechanics - General

The game begins with a triggering event. In the EIA prototype, it was assumed that the US government becomes very concerned about our ability to compete in the field of digital consumer electronics. The President convenes a high-level committee (Blue Teams) empowered to make far-reaching recommendations for the revitalization of the US consumer electronics industry. Simultaneously, concerned about a possible US over-reaction, a foreign consortium convenes a high-level panel (Purple Team) to assess possible US moves and to develop counter strategies.



The Blue Teams recommend a policy framework and enabling initiatives to achieve their goals. The Purple Team similarly develops its own policies. Memoranda proposed by these teams are assessed against criteria established by the Green Team. In subsequent moves, the teams exchange memoranda, provide feedback to the originating teams, and alter their own strategies to improve their chances of accomplishing their goals. The Green Team assesses the outcomes of the moves and countermoves. A final group session informs all players of the game highlights.

EIA PROTOTYPE GAME

The EIA prototype differed from the general game in several ways. Industry executives were employed to play the roles of all eight entities (four from the US, four from foreign countries). Only one player was actually from the government. Some players had difficulty representing unfamiliar roles in government, laboratories and academia. Because of this role-playing, recommendations from the prototype might not accurately reflect the conflicts and results from a real game. However, the team outputs are valuable indicators of important industry perspectives on roles, policies and initiatives for industrial competitiveness; they may also accurately present several possible strategies and their possible outcomes.

A comprehensive 'Players' Handbook" was prepared and supplied to the players prior to the game. The 'Innovator," an electronic polling device, was used to facilitate rapid voting on decisions and to capture results for subsequent analyses.

To allow all interested EIA members to play, four Blue Teams were formed instead of two. Because of time limitations, the play was limited to the initial session (1.75 hours), and one abbreviated session (45 minutes) to assess other team strategies and develop counter strategies. Green Team feedback was only provided in the 45-minute wrap-up session. The actual game will involve three sessions, with more interactions. The team compositions are given in Appendix A. Detailed memoranda, assessments, and analyses are provided in Appendix B.

Metrics

In addition to policy recommendations, the Blue and Purple Teams generated trend judgments on four metrics, which were refined by the Green Team as marketplace feedback:

- Jobs: Consumer electronics production in factories within the United States regardless of country of ownership. The assumed 'business-as-usual" annual growth rate was 2.5% in the US, 3.0% in Purple countries.

- Profits and market share: Fractional value added to global production of consumer electronics by US-owned companies, regardless of location of production. We assumed a baseline projection of no change in either the US or foreign companies.

- Standard of living and tax revenues: Gross Domestic Product (of which tax revenue is historically approximately 30%). Baseline annual growth was assumed to be 1.3% for the US, 2.0% for Purple countries .

- Innovation and competitiveness: Manufacturing productivity reflects the conflict between reducing costs and increasing jobs since improving worker productivity often reduces the number of jobs in a particular production industry, but reduces costs which increases profits. Innovation is involved in improving productivity and creating new products for both new profits and new jobs. Productivity was assumed to increase 2.8% per year in the US, 3.2% in Purple countries.

RESULTS

Summary

Following an overview presentation, the players assembled in their various teams. Different players brought a variety of expectations to the game. Some were skeptical and even cynical. However, the majority appeared to be very enthusiastic. Blue Team players easily assumed the role of industry, but many were uncomfortable in the roles of government, university and laboratory players. The assumption of these roles contributed to the accomplishment of the

second and third game objectives (see page 4): understanding the roles and relationships among the four groups and facilitating synergistic relationships. The Purple Team industry players adopted their foreign competition roles with the lip-smacking relish of an easy victory. The other Purple groups were generally highly supportive of industry's goals; the fidelity of this role-playing could only be tested in real life.

Not surprisingly, a common Blue theme was the need for the US government to reduce business taxes and to reform business and trade policies and laws. They perceived that an adversarial relationship between the government and business is adversely affecting economic competitiveness. The teams recommended that the US government must become a partner with industry and an advocate of business both nationally and internationally. Specific suggestions included elimination of taxes on long-term capital gains and double taxation of corporate dividends, tax credits for investment and R&D, easing anti-trust laws to allow for more industry partnerships, and taking the initiative in promoting exports. The importance of education was also stressed from both sides of the business equation: a better educated work force will lead to innovation and increased productivity, and will also enlarge the market for high technology consumer electronics products. Blue Team I also believed that a "best in class" software capability was a major factor in DCE success.

Blue Teams I and III initially favored reductions in funding for the national laboratories and limiting them to defense and basic research. In contrast, Blue IV suggested that the labs be reengineered to pursue a national initiative in consumer electronics; the labs could develop leap-frog technologies as well as incremental improvements to products and processes. In even stronger contrast, the Purple Team suggested hiring engineers and scientists with appropriate talents, who become available as a result of defense cutbacks.

The Purple Team deliberations focused on strategies that have already proven successful in maximizing foreign market share. Their primary recommendation was to keep the US on its current course -- i.e., a combination of laws, culture, philosophy, and taxation that Purple believed would continue to handicap any US gain in economic competitiveness.

On the second move, information was exchanged among the Blue teams, and between the Purple and Blue teams, and "the bombs went off." Blue teams received the Purple briefing with shock: "Good God, we're playing right into their hands!" Discussions now moved dramatically from complaining about the US government to how best to compete against foreign countries. On the other hand, the Purple Team received the Blue strategies with derision. They believed that many Blue recommendations would actually help Purple businesses. The reduction of funding for government labs was seen as "crazy." The Purple response was primarily to congratulate themselves on their initial wisdom, and to further develop their initial strategies to accomplish the same goals.

The Green Team was unable to provide feedback in real time, due to the shortness of the session. Their input would have further stimulated rethinking of strategies as the Blue teams were provided with possible outcomes of their recommendations. Based on the Green Team criteria and process described on pages 13-14, the Purple Team received the highest score for its business-as-usual approach -- confirmation of the success foreign companies have enjoyed over the last

decade. The next highest score was assigned to the strategy involving broad tax incentives The lowest scores were assigned to strategies related to trade leadership and reform. Modifying laws to allow more business collaboration and partnership received an intermediate score.

The highly energizing events preceding the second round indicated that the battle had just begun in earnest for the EIA prototyping games. More sophisticated moves, more look-ahead strategies and more creativity were just beginning to develop.

Blue Team I

Blue I believed that US global competitiveness would continue to improve. However, they also believed that industry and government are currently adversaries. Trade barriers, foreign competition, and administration policies were adversely affecting business. Business costs are rising, and there is a worldwide excess manufacturing capacity. They believed that government was in control. Industry could not reverse the trends unless government changed policies and laws to allow it to compete more successfully. They recommended that government take a lead role in penetrating foreign markets through diplomacy, policy changes, and reform of export controls. They also suggested tax relief, and support for R&D, capital investment, exports and job creation.

Blue I stressed the importance of globally oriented and culturally diverse education at all levels. Computer literacy and software training were emphasized. The objectives of this education initiative are to expand the market through computer literacy, and to maintain US software as "best in class" through training US citizens and retaining US-trained foreigners. They also thought that the national labs should focus on basic research and defense R&D.

Blue I estimated that these policy recommendations would cost about $1B, take effect in 4-6 years, and would help other industries as well as DCE.

Blue Team III acted as the President in deciding on the Blue I recommendations and generally accepted the recommendations. Some specifics were added and the government role was modified to emphasize trade and tax initiatives -- like those recommended by Blue III itself. The importance of budget neutrality was emphasized -- like the Blue III recommendations. Therefore, the Presidential Decision tended to converge the Blue I and III approaches. In addition, the Blue Team III decision endorsed the Blue Team I idea of government stimulating interactive learning media, which would create a larger market for future digital consumer electronics.

Blue Team II

Blue II was more convinced of the urgency described in the triggering event. They stressed the importance of productivity, quality, competitiveness, innovation, and a prepared work force to achieve success in the DCE industry. The options considered were formulated into a proposal for a comprehensive *American Competitiveness Act* which would include:

- Repealing long-term capital gains taxes

- Eliminating double taxation of corporate dividends
- Providing tax credits for investment in plant and infrastructure
- Providing tax credits for R&D, including industry-funded R&D by universities
- Repealing fair trade practices legislation
- Implementing national trade secrets laws
- Allocating funds for education and career development in technology and manufacturing fields
- Modifying anti-trust laws to facilitate the formation of industry alliances
- Converting closed military bases to CCC-type education/work facilities
- Increasing participation in international standards setting activities.

Blue II expected this program would cost $25B over 5 years. The cost would be recouped over the course of 20 years. Benefits would start to accrue at about 3-4 years, and these policies would help the US manufacturing and technology community across the board.

Blue Team III

Blue III adopted a free-market approach similar to Blue II. They believed that DCE had a fast growing global market and would be an economic driver in other public and private sectors. Their recommendations were:

- Enforce US international and trade policy in all respects
- Reduce taxation on risk capital
- Reduce federal R&D but increase private R&D, so that the total remains constant
- Eliminate domestic barriers to establishment and growth of a national information infrastructure.

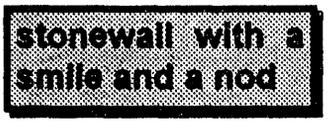
Blue III assumed their recommendations would be cost-free, and results would be produced in about 3 years.

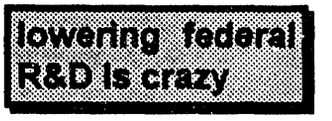
Blue I acted as President for Blue III. They criticized the lack of urgency and timidity of the Blue III recommendations. Although there were similarities between Blue I and Blue III recommendations, Blue I felt that Blue III had not gone far enough in recommending tax reform, investments, incentives, job creation, and trade reforms. Blue I tended to push Blue III into converging more with their own suggestions. However, Blue I also seemed to significantly modify their original position that the situation wasn't that bad. They now described it as an "economic war" requiring "major US policy changes." Blue I also disagreed with the Blue III idea of transferring resources from labs to industry and universities. They increased their advocacy for using laboratory and university assets.

"economic war" requiring "major US policy changes"

The Purple Team also reviewed the Blue III recommendations. They felt that the Blue III recommendations would prove to be ineffective, or could easily be countered. Trade policy would be countered with disinformation and the "appearance" of compliance. Imports would be allowed but would be limited to low technology items ("crumbs" or rice), and hampered by

administrative procedures. Negotiations would be stonewalled with a "smile and a nod," but saber rattling would be avoided. Patent laws would be circumvented by exploiting minute changes; access to US technology would be increased through industrial espionage, more technical symposia, and training Purple students in the US. Taxation would be maintained high with a disinformation campaign and public relations firms. The Purple Team thought that lowering federal R&D is crazy. Their counter strategy would be to fully support this idea; tax credits for industry R&D would be countered by foreign-owned firms locating in the US and demanding equal shares of US R&D dollars for industry. Finally, the Purple strategy for countering the national information infrastructure was to lobby against it by invoking fear about specific competitive market excesses, fighting to keep regulatory barriers in place, and investing in gateway technology businesses.





The Purple response to Blue III was derisive. They believed that Blue III strategy only confirmed the wisdom of the original Purple recommendations (q.v.). Having run the Purple gauntlet, the response of Blue III in the next round would have been very interesting. Unfortunately, time did not allow for another session.

Blue Team IV

Blue IV assumed a continuation of shortening time-to-market and product life cycles, US labor and capital costs higher than offshore, and increasing global productivity. They believed that the US is in a competitively weak position without a long-term strategy. They also believe that all interested parties are willing to look at new ways of doing business. They developed an extensive set of goals and options (see Appendix B) that included:

- Revising corporate tax structure to encourage growth
- Accelerating depreciation schedule to 5 years
- Allowing more cooperation and partnerships within and among industries and government
- Re-engineering the national labs to focus on commercial R&D
- Defining and developing appropriate standards.

Their recommendations would create a comprehensive and cooperative panel involving all four entities to guide the new policy and transition to a new way of doing business. Three major strategies would be explored addressing technology, regulatory and educational reform, and re-engineering of the national laboratories:

- Motivate and empower a select panel to develop a leap-frog digital electronic technology road map for consumer products and determine how to invest money freed up from re-engineered laboratories and federal technology investment programs. This panel should operate in a cooperative mode.
- The panel is charged with defining the investment requirements (regulatory and incentive programs) for developing the map. Emphasis is placed on education, the level of government involvement, and defining the competitive situation worldwide.

- In addition, they are charged with developing the process to be used for re-engineering laboratories and federal technology investment programs. Specific requirements are to develop a 20-year strategic plan with a rolling 5-year implementation plan in the following areas:
  - Jobs
  - Projected market share
  - Profitability
  - Required educational and technology expertise.

The Blue Team IV cost estimate is $3M in the first six months and cost neutral or cost negative over the 20-year plan.

Purple Team

The Purple or 'foreign" team quickly adapted to its role of competitor. It identified its viewpoint as most accurately reflecting a composite view from Japan, France and the Netherlands. The four Purple entities (government, industry, universities, and laboratories) behaved in a mutually supportive and collective fashion. Their common goal was maximizing market share and profitability. They saw the current US environment as contributing to the success of Purple countries and businesses. Hence, their major strategy was to maintain current US laws, regulations, culture, anti-business philosophy, environmental restrictions, focus on short-term profits, unfriendly or disloyal stockholders, lack of focus on exports, little training in foreign languages and cultures, and domestic health and welfare concerns. Their recommendations included:

- Encourage US to make no regulatory changes in:
  - tax policy
  - antitrust laws
  - environmental issues
  - Glas-Stegal prohibitions on bank equity in corporations
- Encourage more US government involvement in:
  - health care
  - regulatory laws
- Increase US government defense spending
- Increase foreign bases
- Partner with US in any areas where we are weak in technology; exploit US strengths
- Hire US laboratory talent (as federal R&D support drops)
- Force US to follow our standards; e.g., electrical
- Overvalue/encourage strong US dollar
- Encourage US federal and state governments to subsidize foreign owned businesses in US.

While Purple did perceive that the US was generating a comeback in some areas (e.g., autos), and that defense conversion could enhance US competitiveness, they were not concerned within the 5-year period.

The Purple Team expects their strategy to increase their world market share, their competitiveness, their profits at a rate twice that of their GDP growth, their collective GDP faster than inflation, and their technological capability. This strategy will also maintain tax revenues with constant or reduced tax rates and increase tax investments for future growth, e.g. by increasing laboratory R&D. They anticipate exporting unskilled jobs while maintaining a high-quality work force with less than 5.5% unemployment.

Blue Teams I and II were made aware of the Purple consortium strategy through an 'intelligence agent." Their strong reaction was one of the most remarkable aspects of the game. Blue I declared "This is the same as war," and "Good God, we are playing right into their hands!" One Blue II player commented that the strategy was a "typical foreign myopic view of the world." Blue II quickly generated ten new options; they were evaluated and narrowed to four promising factors, which were synthesized into one decision: Form associations, patterned after the North American Free Trade Association, with China, South America, and others to achieve global inclusiveness and thereby enlarge the markets for US-produced goods. The Purple intelligence briefing had a major effect on the Blue Teams; they began to view the problem more as competing with foreign countries rather than primarily griping about what the US government had to do to correct the situation.

Good God, we are playing right into their hands!

This is the same as war

Green Team Analysis and Assessments

The Green Team reviewed, modified, discarded, supplemented, and assigned relative importances to the four proposed criteria for assessing the economic, technical, and cultural compatibility of the recommendations from the Blue and Purple teams. The final criteria and their importance on a scale of 1 (low) to 3 (high) were:

1. Encourages capital investment	2.86
2. Likely to increase profits	2.71
3. Accommodates the long term	2.64
4. Likely to increase jobs	2.57
5. Likely to increase quality jobs	2.50
6. Promotes R&D innovation	2.50
7. Likely to increase tax revenue without increasing tax rates	2.43
8. Decreases time to market	2.36
9. Accommodates US cultural traits	1.86
10. Addresses fairness perception	1.50
11. Accommodates foreign cultural traits	1.50

Each component recommendation was to be assessed by the sum of the products of importance times the estimated impact of the recommendation on each criteria (1= little impact, 3= medium impact, and 9= strong impact) as is commonly done in the Quality Functional Deployment[2]

[2] See, for example, James L. Bossert, *Quality Function Deployment*, ASQC Quality Press, Milwaukee, 1991.

formalism. Qualitative feedback would be based on this process.

In addition, simulated quantitative feedback was constructed for the four major metrics and the derivative metrics of electronics jobs, tax revenue, and taxpayer return on investment. Based on the actual rates of change over the last twenty years, the Green Team estimated that future mean annual growth rates for domestic production, US company fraction of worldwide production, standard of living and innovation would be 2.5%, 0%, 1.3% and 2.8%, respectively. Deviations from this business-as-usual expectations were assumed to cover the ranges 0-5%, -0.5-2%, -0.5-3%, and 0-5% respectively. These ranges were divided into five parts as shown in the table below. The Blue teams provided subjective estimates on a scale of 1 to 5 (very unfavorable to very favorable) of the degree to which their recommendations would impact the four metrics. These subjective rankings were converted into expected annual growth rates for each of the four metrics as shown in Table I:

TABLE I: GREEN TEAM QUANTIFICATION OF BLUE TEAM ESTIMATES

METRIC	ANNUAL % RATE OF GROWTH FOR RESPONSES 1 THROUGH 5				
	1	2	3	4	5
Jobs: Production on US soil, regardless of ownership	0	1.25	2.5	3.75	5.0
Profits: Fractional value added by US companies anywhere	-0.5	-0.25	0	1.0	2.0
Standard of living and tax revenue: Gross Domestic Product	-0.5	0.4	1.3	2.15	3.0
Innovation & Competitiveness: Productivity	0	1.4	2.8	3.9	5

The resulting growth rates were applied after the Blue teams' estimated incubation periods to generate quantitative feedback in subsequent rounds. Since the prototyping session was truncated, the feedback is provided in this report. The process remains subjective in that it depends on the collective judgments of the Green and Blue teams. However, the projections allow the players to see some of the possible consequences of their recommendations and assumptions; that feedback should stimulate the next move in the real games.

Summary of Green Team Assessments

Some of the Blue Teams had different but overlapping recommendations. The principal recommendations and their Team sponsorship are summarized in Table II. The Green Team evaluated the recommendations separately. The eleven Green Team criteria, the relative

TABLE II: MAPPING OF DISTINCT RECOMMENDATIONS WITH TEAMS

	RECOMMENDATIONS							
TEAM ↓	**Tax incentives**	**Aggressive trade leadership**	**Legislation: Repeal Fair Trade, pass trade secrets, modify anti-trust laws**	**US lead in setting international standards**	**Make roadmap & re-engineer labs by cooperative panel**	**Assure software leadership**	**Assure National Information Infrastructure**	**Keep US doing business as usual (Purple View)**
Blue I	Broad	Broad reform				US leads		
Blue II	Broad		American Competitive-ness Act	US Gov't lead				
Blue III	Capital &R&D	Enforce laws					Drop barriers	
Blue IV					5 year plans for 20 years			
Purple								Divert US/ no change

TABLE III: GREEN TEAM ASSESSMENTS OF DISTINCT RECOMMENDATIONS

CRITERIA (WHAT) ↓	Relative Importance ↓	RECOMMENDATIONS (HOW) Broad tax incentives	Aggressive trade leadership & reform	Legislation: Repeal Fair Trade, pass trade secrets, modify anti-trust laws	Enforce trade agreements aggressively	Keep US doing business as usual (Purple)
Encourages capital investment	2.86	8.54	1.92	5.31	2.85	6.54
Likely to increase profits	2.71	7.15	3.31	6.08	4.38	6.69
Accommodates the long term	2.64	6.46	4.08	5.31	2.54	5.77
Likely to increase jobs	2.57	6.08	3.77	3.92	2.54	7.15
Likely to increase quality jobs	2.5	6.23	3.31	5.31	2.85	7.62
Promotes R&D innovation	2.5	6.69	1.77	4.08	2.08	5.15
Likely to increase taxes w/o increasing tax rates	2.43	1.92	3.62	3.31	3.92	6.85
Decreases time to market	2.36	3.15	1.46	4.69	1.31	6.08
Accommodates US cultural traits	1.86	5	6.23	3.77	3.92	2.38
Addresses fairness perception	1.5	2.85	5	2.08	4.69	4.85
Accommodates foreign cultural traits	1.5	3.15	3.46	1.77	1.31	7.15
QFD Score (Sum of importance x impact)	{25.43}	139	84	111	74	156

importance of each, the assumed impact (on a scale of 1 to 9), and the total scores (sum of the products of importance times impact) are shown in Table III.

The "Encourage business as usual in the US" recommendation from the Purple Team (foreign competition) received the highest score from the Green Team. From the Blue Teams, the tax incentives scored highest, followed by legislation enabling industrial partnerships and protecting intellectual property more strongly, and then aggressive trade recommendations. The Green Team assessments follow. The detailed recommendations, assumptions, options, and analysts' opinions are reproduced in Appendix B.

Green Team Assessment of Blue Team I:

The Green Team evaluations of the recommended tax incentives (139 points out of a possible 229) and of the recommended aggressive trade reform (84 points out of 229) were motivated by the Blue Team I recommendations. The emphasis on software as a differentiating opportunity was included in the tax incentive evaluation. The feedback to Blue Team I would, in subsequent rounds, have led the team to address the economic return to the US for the investment (in the form of tax incentives), and address the fairness perception by crafting the incentives carefully. The low scoring metrics associated with the recommended trade reform, as shown in Table III, would have encouraged Blue Team I to question whether or not they should improve or abandon this recommendation. The potential advantages of focusing on software could have been developed or modified in the second round.

Green Team Assessment of Blue Team II:

The Green Team assessment of the recommended legislative package for repealing the Fair Trade Practices Act, passing a Trade Secrets Act, and modifying the anti-trust laws was motivated by the Blue Team II proposal for an American Competitiveness Act and resulted in a score of 111 out of the 229 maximum for this recommendation. The feedback would have encouraged Blue II to explicitly address the public's perception of the fairness issues raised by the proposed laws and to examine foreign cultural traits for possible vulnerabilities. In addition, like Blue Team I, Blue II recommended broad tax incentives (139 points out of possible 229). The feedback to Blue II would have led the team to address the economic return to the US for the investment made (in the form of tax incentives), and to address the fairness perception by crafting the incentives carefully. The Green Team did not address the recommendation for government to be more aggressive in setting international standards.

The Blue Team II judgments of the time until impact and the qualitative strength of the impact of their recommendations on four metrics were translated into quantitative marketplace projections through the reasonable percent change chart reviewed by the Green Team. These projections together with baseline projections are shown in Figure 1.

Jobs: Production in factories within the United States regardless of country of ownership. The baseline is $37.5B in 1992.

Profits: Fractional value added to global production by US-owned companies, regardless of location of production. The baseline reference is taken from a MIT study of fractional value added to worldwide consumer electronics by US owned firms: 5% in 1988.

Tax revenue for the public good without increasing tax rates: Gross Domestic Product, of which tax revenue is historically approximately 30%. The baseline reference is $24,000 per capita in 1992.

Innovation and competitiveness: Productivity reflects the tension between increasing profits and increasing jobs since improving worker productivity reduces the number of jobs in a particular production industry, but reduces costs to increase profits. Innovation is involved directly in improving productivity and indirectly in creating new products for both new profits and new jobs. The baseline reference is $240,000 of sales per production worker in 1992.

Three additional "quantitative" projections are provided in Figure 2. These address jobs in the US DCE industry, expected tax revenues, and return on taxpayers' investments.

The manufacturing jobs in consumer electronics in the United States is estimated by the factory sales projections in dollars divided by the productivity (factory sales per production worker). The economic activity multiplier is assumed to be 3.5 to go from direct production activity to total economic activity and the total jobs to production jobs is assumed to scale by the same factor. The same calculation is done for the baseline case and subtracted from the advocate's case to estimate the effect the recommendation might have on total jobs. The information would be returned to the players for reassessment and course correction.

The total tax revenue from the consumer electronics activity is estimated from the projected Gross Domestic Product (GDP) per capita, times 4.5 - the total number of jobs associated with the economic activity arising from consumer electronics production (including the 3.5 economic activity multiplier used in the previous calculation), times the population per worker (assumed to be 2), times the ratio of the nation's tax revenue to the GDP (0.30). The estimate does not include the loss in tax revenue elsewhere in the economy because of the investment of funds into consumer electronics rather than another activity. If properly done, the loss in other activities should be minimal. The same calculation is done for the baseline case and subtracted from the advocate's case to estimate the effect the recommendation might have on total tax revenues. This calculation lets players estimate the expectation for return on the investment from the public.

Figure 1. Blue Team II qualitative judgments on benefits translated into quantitative projections by Green Team algorithm

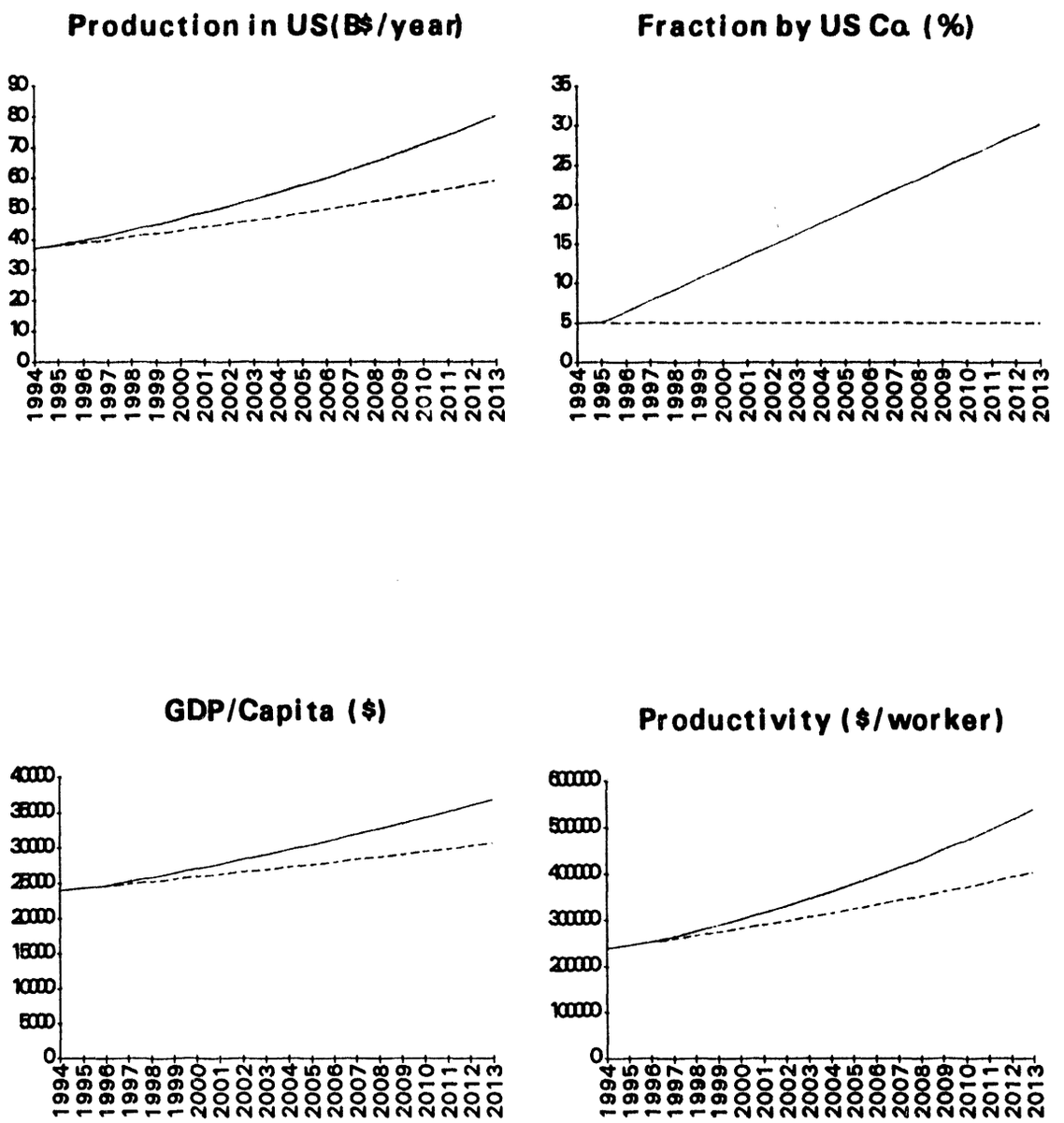


Figure 3. Blue Team III qualitative judgments on benefits translated into quantitative projections by Green Team algorithm

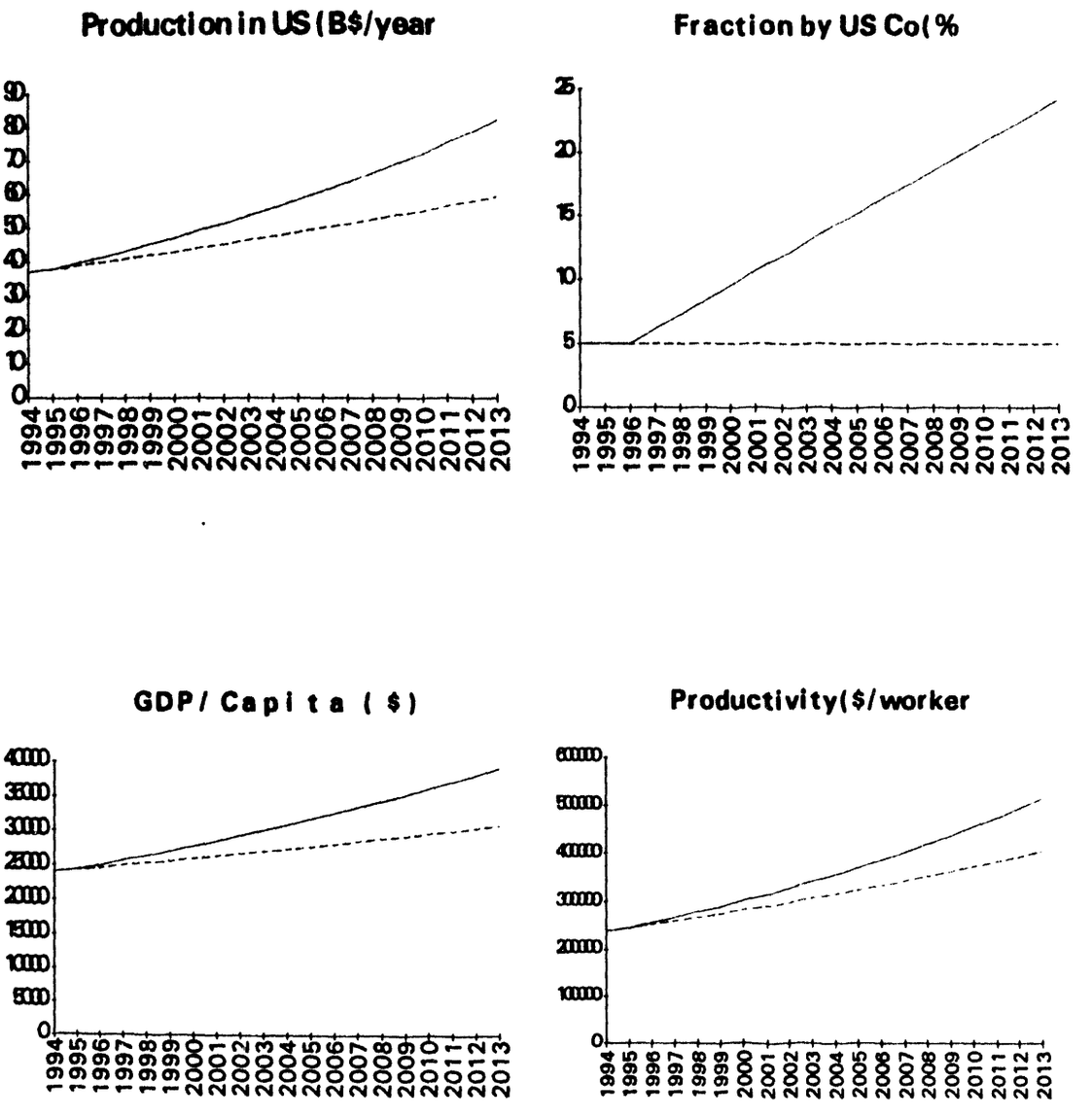
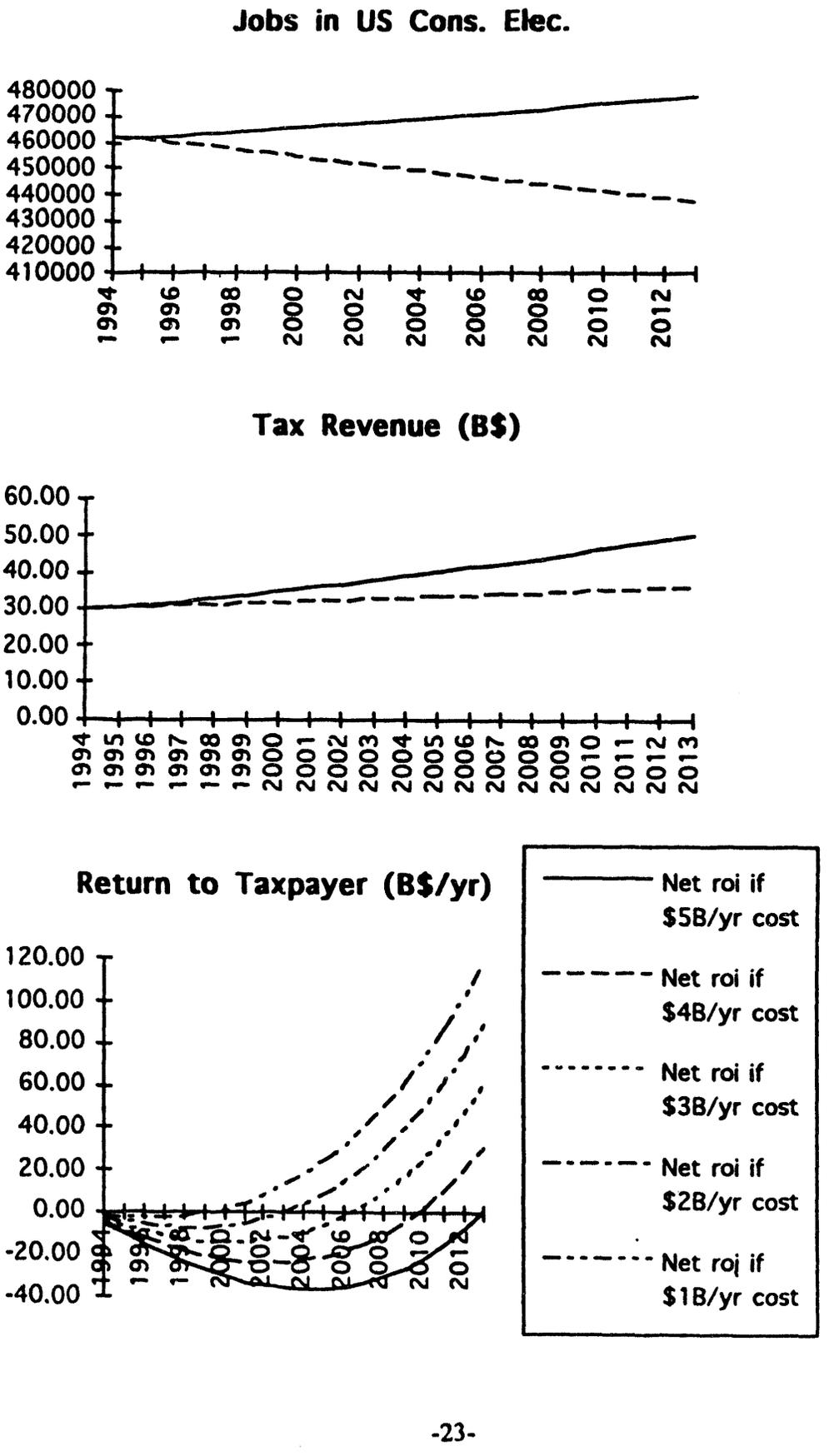


Figure 4. Blue Team III judgments translated into quantitative projections of jobs, tax revenue, and return on investment



Green Team Assessment of Blue Team IV:

The Blue Team IV report did not reach the Green Team in time for an assessment or a decision, even though this team assembled for an additional hour before the Board meeting on the second day to work their memorandum. The deliberations produced many worthwhile ideas, which are recorded in Appendix B.

Green Team Assessment of Purple Team Strategy:

The Green Team assessed the effectiveness of the Purple Team recommendations for achieving their goals using the eleven criteria, applied to the Purple Team's constituency. The Purple Team's strategy of encouraging the US to continue business as usual -- i.e., to further the interests of the foreign competition -- received a score of 156 out of the 229 maximum. This was the highest of the five assessed recommendations. The feedback would only question whether or not the Purple Team approach was compatible with the US cultural traits, i.e. whether the US is really as complacent as the Purple Team assumed.

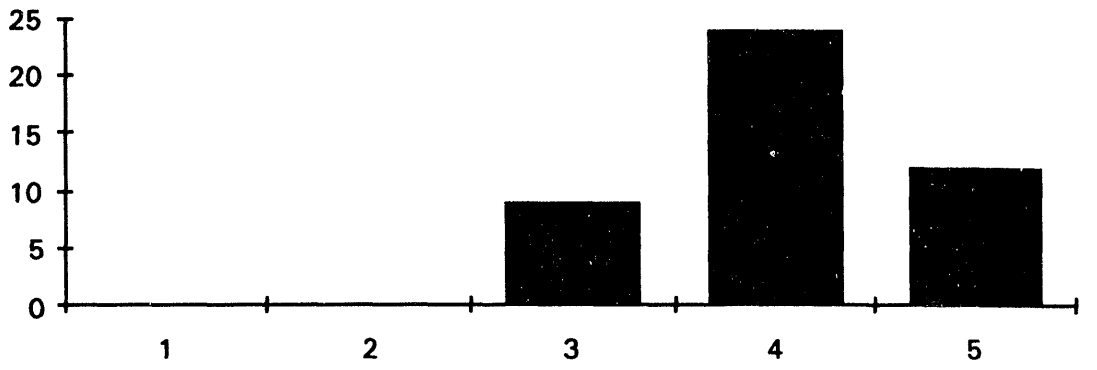
GAME ASSESSMENT BY EIA PLAYERS

Modern quality theory stresses the importance of feedback and continuous improvement. In the wrap-up session, the Innovator system was employed to poll the EIA players on how well the objectives of the game were met and where improvement was needed. Despite the abbreviated nature of the prototype, feedback from the players was generally very favorable.

Almost half of the voting players (21 of 43) responded with the highest voting (5 on a scale from 1 to 5) to the question, "To what extent would you want to play a full two-day Prosperity Game with peers from industry, government, university/expert community, and labs?" An even larger fraction (24 from category 5 and 15 from category 4) recommended that technology policy makers should play a two-day Prosperity Game with industry, government, university/expert community, and laboratory players.

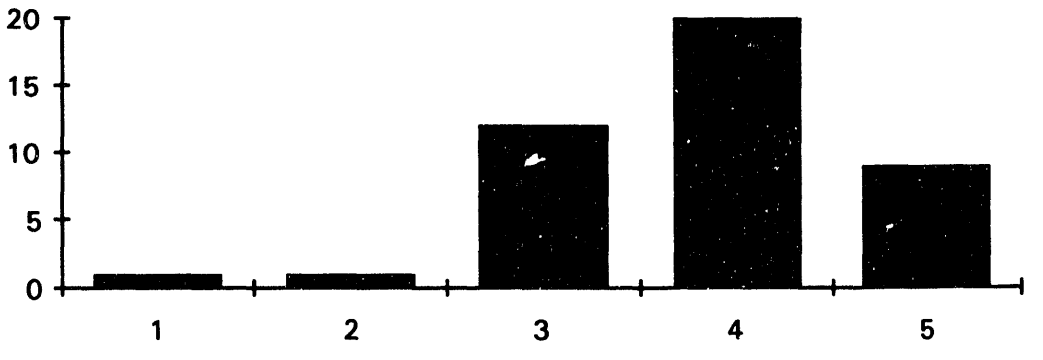
To the extent that the game stimulated thinking in a focused and directed fashion that could yield new insights regarding potential technology policy, players assessed an average of 4.07 ± 0.69 -- a very positive endorsement.

Extent to which Games stimulate thinking



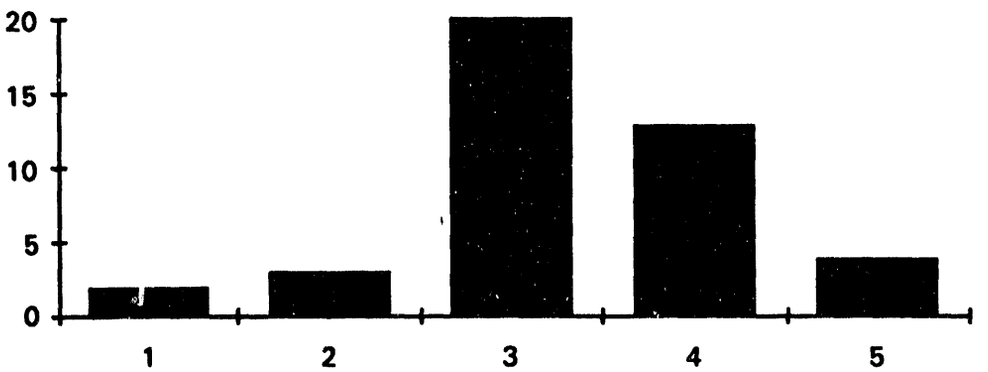
To the extent that the Games facilitated the development of personal relationships that would help in the subsequent development of technology policy, the players assessed an average of 3.81 ± 0.89 -- another positive endorsement.

Extent to which Games develop relationships



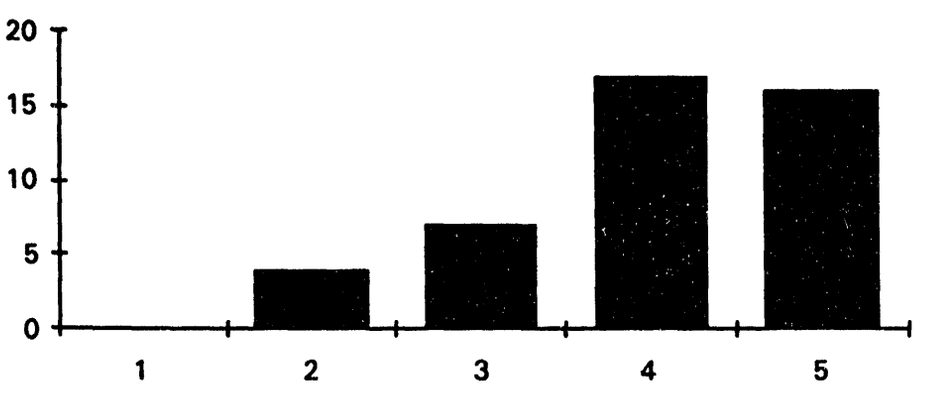
To the extent that the Games developed an understanding of the roles, relationships, and interactions among the four identified groups, the players assessed an average of 3.33 ± 0.93 -- a reasonably positive endorsement but an indication that players must be drawn from all four groups to achieve this purpose. This interpretation was reinforced by the assessment of the extent to which the players in non-industry roles were able to stay in role; their assessments ranged from 1 to 5 with an average of 2.96.

Extent to which Games develop roles



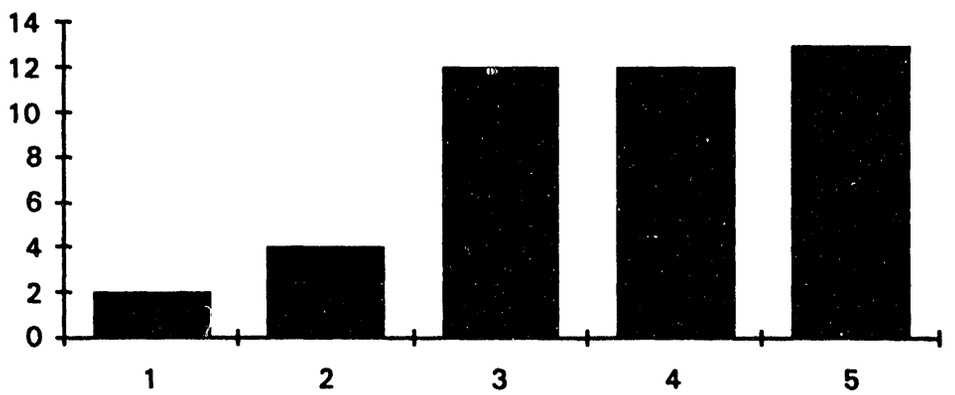
To the extent that the Games explored the importance of using a long-term (10-20 year) horizon when thinking about and crafting policy, the players' assessment was 4.02 ± 0.95 -- a very positive evaluation.

Extent to which Games explore long term



To the extent that the Games laid the foundation for making a road map with the Digital Consumer Electronics Industry, player assessments scored 3.70 ± 1.145 -- a positive endorsement.

Extent to which Games can initiate roadmaps



The last of the listed purposes of the game, providing informed input to individuals crafting possible legislation, would have to be assessed following a real game and could not be assessed in the prototype.

In addition, the quality metrics showed that the general format of the game was good (3.32 ± 0.99), but only two votes in the highest category indicated improvements are needed. The metrics on the Players' Handbook (2.87 ± 1.25), the introductory briefing (3.30 ± 0.95), and the wrap-up briefing (3.55 ± 0.85) indicated additional areas for improvement.

LESSONS LEARNED

In response to this evaluation, the Goals and related Metrics will be communicated more clearly in the Handbook and the General Inbriefing (saving time in the breakout groups). A Team Inbriefing will be added to the first break-out period to clarify tasks and processes. More time will be allocated for the work sessions, and the number of cycles will be reduced from 4 to 3 to compensate. Attempts will be made to increase the interactions among all the teams. The Player's Handbook will be revised with more extensive industry input and focused more tightly on the Digital Consumer Electronics part of consumer electronics. Handbooks for the facilitators and recorders will be created to assure uniformity of processes. The General Inbriefing will be consolidated. The Green Team tools for evaluation will be streamlined and the Green Team practice session will be extended to allow more feedback. Finally, the real game and additional

prototyping will include representatives from all four groups--industry, government, university/expert community, and laboratories--to improve the fidelity of the game.

We believe that the prototyping game was very stimulating and beneficial. What we learned here will help ensure that future games are even more successful.

ACKNOWLEDGMENTS

The EIA prototyping required a wide range of expertise. Of 28 support staff, 17 were from Sandia National Laboratories, 4 from the US Naval War College, 3 from Lawrence Livermore, 1 from Los Alamos, 1 from De La Porte Associates, and 3 National Laboratories special consultants. The EIA supplied 54 players representing a large number of US- and foreign-owned companies and EIA staff. All players and staff committed themselves to the success of this game, and their efforts are greatly appreciated.

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APPENDIX A

List of participants, facilitators, recorders, analysts and directors for the Prosperity Games Prototype with the Electronic Industries Association held on January 20-21, 1994 in Palm Springs, California

Team	Role	Name	Company	Position
Blue I	Industry	Guy W. Numann	Harris Corporation	President, Communications Sector
Blue I	Industry	Leigh S. Belden	Verilink Corporation	President and CEO
Blue I	Industry	Blair K. Haas	Bud Industries	Sr. VP, Pres. of Bud East, Inc.
Blue I	Government	Kevin C. Richardson	EIA	VP Government Relations
Blue I	Government	Laramie F. McNamara	TRW	Director, Federal Relations
Blue I	Lab Director	Dan A. Peterson	Martin Marietta Corp.	Sr. VP, Washington Operations.
Blue I	University/Expert	Dr. T. A. Straeter/Ms.Dong	GDE Systems, Inc.	President and CEO
Blue I	Facilitator	Don Schroeder	Sandia National Laboratories	Program Manager
Blue I	Analyst	Charryl Berger	Los Alamos National Laboratory	Prog. Mgr./ Advanced Manufacturing
Blue I	Recorder	Alex Ryburn	Sandia National Laboratories	Staff Secretary / Admin. Asst.
Team	**Role**	**Name**	**Company**	**Position**
Blue II	Industry	Ronald H. Barnhart	Honeywell, Inc.	VP Business Development
Blue II	Industry	Harold A. Ketchum	Thomas Electronics, Inc.	President and CEO
Blue II	Industry	Samuel K. Scovil	Eaton Corp.	VP, Commercial & Military Controls
Blue II	Government	Joseph H. Garrett, Jr.	Rockwell International Corp.	VP, Elect., Gov't Affairs, & Market.

Blue II	Government	Gary J. Shapiro	EIA	Group VP, Consumer Electronics
Blue II	Lab Director	Dr. James Soos	Cincinnati Electronics Corp.	Chairman, President, and CEO
Blue II	University/Expert	John R. Lauritzen, Jr.	AT&T	VP Strategic Support
Blue II	Facilitator	David Williams	Sandia National Laboratories	Dept. Mgr./ Program Development
Blue II	Analyst	David Strip	Sandia National Laboratories	Dept. Mgr./Intel. Sys. Princ. Dept.
Blue II	Recorder	Ray Heath	Sandia National Laboratories	Senior Member of Technical Staff
Team	**Role**	**Name**	**Company**	**Position**
Blue III	Industry	Peter F. McCloskey	EIA	President
Blue III	Industry	Matthew J. Flanigan	Cognitronics Corp.	President and CEO
Blue III	Industry	Bruce Carswell	GTE Corp.	Senior VP, Human Resources
Blue III	Government	Patrick VonBargen	Senator Bingaman	Chief of Staff
Blue III	Government	Arnie Rosenblum	Cole-Flex Corp.	President
Blue III	Government	Donald (Don) E. Dangott	Eaton Corp.	Director, Business Development
Blue III	Lab Director	John Major	Motorola	Sr. VP/Mgr, Spectr, Stand., & Soft.
Blue III	University/Expert	Allen R. (Mike) Frischkorn, Jr.	Telecommunications Indust. Assoc.	President
Blue III	Facilitator	Jim Jorgenson	Sandia National Laboratories	Dept. Mgr./Info. Components Mfg.
Blue III	Analyst	Gordon Longerbeam	Lawrence Livermore National Lab.	Asst. to Lab. Associate Director
Blue III	Observer	Dick Prairie	Sandia National Laboratories	Dept. Mgr./Quality Stats. & Rel.
Blue III	Recorder	Betty Fleming	Sandia National Laboratories	Administrative Assistant

Team	Role	Name	Company	Position
Blue IV	Industry	John (Jack) P. Driscoll	Murata Erie North America, Inc.	Senior VP, Marketing and Sales
Blue IV	Industry	Jack Chmura	Aerovox, Inc.	VP, Sales and Marketing
Blue IV	Industry	Anthony E. Scandora	Olympic Controls Corp.	President and CEO
Blue IV	Government	John J. Kelly	EIA	VP, Sec. and Gen. Counsel (antitrust)
Blue IV	Government	Ken McAllister	General Cable Company	Group VP, Electronic Div.s
Blue IV	Government	Martin J. Kiousis	M-Tron Industries, Inc.	Chairman & CEO
Blue IV	Lab Director	John H. Davis	AT&T	VP, Network Development
Blue IV	Facilitator	David Larson	De La Porte Associates	Consultant
Blue IV	Analyst	Jim Gover	Sandia National Laboratories	Government Relations Staff Member
Blue IV	Recorder	Connie Nenninger	Sandia National Laboratories	Secretary/Conf. Coordinator
Team	**Role**	**Name**	**Company**	**Position**
Purple	Industry	Jerry Kalov	Cobra Electronics Corp.	President and CEO
Purple	Industry	John J. McDonald	Casio, Inc.	President
Purple	Industry	Thomas B. Patton	Philips Elect. N. America Corp.	VP/Government Relations
Purple	Government	Ron Stone	Pioneer Electronics (USA) Inc.	Exec. Vice President
Purple	Government	Francis (Frank) J. Myers	Wells-Gardner Electronics Corp.	Chairman and CEO
Purple	Government	Mark V. Rosenker	EIA	VP, Public Affairs
Purple	Lab Director	James D. Bell	Thomson-CSF	Chairman and President
Purple	University/Expert	James R. Kaplan	Cornell Dubilier Electronics	Pres. and CEO
Purple	Facilitator	Georgianne Smith	Sandia National Laboratories	Member of the Laboratory Staff

Purple	Analyst	Marshall Berman	Sandia National Laboratories	Dept. Mgr./Innov. Tech. Applic.
Purple	Recorder	Marylee Adams	Sandia National Laboratories	Staff Secretary
Team	**Role**	**Name**	**Company**	**Position**
Green	Team Leader	Ron Lehman	Livermore National Laboratory	Assistant to the Director
Green	Co Team Leader	Al Bottoms	SNL/Consultant	Game Consultant
Green	Industry	Joseph L. Maher, Jr.	AMP, Inc.	VP
Green	Industry	O. E. (Gene) Lussier, Jr.	EIA	Group VP, Components
Green	Industry	Benedict P. Rosen	AVX Corp.	Exec. VP, US & Far East Oper's
Green	Industry	Pat Welker	Telecommunications Industry Assoc.	Chairman
Green	Industry	Lester Rice	KOA Speer Electronics	Exec. VP and Director
Green	Government	John P. Stenbit	TRW/Systems Integration Group	President and General Manager
Green	Government	William G. Little	Quam-Nichols Company, Inc.	President
Green	Government	Lowell B. Thomas	GTE	Director, Gov't Plans & Programs
Green	Government	Clifford H. Tuttle	Aerovox Inc.	Chairman, President, CEO
Green	Government	Dan Heinemeier	EIA	VP Government Division
Green	Lab Director	Alan Bennett	Livermore National Laboratory	Director of Program Development
Green	University/Expert	Eduardo "Lalo" Tagliapietra	Cornell Dubilier Electronics, Inc.	General Manager
Green	University/Expert	Adam Russell	Russell Industries	President
Green	Facilitator	Michael Oppenheimer	Naval War College	Gaming Consultant
Green	Analyst	Ken McGruther	Naval War College	Gaming Consultant
Green	Recorder	Theresa Apodaca	Sandia National Laboratories	Administrative Assistant

Team	Role	Name	Company	Position
Control	Game Director	Pace VanDevender	Sandia National Laboratories	Director, Nat'l Industrial Alliances
Control	Asst. Game Director	Jack Doyle	Naval War College	Advanced Technology Assistant
Control	Scenario Director	Bob Post	SNL/Consultant	Game Consultant
Control	Innovator Mgr.	Bill Moye	De La Porte Associates	Senior Consultant
Control	Innovator Tech.	Adrian Gurule	Sandia National Laboratories	Member of the Technical Staff
Control	Analyst	Jake Luhan	Naval War College	Game Consultant

APPENDIX B

Action Memoranda, analysis, outcomes, and counter strategies for the Blue and Purple Teams.

Blue Team I -- Memorandum to the President

As requested, we are providing the assumptions, options, recommendations, and projected outcomes from our deliberations on how to increase the competitiveness of the US industrial base, with a focus on digital consumer electronics.

Assumptions:

- Software will be the biggest factor in Digital Consumer Electronics success.
- Problems due to trade barriers and other international issues will not change much.
- There will be worldwide excess manufacturing capacity.
- Demand from non-industrialized nations will grow more rapidly than that from industrialized nations.
- US global competitiveness will continue to improve and the US will gain a larger share of global markets.
- Foreign governments will continue to act with self-serving interests.
- This administration faces pressures that are unfavorable to business which will result in rising business costs.
- Both government and industry recognize that TQM (continuous process improvement) is critical to future US competitiveness.

Options:

- Provide tax relief and support for R&D, capital investment, exports, and job creation.
- Provide significant export control reform.
- The government should become a significant business advocate and partner to assist in penetrating foreign markets.
- Accelerate computer literacy through education.
- US education at all levels must be globally oriented and culturally diverse.
- Software market development must be globally focused and culturally sensitive.
- Remove impediments to US-educated foreign nationals remaining in US if they so desire.

- Prioritize government, laboratory, and university research toward software development.
- Non-defense R&D in government labs should be focused on basic research.
- Labs and universities should focus on software education, training, and tech transfer.

Recommendation(s):

To maintain or regain a global market lead, the Consumer Electronics Industry believes the government should become a significant business advocate and partner. The committee recommends that:

- The government provide targeted tax relief and support for R&D, capital investment, exports, and job creation.
- The government take a lead role in penetrating foreign markets as an ambassador and through policy revisions including significant export control reform.
- Industry, working with government, develop and maintain US software capability to be globally "best in class" through education/training, basic research, globalization of view, and retention of US trained individuals.

Blue Team III Assessment of Blue Team I Strategy

Blue Team III acted as the President in deciding on the strategy recommended by Blue Team I and generally accepted the recommendations. The President added specifics and modified the emphasis of the government role with respect to trade and tax policy.

The Blue Team I proposal had not considered cost. The action emphasized the importance of budget neutrality--zero net cost.

The action endorsed the Blue Team I approach for a government role in stimulating the development and use of interactive learning media.

Blue Team I -- Analyst's Report

Industry and government are currently adversaries; they should partner to set a stage for US industry global competitiveness.

- Current US foreign trade policy negatively impacts US global competitiveness.
- There exists few incentives to US industry for investments in R&D, equipment, or other capital investments.

Government should play more of a facilitator role in supporting technology advancement.

- Labs should not develop technology; limit the role of labs to basic research.
- Encourage federal programs where industry R&D is federally supported, e.g., ATP.
- Labs have the wrong incentives to successfully engage in technology development for industry.

A continuing role for the Federal Laboratories in support of industry needs to be examined.

- Limit Federal Labs to basic research efforts (pre-competitive).
- Limit Labs to defense R&D.
- Labs should in no way be involved in production issues.

Education is key to maintaining DCE global competitiveness.

- US needs formalized training for software designers.
- US needs to keep US trained foreign nationals in US.
- Long term market share is tied to education.
- Need to educate consumers at an early age.

Issues are global, businesses are output oriented, and there are increasing pressures on cost.

Blue Team II -- Memorandum to the President

As requested, we are providing the assumptions, options, recommendations, and projected outcomes from our deliberations on how to increase the competitiveness of the US industrial base, with a focus on digital consumer electronics.

Assumptions:

We believe there is a compelling need for a national technology policy which explicitly addresses the following issues:

- The discretionary nature of consumer electronics stresses industry productivity, quality, and competitiveness.
- Innovation in product, manufacturing methods, and the preparation of the industry workforce.
- The desirability of US control of world market share and the magnitude of on-shore US manufacturing .

Options:

We categorize policy options considered into four categories: tax reform, legislative actions exclusive of taxation, foreign policy, and executive actions. The options explored were:

- Taxation:
  - Investment tax credits
  - Tax treatment of corporate dividends
  - Long term capital gains treatment
  - Tax credits for R&D

- Legislation excluding taxation:
  - New vehicles to stimulate the spread of technology information while protecting intellectual property
  - Fair Trade practices
  - Anti-trust reform to facilitate formation of alliances
  - Trade Secret Laws
  - Stimulation of education and career development in technical and manufacturing fields
  - Elimination of minimum wage, social security, anti-discrimination laws, and other similar barriers to hiring

- Executive actions:
  - Increase government role in international standards setting activities
  - Increase government role in translation and dissemination of foreign papers in technology development

- Foreign Policy
  - Redirect federal R&D money into the purchase of technology rich foreign manufacturing industries
  - Annex the three mile strip of Mexico along US border

Recommendations:

To place *technology implementation* among the nation's highest priorities, to remove legal impediments to US manufacturing competitiveness, and to cause a significant enhancement of our educational capabilities, we recommend you propose a comprehensive *American Competitiveness Act* which includes:

- Taxation:
  - Repeal long-term capital gains taxes
  - Eliminate the double taxation of corporate dividends by excluding income paid out as dividends from corporate taxation
  - Provide tax credits for investments in plant and infrastructure
  - Provide tax credits for R&D, including industry-funded R&D carried out by universities

- Legislative Reforms:
  - Repeal fair trade practices legislation
  - Implement national trade secrets laws modeled on the New Jersey trade secrets laws.
  - Allocate funds for education and career development in technology and manufacturing fields
  - Modify anti-trust law to facilitate the formation of industry alliances.
  - Convert closed military bases to CCC-type education/work facilities

- Executive Act:
  - Significantly increase executive participation in international standards setting activities

Outcomes:

The first five years of this program will cost approximately $5 billion per year in additional government expenditures. The increased tax revenues and jobs over the 20 year horizon of this committee will more than offset these expenditures, making this proposal cost neutral at worst.

In addition, benefits to industry will be to:

- reduce the cost of capital
- increase productivity
- increase the quality of the workforce
- expand our technological base

Blue Team II Evaluation of Outcomes:

Cost

Implementing the recommendations will cost $5.0B per year for the first five years. However, the recommended tax and legislative reforms are expected to dramatically increase tax revenues so that at worst this proposal is cost neutral.

	Years until impact	Strength of effect
Consumer Electronics Domestic Factory Sales	**2.4**	**4.4**
Fractional Value Added Domestic Composition	**2.4**	**4.4**
Gross Domestic Product per Capita if same approach were applied everywhere in nation's industrial base	**2.7**	**4.3**
Manufacturing Productivity ($ factory sales per production worker) if same approach were applied everywhere in nation's industrial base	**3.0**	**4.6**

Blue Team III -- Memorandum to the President

As requested, we are providing the assumptions, options, recommendations, and projected outcomes from our deliberations on how to increase the competitiveness of the US industrial base, with a focus on digital consumer electronics.

Goal:

US industry is a world leader in digital consumer electronics, capturing a dominant share of the global market.

Assumptions:

Digital Consumer Electronics is a fast growth global market, and economic driver in other sectors, both public and private.

Global competition for the Digital Consumer Electronics market is extremely strong, and getting stronger.

Options:

1. Government tax policy should assist the Digital Consumer Electronics Industry by: making the R&D tax credit total and permanent; eliminating the capital gains tax; providing tax incentives on savings and investment; and eliminating double taxation on dividends.

2. Strengthen US trade environment by: stronger global intellectual property protection; enforcement of fair trade laws; and elimination of tariff and non-tariff barriers.

3. Make US R&D more market relevant by: significant reduction in federally funded R&D; make federal R&D complementary to industry funded R&D; strengthen R&D tax credits.

Recommendations: (in priority order)

1. Aggressively enforce international and US trade policy and laws regarding intellectual property rights, trade barriers and high tariffs.

2. Reduce taxation on risk capital in a budget neutral fashion.

3. Reduce federal R&D while providing incentives for private sector R&D, so the total remains constant.

4. Eliminate domestic barriers to establishment and growth of a national information infrastructure.

Evaluation of Outcomes:

Implementing the above recommendations will cost $0.0 per year (budget neutral).

	Years until impact	Strength of effect
Consumer Electronics Domestic Factory Sales	**2.38**	**4.50**
Fractional Value Added Domestic Composition	**2.63**	**4.13**
Gross Domestic Product per Capita if same approach were applied everywhere in nation's industrial base	**2.38**	**4.60**
Manufacturing Productivity ($ factory sales per production worker) if same approach were applied everywhere in nation's industrial base	**2.50**	**4.25**

Analysis of Blue Team III Recommendation by Blue Team I

Criticisms:

1. Status Quo
2. No urgency.
3. Doesn't address major issues.

Changes:

1. Recognizing that US is in economic war, we must make major US policy changes to enhance the business environment in the United States.

2. We must reassess and redirect all resources available from less productive activities to advancement of Consumer Digital Electronics. For example, incentive for capital investment, training and education, use of laboratory and university assets, retention of US trained individuals, and focus on software.

3. Bring all resources of Office of President to bear on this problem including implementation of the above recommendations through the removal of regulatory and statutory barriers to give the US a strategic advantage.

Purple Team Counter Strategies Against Blue Team III

The primary response was derision. The Purple Team felt that the Blue Team III strategy was generally so poorly formulated that it could only help the Purple businesses. They thought that the Blue Team recommendations confirmed the earlier wisdom of the Purple Team Memorandum. Their responses to the four Blue Team recommendations follow:

Enforce US and international trade policy on property rights, trade barriers and high tariffs.

Key themes involved disinformation and the "appearance" of compliance without sacrificing or changing any of the original Purple Team strategies.

- Some imports into foreign (Purple) ports would be allowed but:
  - Limit them to low technology items ("crumbs" or rice).
  - Allow imports only through specified ports; tie them down with administrative procedures.
  - Avoid direct opposition or saber rattling; use negotiations to delay, stonewall; talk, smile or nod.
  - Agree to protect intellectual property rights, but alter foreign laws such that slight variations are permissible, but appear to comply with international laws.
  - Capitalize on US naiveté in market access; seek product niches.
- Gain access to U. S. technology by:
  - Expanding industrial espionage network.
  - Encouraging more technical symposia; target symposia towards U. S. areas of interest.
  - Increasing the number of students at U. S. technical schools.

Reduce taxation on risk capital in a budget neutral fashion.

Primary strategy is to maintain high level of U. S. taxation on business. Earlier strategies were confirmed; e.g., keep US spending high on all projects not related to capital formation, such as defense, military bases, social programs -- use lobbyists and PR firms. In addition, promoting disinformation was suggested:

- Keep publicizing the "weaknesses" of Japan, Germany, etc. to make US population feel good. Maintain U. S. perception of foreign economic weakness.

Reduce federal R&D while incentivizing private sector R&D, with constant total R&D.

Lowering Federal R&D or even transferring R&D to the private sector was considered "crazy." Strategy was either to support reduction in US R&D and/or garner a share for Purple Team businesses. Another strategy was to redirect R&D toward social programs. Disinformation could also be used to give the impression that Purple governments were reducing their R&D, when, in fact, it was being increased.

Eliminate domestic barriers to a national information infrastructure.

- Use lobbyists to invoke fear against specific competitive markets (e.g., software, cable); encourage internecine battles; raise specter of trusts.
- Acquire or invest in businesses as required.
- Target and try to control key technologies.
- Fight to keep barriers intact.

Blue Team IV -- Memorandum to the President

As requested, we are providing the assumptions, options, recommendations, and projected outcomes from our deliberations on how to increase the competitiveness of the US industrial base, with a focus on digital consumer electronics.

Assumptions:

- Time to market and product life cycles will continue to shorten.
- Cost of labor and capital are higher in US than offshore and government is not taking appropriate steps to ameliorate.
- Productivity will continue to increase at our country and competitors over the next 5 years.
- US is better at reacting vs. proacting in manufacturing and service.
- Less than 30% of technical skills are applicable to consumer electronics industry.
- We have a viable semi-conductor capability (hanging on).
- We are in a relatively weak competitive position and will remain for 5 years.
- There is no committed investment to help focus on long-term strategy.
- All interested parties are willing to look at a new way of doing business.

Goals:

- Develop a panel to determine how the Japanese were able to establish world-wide dominance in consumer electronics market at the expense of the US
- Leverage today's strengths while supporting international capitalism and open commerce.
- Generate jobs within the U. S.
- Maximize U. S. owned company profitability.
- Revise corporate tax structure to incentivize growth.
- Maintain a base of core technology in U. S. owned companies for national security.

Options:

- Accelerate depreciation schedule to 5 years.
- Use successful parts of HDTV model for consumer products mutual standards to support US industry and encourage government and private sector cooperation.
- Allow more partnerships i.e. industry-to-industry cooperation, ease the regulations to support joint partnerships (manufacturing, cross-technology, marketing and sales.)
- Re-engineer the national labs to focus on commercial R & D, free cash would be invested elsewhere i.e. investment tax credit.
- Poll knowledgeable industry groups for information and develop a competitive attack in reasonable time frame.
- Ease government legislation to allow for dialogue among competitors and government Federal Advisory Committee Act. (ease restrictions)
- Develop a technology road map for consumer products.
- Develop a technology road map for materials and parts designed into equipment.
- Encourage government to develop investment tax credits to support plant/equipment investment to provide reasonable opportunity for profitability.
- Acquire capability to develop display technology.
- Stimulate the capability for taking innovation to market place.
- Define and develop appropriate standards that preferentially advantage the U. S. (initially).

Recommendations(s):

- Incentivize and empower a select panel to develop a leap-frog digital electronic technology road map for consumer products and determine how to invest money freed up from re-engineered laboratories and federal technology investment programs. This panel should operate in a cooperative mode.
- The panel is charged with defining the investment requirements (regulatory and incentive programs for developing the map. Emphasis is placed on education, the level of government involvement and defining the competitive situation worldwide.

- In addition, they are charged with developing the process to be used for re-engineering laboratories and federal technology investment programs. Specific requirements are to develop a 20 year strategic plan with a rolling 5 year implementation in the following areas.

    - Jobs
    - Projected market share
    - Profitability
    - Required educational and technology expertise

Benefits:

- Re-establish our position as a world-wide player in the manufacturing and sales of consumer electronics products.

- Provide a focus for future educational curriculums.

- An improved understanding and awareness of the interactions between government and industry.

- Improved financial well being of industries and an increased tax base.

- Maintain the core technologies required for national security.

- Establish "Made in USA" as a brand recognition fact.

- Establish the United States as the world-wide standard for Quality in consumer electronics.

Costs:

- Initial estimates:

  $3 million in the first six months.

  Over the 20-year plan, cost neutral or cost negative.

Blue Team IV -- Analyst's Report

US economic development and assurance of national security demand that the US have a competitive consumer electronics industry. For that to occur the US must create a blue ribbon, national panel and task it to develop a holistic national strategy for consumer electronics that fully utilizes the relevant capabilities of industry, government, government-owned laboratories, and universities and preferentially advantages the US as a site for consumer electronics manufacturing firms. This strategic plan must include three primary thrusts: (1)development of a strategy for assuring that US consumer electronics technology leap frogs that of foreign competitors within 5 years, (2)government regulations that inhibit and delay siting consumer electronic manufacturing facilities in the US must be reformed to encourage private sector investment in plant and equipment, and (3) US government-owned laboratories must be re-engineered to provide the funding necessary to support execution of this national strategy and identify those capable of contributing to the development of leap-frog technology. This panel must develop strategies that lead to the following four outcomes: maximizing job growth in the US, maximizing market share for US owned companies, maximizing profits for US owned companies, and maximizing sales for US owned companies, and enhance the existing tax base. This panel shall complete these tasks in 6 months and spend no more than $3M in doing this work. This strategic plan must include strategies that ensure survival of existing US firms for the short term (1 year) as well as a plan that will assure catching-up in 5 years(35% of global market) and dominating consumer electronics markets in 20 years (65% of global market).

Task I: Technology Strategy

The panel shall develop technology road maps for consumer electronics and the materials and components that are essential to competing in consumer electronics. The technological strengths of the US must be fully utilized in these road maps to provide competitive advantage to US firms, for example, consumer electronics products must become software intensive, take greater advantage of the inventive capabilities of Americans by strengthening intellectual property laws, maximize US semiconductors strengths in ASICs and microprocessors, etc. These road maps must include learning how other nations, especially Japan, were so successful in catching-up with the US in consumer electronics. This technology strategy must include developing a strategy for US owned corporations being competitive in all of the major component areas that are critical to the consumer electronics business including DRAMs and flat panel display;

Task II: Regulatory Reform Strategy

State, local, and federal government regulatory practices must be reformed so that no other nation is a more attractive site for the location of manufacturing facilities than the US Industry will locate facilities in the US only if it is comparatively advantageous. Regulatory practices that must be adjusted to favor locating consumer electronics manufacturing facilities in the US include fiscal and monetary policies that reduce the cost of debt and equity capital; intellectual property protection must be strengthened to favor US industry; education and training policies must result in a highly trained and adaptable work force that is second to that of no other nation; tax

incentives must be offered to consumer electronics corporations, e.g.., accelerated depreciation schedules for plant and equipment; the federal government must coordinate the selection of technical and product standards for the National Information Infrastructure that preferentially advantages US corporations; anti-trust laws must be relaxed to promote partnering, particularly, joint ownership of manufacturing facilities; the execution of regulatory processes must be streamlined to be compatible with the shrinking product cycles of consumer electronics;

Task III: Re-engineering of Government-owned Laboratories

With the end of the Cold War and the reduction of defense budgets the issue of how many governments laboratories the US needs and how large each should be must be reopened. This task of reevaluating these needs should be pursued as a re-engineering activity. The goals of this activity are to identify reductions in federal R&D expenditures that can be redirected to funding a national initiative in consumer electronics and identify those **government-owned laboratories** that are receptive to industrial leadership and have the discipline to conform to industrial road maps. These laboratories can contribute to the development of consumer electronics by developing leap-frog technologies in DRAMS and flat panels and support US consumer electronics companies in the development of incremental improvements to products and processes. The panel shall propose a process for this re-engineering activity.

Purple Team -- Memorandum to the European and Asian Consortium

As requested, we are providing the assumptions, options, recommendations, and projected outcomes from our deliberations on how to increase the competitiveness of the US industrial base, with focus on digital consumer electronics.

Assumptions:

- Maximize world market share (as close to 100% as possible)
- Want to sell in US market
- Increasing profit
- Focus is on Japan, France, and the Netherlands
- (US could make comebacks in selected industries: autos, information superhighway)

Strategic Goals:

- Maximize market share
- Operate as close to a monopoly as possible
- Maximize profitability

- **Options:**
  - Government, industry, countries, etc., all act together as unified team. Role of government is to create environment that allows our countries to prosper; i.e., change tax policy to help business
  - Encourage US to be defender of the world
  - Encourage no changes in US policy; continue federal mandates
  - Create program that forces non-productive domestic investment
  - Produce in US if it makes good economic sense
  - How will foreign companies counter US moves?
    - consider opening non-US markets
    - highest quality possible
    - lowest possible price

- foreign governments: leave banks and credit alone; increase credit; use environmental laws to benefit us (foreign companies)

- Encourage foreign governments to work with US government to act as facilitators, but take strong positions when necessary; e.g., less protectionism, lower barriers

- Capitalize on US strengths; e.g., hire defense talent

- Role of government is to create an environment (rules and regulations) to encourage our companies and discourage theirs; allow our countries to prosper

- Form alliance with Pacific Rim and Europe

- Provide jobs within the consortium

Recommendations:

- Encourage US to make no regulatory changes in:
  - tax policy
  - antitrust laws
  - environmental issues
  - maintain Glass-Stiegal prohibitions on bank equity in corporations

- Encourage more US government involvement in:
  - health care
  - regulatory laws

- Increase US government defense spending

- Increase foreign bases

- Partner with US in any areas where we are weak in technology; exploit US strengths

- Hire US talent

- Force US to follow our standards; e.g., electrical

- Overvalue/encourage strong US dollar

- Encourage US federal and state government to subsidize foreign owned businesses in US

- Form alliances with other countries.
- Encourage foreign (home) governments to expand their pro-business positions with lower taxes, easier credit, increased R&D support.
- If necessary, make it look like we are producing more in the US to meet possible import restrictions, but keep quality jobs in the home countries.
- Compete by seeking higher quality, lower prices, supportive environmental laws.
- Resist pressures for foreign countries to participate more in their own defense.
- Capitalize on available US defense talents; hire engineers and scientists with appropriate talent.
- Encourage a strong US dollar with appropriate intervention by banks and governments.

Cautions:

- US has shown ability make surprising comebacks; e.g., in autos.
- Defense conversion may enhance US competitiveness.
- Stay abreast of advancing technologies to keep US from grabbing the lead.

Possible Flaws and Omissions:

- Competition from China, Southeast Asia, Germany and Eastern Europe was not considered in any depth. (South America was considered as a supplier and a potential market.)
- Foreign government players were unconcerned by industry's desire to develop monopolies.
- Encouragement of US acceptance of international standards may actually backfire by making US exports more competitive.

Notes:

- The team had a very negative opinion of the worksheet on outcomes. Their first concern was a lack of understanding in the success criteria. This was followed by a statement of inability to answer the subjective questions. However, they reluctantly provided their opinions.
- The five separate memorandum categories led to significant repetition. Three would be sufficient: Assumptions; Recommendations; and Projected 5-Year Outcomes.

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