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PATH GAMES—A DECISION-MAKING TOOL

**B. P. Finn, et al.
Harold Rosenbaum Associates, Inc.
111 South Bedford Street, Suite 101
Burlington, MA 01803**

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PATH Gaming is a new research tool which allows one to investigate the possible paths connecting the present day strategic environment with a preferred one in the future. This analysis is conducted within the planning process. This tool helps decision-makers better understand the complex interrelationships among the critical variables which affect the long-term consequences of current decisions. This report is intended to aid the potential users of path gaming in determining whether this tool is appropriate for their specific application and then in determining the gaming format best suited for their needs. Four path gaming formats are described: mini-games, one-day games, multi-day games, and extended games. A series of guide-lines are offered to help choose a gaming format.				
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Purpose

This briefing will address two questions:

1. Is path gaming an appropriate tool for a given application?
2. What is the optimal gaming format to use?

CHART 1
PURPOSE

The main purpose of this briefing is to aid the potential users of path gaming in first determining whether or not this tool would be useful for addressing their particular problem, and second to guide them in picking the specific gaming format that best suits their needs.

Overview

- General Issue of Gaming
 - Research tool
 - Decision-making aide
- Path Gaming
- Formats Used in Path Gaming
 - Mini-game
 - One-day game
 - Multi-day game
 - Extended game
- Method of Selecting Format

CHART 2 OVERVIEW

This briefing will first discuss some general issues associated with gaming, both as a research tool and decision-making aide. Second, it will define and describe a special form of gaming: Path Games, which are especially useful in long range planning. Third, it will discuss four formats used in path gaming: Mini-games (which is an abbreviated form and can be played in about 4 hours), One-day games (which are more formal games and require a full day to play), Multi-day games (which are useful for more involved issues), and finally extended games (where the game is played over an extended period of time and each move is separated by one or more weeks). Finally, some general guidelines on selecting the most appropriate format will be offered.

Example of Gaming Problem

NATO Conventional Force Modernization

Consider Impact of:

- US–Soviet Relations
- Arms Control
 - Strategic
 - Conventional
- Domestic Politics
 - US
 - Europe
- Trade Relations and Economics
- NATO Strategy

CHART 3
EXAMPLE OF GAMING PROBLEM

In order to illustrate the utility of gaming in general and path gaming in particular, an example will be used throughout this briefing. The problem is the modernization of NATO's conventional forces. The impact of the following variables is to be assessed: the state of US-Soviet relations, arms control (both the direct impact of agreements on conventional arms in Europe and the indirect effect of a possible START agreement calling for deep reductions in strategic arsenals), domestic politics in both America and Europe (especially the ability to achieve and maintain the political consensus needed to support the expense of conventional forces), US-Europe trade relations and domestic economics, and finally the effect of conventional force modernization and arms control on NATO's strategies of flexible response and forward defense.

Gaming as Tool to Address Example

Gaming Can:

- Pool collective expertise of
 - Government analysts
 - Academics
 - Consultants
- Consider intangible problems:
 - Political dynamics of NATO
 - Impact of domestic politics
 - Differing perceptions of Soviet threat (e.g., Gorbachev's "new thinking")
 - Inter-service rivalries
- Combine widely disparate factors
 - Military
 - Political
 - Economic

CHART 4
GAMING AS A TOOL TO ADDRESS EXAMPLE

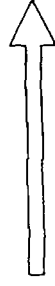
Since a wide array of different variables impact the ability of the Western alliance to enact a major modernization program, the tool needed to analyze this problem must be able to handle this kind of issue. Gaming is such a tool.

Gaming can be used to pool the collective expertise of many different analysts. It can consider intangible problems which are not amenable to quantitative analysis. The essence of gaming is the dynamic interaction of the players and teams. Many of the problems associated with the alliance center around the political interplay of the main members of the alliance. Gaming can explicitly consider the politics (both the competition and cooperation) of NATO. Few other research tools can highlight this aspect of the problem as effectively. Finally, gaming can combine together many different kinds of variables as military, political, and economic.

Alternative Research Tools Are Inadequate

1. Systems Analysis

Overly Quantitative



Problems Are Political

2. Strategic Analysis

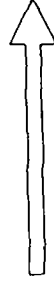
Overly "rational"



Alliance Dynamics Have
Different Logic

3. Historical Analysis

Limited Relevance



Modern Strategic
Environment Changing

CHART 5
ALTERNATIVES RESEARCH TOOLS ARE INADEQUATE

Consider some other methods to address this problem:

Systems analysis is overly quantitative. While it might be useful for some aspects of the problem (e.g., assessing the impact of changes in force structures on the overall balance between NATO and the Warsaw Pact), it misses the key part of the problem: Alliance politics. The problem is much more than simply identifying the most cost-effective means of overcoming the Soviet advantage in tanks.

Strategic analysis, which takes a broader perspective by considering NATO's military requirements and strategies, implicitly assumes that the decision-making process in the alliance (and within each of its member countries) is "rational." However, this is clearly not the case. Public opinion -- to which all Western leaders must react -- gives Western politics a different dynamics.

Finally, historical analysis can provide some interesting insights by highlighting the similarities with previous attempts to modernize NATO's forces. But the strategic environment of the 1980s and 1990s is dramatically different than at any previous time in the post-war era.

Definition of Games

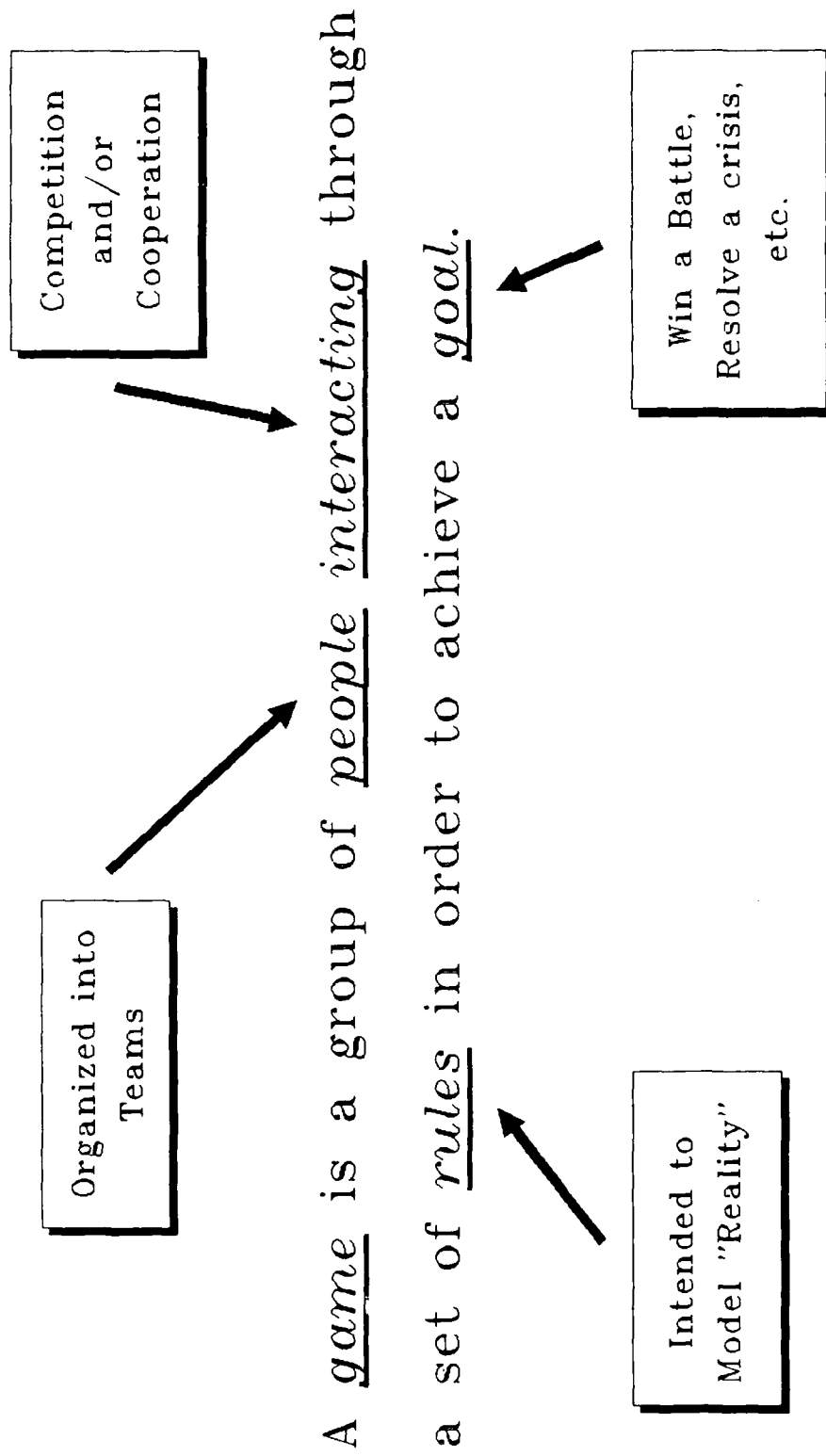


CHART 6
DEFINITION OF GAMES

Before proceeding, it is worthwhile to provide a formal definition of a game: A game is a group of people interacting through a set of rules in order to achieve a goal. The players may be organized into teams which represent real world organizations or groups. The interaction need not be only competition, it can also be cooperation. The rules are designed to help the game simulate the key aspects of the real world. And the goal can vary from winning a battle (war game), resolving an international crisis (crisis games), to studying the strategic decisions which must be made in order to implement a policy goal (path gaming).

Gaming is Useful Tool If:

1. Competition is key aspect of problem
2. Parameters of problem are ill-defined
3. Purpose is to educate officials in an issue

CHART 7
GAMING IS USEFUL TOOL

As the example of NATO's conventional modernization indicated, gaming is a useful tool -- and thus a tool that a decision-maker should seriously consider employing -- if:

A key aspect of the problem involves the political interaction of groups or institutions or countries. In other words if competition among the key actors plays an important role.

The parameters defining the problem are ill-defined or poorly understood -- or many widely disparate variables impact the solution in ways that are difficult to predict.

An important part of the problem is simply making many key officials more aware of the various aspects of the problem, or exposing them to different opinions, perspectives, approaches to the problem, or points of view.

Path Gaming

Purpose:

To investigate the long range implications of present day decisions.

Method:

"Compress" time by simulating decision-making process in a game

Force players to confront implications of decisions from previous moves.

Games cover 5 to 20 years over several hours or days.

CHART 8
PATH GAMING

The main purpose of path games is to use a free-form game style to investigate the long term implications of decisions made today. Because the time scale is decades (the impact of strategic decisions may not be felt immediately), a method must be found to make the players address the future impact of their decisions. This is done by "compressing time." The first move takes place in today's strategic environment. The subsequent moves occur at various points in the future: one year or 5 years.

"Paths" are series of decisions which must be made in order to change the current strategic environment into a preferred one at a point in the future. The purpose of path gaming is to examine these sets of decisions.

Main Purposes of Path Games

- Issue Identification

- Education

- Policy Recommendation



Greater Impact
On Decision-Making
Process
Than Alternatives

CHART 9
MAIN PURPOSE OF PATH GAMES

Path games can be used for three main purposes:

Identifying all of the issues associated with a given problem (frequently simply making people aware of a previously unrecognized feature of a policy problem is worthwhile).

Education of officials (which can include education in the various aspects of the problem, methods of approaching the problem, the techniques of gaming, or forcing them to expand their time horizons away from the immediate future and towards the long term future).

Formulating new or evaluating existing policy recommendations, especially in those policy problems which are readily amenable to gaming.

Formulation of Path Game

- Develop Path Diagram
- Identify Key Actors in Game
- Write Scenario for Game
- Create Charge to Players
- Collect Background Material for Players
- Game
- Post-Game Analysis

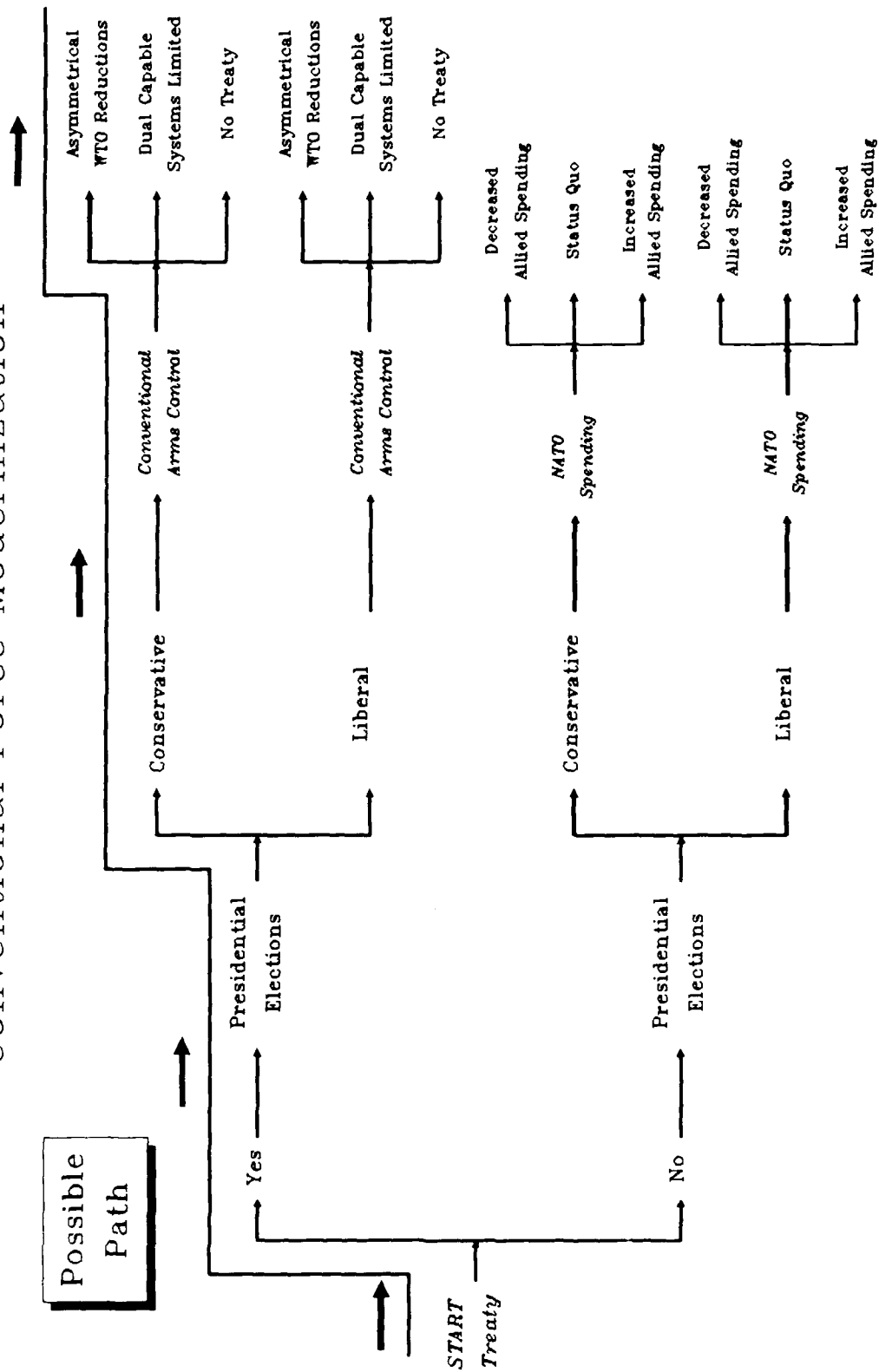
CHART 10
FORMULATION OF PATH GAME

These are the main steps in the formulation of a path game. A path diagram (example to be given shortly) summarizes the key decisions which the players will be asked to address in a schematic diagram. This is intended as a rough road map to guide the players into the future. This diagram is then used to identify the key institutional actors and write the specific scenario for the game. Since path games are free-style with few formal rules, the scenario and the charge to the players are both very important parts to the game. The charge is a list of questions that the players are asked to answer during each move and over the course of the game. In addition, before the game all background information that the players might need must be collected (e.g., budgetary data, force levels, policy statements, etc.).

Next the game is scheduled and played: the specific players are identified and invited, the facility used for the game is reserved, and the game is played.

Post-game analysis based on the results of the game is carried out by the game's sponsors.

Diagram of Path Game Conventional Force Modernization



May 1988

Nov. 1988

Late 1989

CHART 11
DIAGRAM OF PATH GAME

This chart is an example of a path diagram using the example of NATO's conventional force modernization. It indicates that the first major decision to be made is whether or not to sign a START treaty. Next, the control team determines whether or not the next US administration is conservative or liberal. The players are then asked to consider either a conventional arms control agreement or how to increase NATO defense spending, depending on their decision in move one on the START treaty. The players would be allowed -- and encouraged -- to question the assumptions behind this diagram, and offer alternative decision points or paths.

As noted earlier, a path is a series of decisions connecting the current environment to a preferred one in the future. One such path is indicated here.

Identify Individual Players

- Senior Level Decision Makers
- Mid Level Managers
- Staff Officials
- Outside Experts From:
 - Academic Institutions
 - Consulting Firms
 - Private Industry

CHART 12
IDENTIFY INDIVIDUAL PLAYERS

The players used in a path game vary widely from senior level decision makers to outside consultants. Since path gaming is a very unstructured form of gaming, the players should be selected with care. A game will only be as good as the people participating in it.

Game Structure

- Introductory Briefing
Gaming Techniques
Scenario
Charge

- Move 1
Team Discussions
Plenary Session
Decisions

- Move 2

•

•

- Move 3

•

•

- Move 4

•

•

Replay of Move 1
with Benefit of
"Hindsight"



CHART 13
GAME STRUCTURE

An example of the overall structure of a path game is illustrated here. Before the game begins, the control team provides an introductory briefing on gaming techniques, the specific scenario to be played, and provides the players with their individual charges. Each move can have a structure such as the following: first each team (there can be as many as three teams) meets separately for a preliminary discussion of their charge, next the teams meet in a plenary session and exchange proposals, finally the teams meet separately again in order to make their final decisions and fulfill their charge for that move. The game clock is advanced and the control team presents the players with the new strategic environment and their new charges. The next move is played. The last move is a re-play of the first move - where the players are allowed to reconsider their initial decisions with the benefit of seeing how these impacted the future. This re-play is a key feature of path games.

Teams

"Color Coding System"

Blue Team

Major actor in the game, usually represents game's sponsor.
Example: Current US Administration.

Red Team

Primary actor to which the blue team must respond, or its main competition. Example: Soviet Union.

Green Team

Groups that influence the blue team but are not in direct competition with it. Examples: US Congress, NATO Allies, general public

Control Team

Higher level authorities or administrative functions needed to play a game.

CHART 14
TEAMS

A color coding system is used for labeling the teams:

The blue team is the main actor in the game, usually the current US administration. The red team is the main competition -- or the USSR. The green team represents all of the actors that influence the blue team without being in direct competition with it: e.g., NATO allies, the US Congress, public opinion, etc. Finally, the control team is used both to represent higher level authorities and perform administrative functions.

Style of Game Play

- OPEN

Players meet together and interact freely without interference from the control team. Less realistic, but frequently more useful for the players.

- CLOSED

All inter-team communications monitored by the control team which determines the content of all messages. More realistic, but more cumbersome.

CHART 15
STYLE OF GAME PLAY

Two forms of play are possible. In open play all of the players interact freely. While this is less realistic (US, Soviet, and European officials rarely meet together), it is frequently more useful to the players because they are allowed to see how each team reaches their decisions, not just the end result.

Close play is just the opposite. All inter-team communications are regulated by the control team. This style of play is more realistic, but it can be considerably more complex to administer.

Functions of Control Team

- Pre-Game Preparations
 - Write Scenario, Charge to Players
 - Computer Programs
 - Invite Players, other logistical matters
- Game
 - Introductory Briefing
 - Regulate Play
 - Supervise Discussions
 - Monitor Inter-Team Communications
 - New charge for each move
 - Maintain Record of Game
 - Analyze Data as Requested by Players
- Post-Game Analysis
 - Summary of Game
 - Substance
 - Methodology
 - Briefings
 - Analysis

CHART 16
FUNCTIONS OF CONTROL TEAM

The control team performs important functions at three stages in the development of a path game:

Pre-game preparations: Basically it develops the game in coordination with the game's sponsor. In particular it develops any computer software that might be needed during the course of the game.

Game: It will give the introductory briefing as noted above, regulate the game play -- especially if it is to be closed, maintain a record of the game's proceedings for post-game analysis, and perform any data analysis requested by the players or needed for the development of new charges.

Post-game analysis: It provides a summary of the game in terms of the substance of the game and any methodological issues. If post-game briefings are requested, then the control team will help the sponsor perform them. Finally, the results of the game are analyzed, especially if the game is one in a series of games.

Computers

Used for:

- Displaying game material
- Maintaining and displaying record proceedings
- Inter-team communications
- Data analysis

Limitations:

- Avoid distracting players' attention from main issues
- Limited time for calculations

CHART 17
COMPUTERS

Computers are used extensively in path games to display game material (introductory briefings, etc.), maintain/display of the discussions (which helps focus the discussions), facilitate inter-team communications (by using a computer network at a gaming center), and for quantitative analysis.

However, two limitations should be noted: (1) computers and excessively complex numerical analysis should not allow the players' attention to be diverted from their main purpose. Often if detailed analysis is used, the players may spend too much time on the assumptions behind the calculations and not enough time on the strategic decisions. (2) There is a limited amount of time for analysis, especially since the control team may not always anticipate the exact nature of the questions which the players can pose.

Gaming Format

- Basic Structure of a Game
- Described by
 - Length of each move
 - Length of break between moves
 - Number of moves
 - Number and Kinds of Teams
 - Style of Play (open/closed)
 - Number and Kinds of Players
- Four Basic Formats
 - Mini-Game
 - One-Day Game
 - Multi-Day Game
 - Extended Game

CHART 18
GAMING FORMAT

A path gaming format describes the basic structure of the game and is defined by the following parameters: the length of each move (in hours), the length of the break between moves (the inter-move duration is a key variable), number of moves, teams, style of play, and players.

As noted earlier there are four main formats. Each will be discussed in terms of its purpose, its main features, and its strengths and weaknesses.

Mini-Game Format

Purpose

Use a small group (about a dozen) of experts to investigate a set of inter-related issues in a structured seminar.

Best if a series of games are used, one for each aspect of an issue because this format can easily be repeated.

CHART 19
MINI-GAME FORMAT
PURPOSE

The main purpose of a mini-game is a quick assessment of a path using a small group of players. Since it is a simple format which can easily be re-played, a series of games can be used to investigate an issue. However, complex issues can not be easily addressed in this format.

Mini-Game Format

Description

<u>Attribute</u>	<u>Value</u>
Length of Game	4 hours
Move Duration	1 hour
Inter-Move Duration	None
Number of Moves	2 with replay of first
Game Play	Open
Number of Teams	2 (Blue, Control)
Number of Players	12 - 18
Facilities	Seminar room

CHART 20
MINI-GAME FORMAT
DESCRIPTION

The main attributes are: the total length of the game is short, each move is short, the number of players is small, and the facilities needed are inexpensive and readily available. In addition, the issue being addressed must need no more than one team, i.e., be mainly internal to the blue team. The other teams (red and green) are represented by only one or two players.

Strengths and Weaknesses of Mini-Games

Purpose	Strength	Weakness
Education	Expose small group to new issues and gaming methods	Unable to handle more than a few new players
Issue Identification	Locate many new features to problems by combining expertise of players	Issue must be small in scope and modeled with one team
Policy Recommendation	Suggest broad change in strategies	Limited by inability to include any detailed analysis in game

CHART 21
MINI-GAME FORMAT
STRENGTHS AND WEAKNESSES

The most important strength of the mini-game format is its ability to utilize the expertise of the players for issue identification, with the limitation that the overall issue under consideration must be fairly narrow in scope. An issue can be narrowed by playing a series of mini-games. Because the mini-game format cannot handle too many new players (the time constraints are too severe for many new players to become familiar with gaming techniques; many of the players must already be "up to speed"), only a very small number of officials can be educated using this format. But the mini-game format is an excellent device to introduce a handful of people both to new issues/approaches and to gaming. Since there is little time for analysis and the pace of the game is brisk, this format is not ideally suited for making detailed policy recommendations. However, broad, strategic recommendations are possible.

One-Day Game Purpose

Involve a large group (>40 people) in a discussion of a major policy issue in order to expose them to new ideas or approaches.

Good format for education of large number of officials.

CHART 22
ONE-DAY GAME
PURPOSE

The primary purpose of the one-day game format is to involve a large number of people in a more detailed discussion of a major policy issue than is possible in the limitations of the mini-game format. In this case a multi-team game is possible, and the interactions among the different groups can be considered.

This format is especially good for educating a large audience because the time constraints are relaxed without a large increase in the overall length of the game.

One-Day Game

Description

<u>Attribute</u>	<u>Value</u>
Length of Game	1 day
Move Duration	2 hours
Inter-Move Duration	< 1 hour
Number of Moves	2-3 with replay of first
Game Play	Open or closed
Number of Teams	3-4 (Blue, Red, Control, Green)
Number of Players	40 - 50
Facilities	Gaming Center

CHART 23
ONE-DAY GAME
DESCRIPTION

The main attributes are: the game length is one full working day, as many as 4 teams can be used, the number of players is large, and a gaming center is required. Since there are many more players and several teams are used (which may need to meet separately if play is to be closed), a formal gaming center may be a necessity. A gaming center provides several interconnected meeting rooms, a central facility where the control team can regulate the game's play, a central meeting place for plenary sessions, and a computer network.

Strengths and Weaknesses of One-Day Games

Purpose	Strength	Weakness
Education	Expose large group to new concepts and approaches	May be expensive and require much pre-game analysis
Issue Identification	Locate unresolved problems in broad policy questions	Result is indirect outcome from process of education
Policy Recommendation	Suggest broad change in strategies	Limited by inability to include any detailed analysis in game

CHART 24
ONE-DAY GAME
STRENGTHS AND WEAKNESSES

As just noted, the main strength of this format is education. It will have considerably greater impact than more traditional briefings or written analyses because the players will "learn by doing." They will be more actively involved in learning about the problem -- and solving simulated real-world problems, rather than passively listening. This format does require more pre-game preparations for the simple reason that many more inexperienced players are involved: they must be brought up to speed in both the issue under consideration and gaming techniques. At the same time, the players -- largely as a result of becoming more familiar with the issue being gamed -- are better able to identify new issues and formulate policy recommendations.

Multi-Day Game Purpose

Investigate a large, complex problem and expose a large number of officials to a wide array of related issues and points of view.

More time for development of new scenarios and charges to the players.

CHART 25
MULTI-DAY GAME
PURPOSE

Multi-day games, because they have a longer break between moves, can accommodate more complex issues where the control team may need more time to prepare for each move. Large, complex problems may be best addressed by the multi-day game format. At the same time, the question of cost-effectiveness restricts the utility of this format: there may be other formats which, while less optimal, may turn out to yield more output for a given level of resources.

Multi-Day Game

Description

<u>Attribute</u>	<u>Value</u>
Length of Game	3 - 4 days
Move Duration	4 hours
Inter-Move Duration	1 day
Number of Moves	3 with replay of first
Game Play	Open or closed
Number of Teams	4 (Blue, Red, Green, Control)
Number of Players	40 - 50
Facilities	Gaming Center

CHART 26
MULTI-DAY GAME
DESCRIPTION

The main attribute of this format are the one-day breaks between moves and the longer move duration of approximately 4 hours.

Strengths and Weaknesses of Multi-Day Games

Purpose	Strength	Weakness
Education	Expose large group to issues related to very complex issue	Extremely expensive to play game, large time commitment
Issue Identification	Locate unresolved problems in broad, long range policy questions	Poor cost-effectiveness due to expense and player turnover
Policy Recommendation	Suggest more detailed changes in strategy	Poor cost-effectiveness due to expense and player turnover

CHART 27
MULTI-DAY GAME
STRENGTHS AND WEAKNESSES

As noted earlier, the main weakness of this format is its relatively poor cost-effectiveness. This format may offer many advantages over previous formats -- but at greatly increased cost. For example, it may be difficult to simply schedule the game, i.e., finding several consecutive days when all of the players (of which there are 40 to 50) are available at the same time when a gaming center is also available will greatly restrict the use of this format. The alternative is to try to minimize, without entirely eliminating scheduling conflicts, but at the cost of player-turnover. Some players may attend only part of the game. This will require that time be spent bringing new players up to speed. Problems such as these reduce the strength of this format in satisfying these three purposes.

Extended Game Purpose

Examine in detail a relatively well-defined problem to formulate policy recommendations.

Best format for detailed, quantitative analysis.

CHART 28
EXTENDED GAME
PURPOSE

The purpose of extended games is a detailed examination of a fairly well defined issue in order to formulate policy recommendations. It is particularly well suited to problems requiring quantitative analysis such as budgetary data.

Extended Game Description

<u>Attribute</u>	<u>Value</u>
Length of Game	> 1 month
Move Duration	4 hours
Inter-Move Duration	1 - 3 weeks
Number of Moves	3
Game Play	Open or Closed
Number of Teams	3 (Blue, Red, Control)
Number of Players	30-40
Facilities	Gaming Center

CHART 29
EXTENDED GAME
DESCRIPTION

The main attributes of extended games are their length which is one month (from beginning to end, although play is not continuous for the entire time) and the long inter-move duration of one week which gives the control team much time for preparing for each move. This break can also be used by the players to digest the material presented to them, discuss the game with their colleagues, and prepare for the next move themselves. If the players do not take advantage of this time, then this format is less useful.

Strengths and Weaknesses of Extended Games

Purpose	Strength	Weakness
Education	Expose small group to issues related to very complex issue	Extremely expensive to play game, time commitment too large
Issue Identification	Possibly locate obstacles to implementing policy recommendations	Format too structured to permit wide-ranging discussions
Policy Recommendation	Detailed analysis in game permits players to make good policy recommendations	Players may not use inter-move breaks effectively

CHART 30
EXTENDED GAME
STRENGTHS AND WEAKNESSES

The main strength of this format is the players' ability to take advantage of the slow pace of the game and the amount of analysis available to them to formulate policy recommendations. It is less useful for education, given the large time commitment involved. This format is too structured and the issues too focused for this format to be useful in issue identification. The mini-game format, because it is highly unstructured, is better in this regard.

Method of Selecting Format

- No "Hard-And-Fast" Rules
- Consider Trade-Offs Among Competing Objectives
- Only Offer General Guidelines

CHART 31
METHOD OF SELECTING FORMAT

The purpose of this part of the briefing is to help guide potential sponsors and developers of path games in determining the most appropriate format to be used in their particular application. First, the most important inputs will be considered: the purpose of the game itself, the type of topic being addressed (which could be either narrow and well-focused or broad and ill-defined), and the level of resources available for the game (including the total amount of time to be used in the study). Next, the trade-offs that must be taken into account will be discussed since frequently no one single format will satisfy all of the goals of the game's sponsors or developers. Finally, some general recommendations will be offered, noting however that no "hard-and-fast" rules can be made for selecting the optimal gaming format.

Inputs in Selection

- Purpose of Game
 - Education
 - Issue identification
 - Policy recommendation
- Type of Topic
 - Broad, ill-defined
 - Narrow, focused
- Level of Resources
 - Period of performance

CHART 32
INPUTS IN SELECTION

All games will contain an element of each of these three basic purposes, but before actually selecting a gaming format the game's sponsors should carefully consider the relative priorities which they attach to each. The discussion on each individual gaming format clearly indicated that each format is best suited to primarily one purpose, and less useful for other applications. Consequently, this step is the most critical one in deciding on the most appropriate format.

A second major input is the type of topic being addressed by the game. The specific problem is not as important and the scope being addressed. For example, the scope can be extremely broad to include both political and economic variables or narrow to incorporate essentially only military, technical and budgetary factors. The broader the scope, the less well-defined its boundaries become.

The third important input which should be considered is the amount of resources available both for planning and playing the game or games and for evaluating the results. Many of the costs are difficult to precisely quantify. One resource that can be discussed in more concrete terms is time. The sponsor of a game or a series of games may have a limited amount of time during which to plan, execute, and evaluate the output from a path game. This will be used to measure the level of resources.

Key Trade-Offs

- Purpose for Game
 - Relative priority for each
 - Continuity of Play
 - Short inter-move duration
 - Low player--turnover
No need to re-brief players
 - Long inter-move duration
 - Time for quantitative analysis
Detailed new charges, scenario
 - Level of resources
 - Available time
 - Cost-Effectiveness
- BUT* No time for analysis
- BUT* Player--turnover
Loss of mind--set
of game

CHART 33
KEY TRADE-OFFS

Three major trade-offs that must be considered are:

The relative priorities attached to each of the purposes for the game, since one might need to be sacrificed in order to choose a format better suited for the principal purpose.

The continuity of play, or the inter-move duration which can be short in order to minimize player turnover and keep the game fresh in the minds of the players. Note that once players are in the strategic mind-set of the game, it is best to keep them there, otherwise they will have to be re-briefed and brought back into this mind-set -- something that wastes valuable game time. On the other hand, a longer inter-move break gives time for reflection and analysis (both quantitative and more qualitative -- drafting of new descriptions of changes in the scenario and new charges).

Finally, it should be emphasized that the theoretically best gaming format may not be the most cost-effective in terms of making best use of limited resources -- including time.

Recommended Gaming Format Depending on Purpose

	Education	Specific Recommendation	Issue Identification
Mini-Game	Good for small group of players	Possible	Very Good
One-Day Game	Very Good	Unlikely	Possible
Multi-Day Game	Good	Possible	Possible
Extended Game	Good for small group of players	Good	Unlikely

CHART 34
RECOMMENDED GAMING FORMAT
DEPENDENT ON PURPOSE

A one-day game will frequently prove to be the best format for educating a large number of people and familiarizing them with gaming methods. A multi-day game can also be used, but it involves a considerably larger time commitment by the players without guaranteeing a correspondingly larger payoff. Mini-games and extended games are useful for education but only if the intended audience is small.

If the primary purpose of the game is to help formulate policy recommendations, then the extended game format is good alternative. The remaining formats cannot easily handle the amount of analysis required in helping to formulate specific recommendations. The main strength of the mini-game format is its ability to help identify issues related to a given policy problem that had gone unnoticed.

If this is the basic purpose of playing a path game, then a single or, more likely, a series of mini-games is probably the best alternative. A one-day game could also be used for this purpose, but since it is restricted to investigating a single path, its ability to identify issues is similarly limited. Multi-day games suffer from the same problems as one-day games. Extended games, due to their narrow focus are ill-suited for this purpose.

Recommended Gaming Format Depending on Game Topic

	Broad Ill Defined	Narrow Well Focused
Mini-Game	<i>Very Good</i>	Good
One-Day Game	<i>Very Good</i>	Good
Multi-Day Game	Good	Good
Extended Game	Poor	<i>Very Good</i>

CHART 35
RECOMMENDED GAMING FORMAT
DEPENDENT ON TOPIC

Both mini-games and one-day games are useful vehicles for investigating issues which are broad in scope with ill defined boundaries. These formats are sufficiently unstructured to allow the players the ability to reformulate the main questions posed at the beginning of the game. A multi-day game, because it is a more cumbersome format, cannot be used as flexibly, but it is still well suited for accommodating broad, wide ranging topics. While their structured nature makes them less appropriate for ill defined problems, extended games are best adapted for narrow and well focused topics. Any of the other formats can likewise be used if the problem is well defined.

Recommended Gaming Format Depending on Period of Performance

	Short (< 3 mo.)	Medium (6 mo. - 1 yr.)	Long (> 1 yr.)
Mini-Game	Good	Very Good	Very Good
One-Day Game	Possible	Good	Very Good
Multi-Day Game	Poor	Possible	Very Good
Extended Game	Poor	Possible	Very Good

CHART 36
RECOMMENDED GAMING FORMAT
DEPENDING ON PERIOD OF PERFORMANCE

Since, as noted above, many of the monetary costs associated with a path game cannot be readily measured, one means of assessing the cost-effectiveness is to use the period of performance for the game, or the total amount of time required for the conceptualization, preparation, execution, and analysis of the game. This chart distinguishes three levels: (1) quick reaction analyses requiring 3 months or less; (2) more involved studies taking from 6 months up to a year; and (3) long-term analyses which last for a year or more.

If the game's sponsors have approximately 3 months for the path game, then the only format that is reasonable to consider is the mini-game, especially if a pool of experienced players already exists. As the length of time increases to over 6 months, then one or more series of mini-games can be played or a one-day game can be considered. While it is possible to prepare a single one-day game in 3 months, more time may be needed for both pre- and post-game analysis, or for the use of either a set of one-day games or a combination of mini-games and a one-day game. As the total period of performance approaches a year or more, any of the gaming format can be used to analyze a given policy problem. It should be noted that any gaming format can be fit into nearly any length of time. But a price would have to be paid in the form of inadequate preparations or incomplete post-game evaluations. The guidelines shown in here are thus the preferred ones for the optimal use of path gaming.

Conclusion

- Path Gaming is a valuable tool:
 - Studying ill-defined problems
 - Exposing officials to diverse opinions
 - Including political competition into analyses
- Formats exist for a wide variety of uses
 - Education
 - Issue identification
 - Policy recommendation

CHART 37
CONCLUSION

Path gaming is a valuable tool for problems where there is a need to study the boundaries of an ill-defined problem, to expose officials to a wide variety of opinions, perspectives or approaches related to a policy problem, or where an essential aspect of the problem centers around politics. Many issues fit these characteristics.

Gaming formats exist to meet the three principal purposes of gaming: education, formulation of policy recommendations, and issue identification.

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