

A decorative graphic on the left side of the slide consists of a vertical black line intersecting a horizontal black line. To the left of the vertical line are three overlapping rectangular shapes: a blue one at the top, a red one in the middle, and a yellow one at the bottom. The horizontal line is a thick, light gray gradient that spans the width of the slide.

A Multi-Objective Market Assessment Process

Steve Mack
Whitney, Bradley & Brown
smack@wbbinc.com
703.448.6081 x125

Obligatory Dilbert



www.dilbert.com scottadams@aol.com



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Background

- BFGoodrich Aerospace Engineered Polymer Products (EPP) Division had developed a new product, FyreRoc that has a significant number of market applications
- Specific target market sectors/applications for FyreRoc had been identified
- EPP management realized that internal resources are not available to immediately exploit every attractive opportunity
 - A complex range of business objectives and technology factors (decision elements) come into play when evaluating the set of market sector candidates
 - The EPP management team needed a way of optimally integrating the decision elements in order to prioritize the market segments, yielding a portfolio of opportunities aligned to maximize corporate return at an acceptable level of investment risk

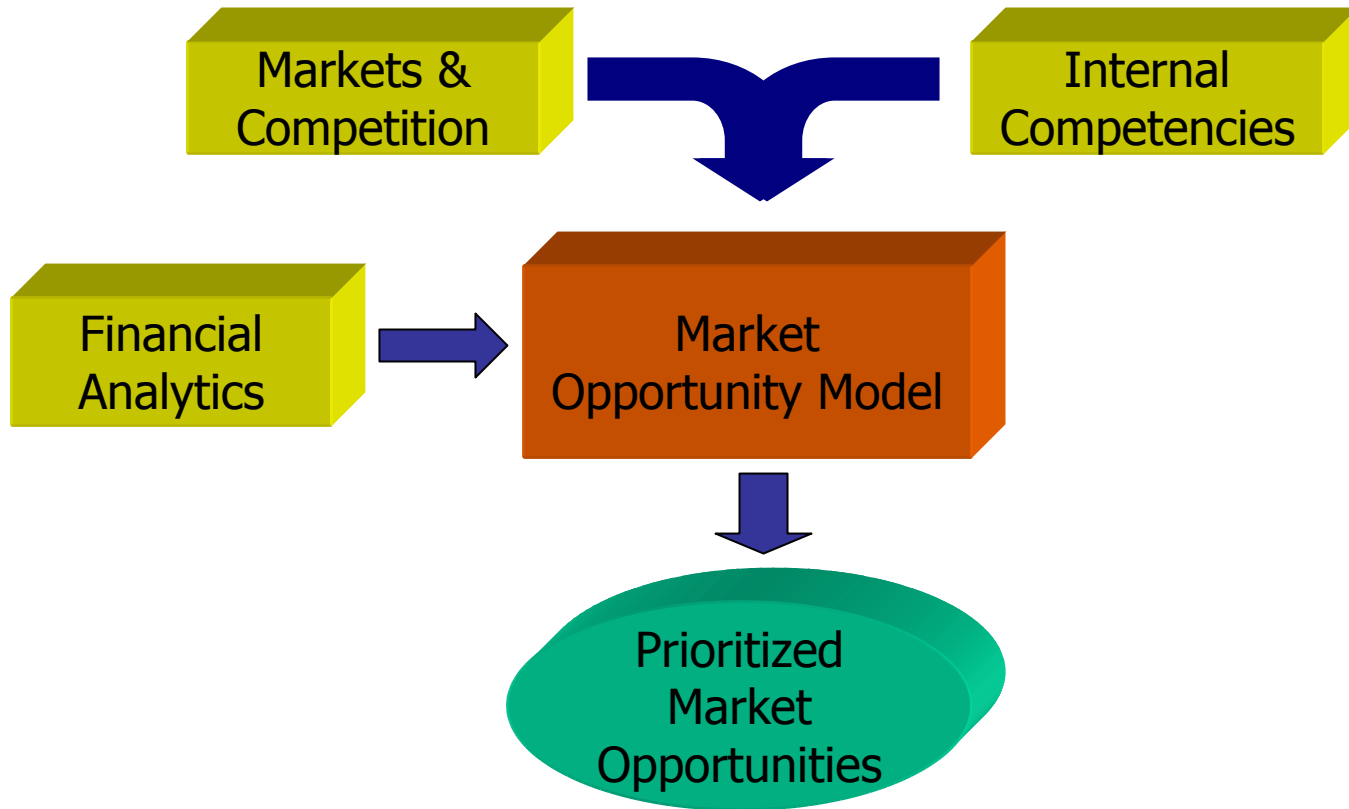


Market Assessment Objective & Strategy

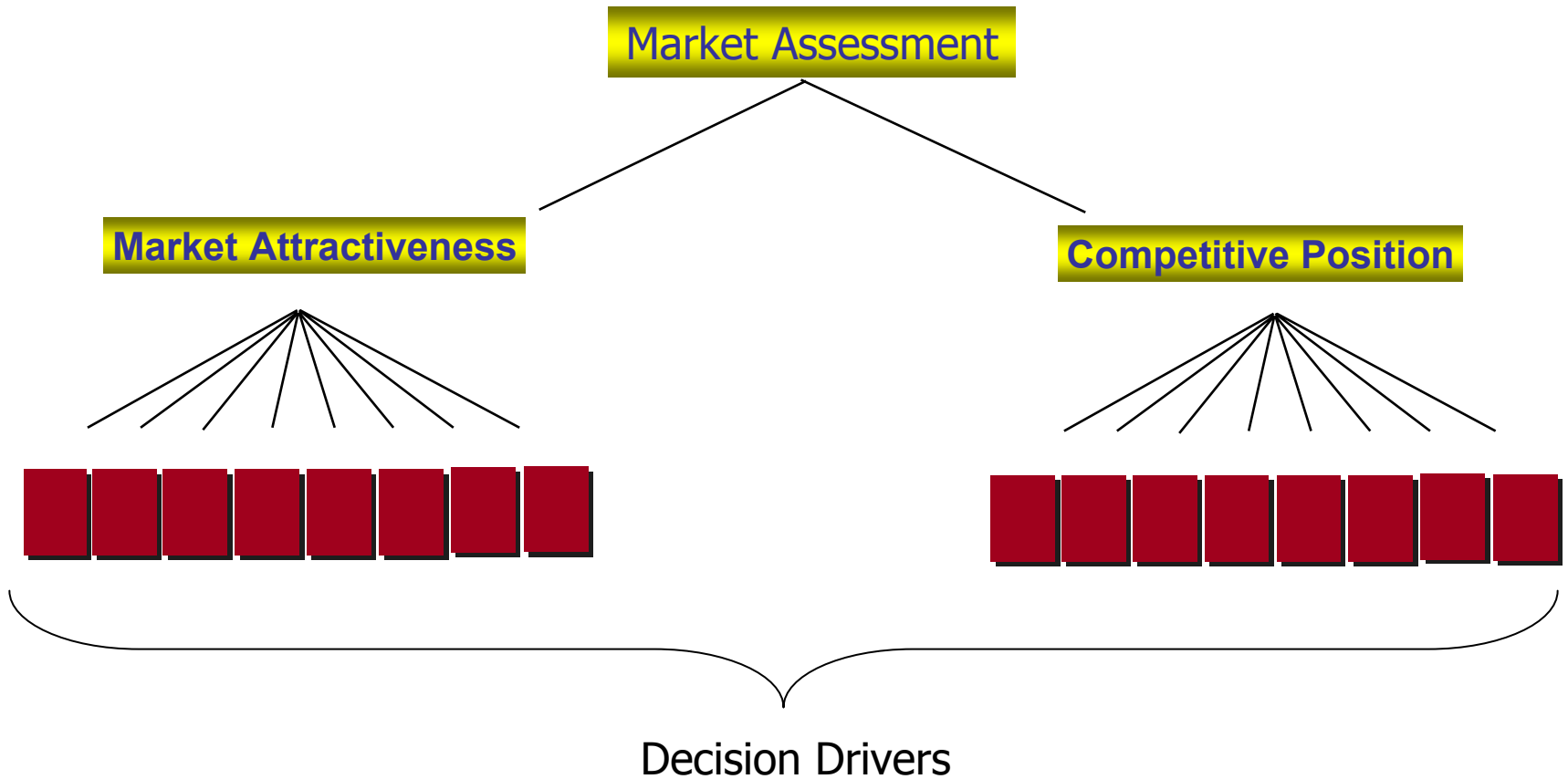
- Determine the best market opportunities for the FyreRoc product
 - Build a multi-objective market assessment model that incorporates the decision elements identified by EPP management
 - Facilitated sessions with the management team
 - Weigh the decision elements based on their importance to individual market sector success
 - Use the Analytic Hierarchy Process – Team Expert Choice for collaborative weighing
 - Rate the candidate market sectors against the weighted decision elements
 - Collaboration - Team Expert Choice
 - Identify high value opportunities that may be exploited through tactical investing
 - Facilitated session to review results and determine action items/next steps
 - Output - prioritized market opportunity profile that will maximize corporate return at an acceptable level of investment risk
 - Build credible investment “Story” for corporate management



Market Assessment Approach

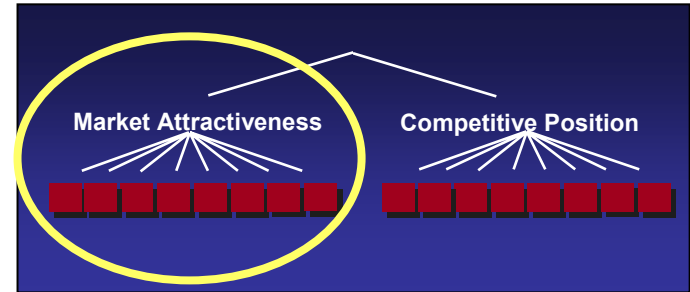


Market Assessment – 2D Decomposition





Market Attractiveness Structuring



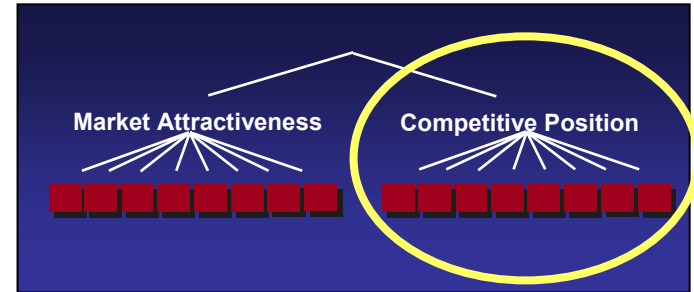
Market Attractiveness Drivers

MARKET SIZE	GROWTH RATE	PROFITABILITY	TECHNOLOGY FIT	STRATEGIC FIT	COMPETITION	SUPPLIERS/PARTNERS	EXTERNALITIES
Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125

Elements	Description
MARKET SIZE	CURRENT SIZE OF AVAILABLE MARKET IN \$ OR UNITS
GROWTH RATE	COMPOUNDED ANNUAL MARKET GROWTH RATE (%)
PROFITABILITY	PREFERRED FINANCIAL MEASURE
TECHNOLOGY FIT	EXISTING COMPANY TECHNICAL COMPETENCIES OR STRENGTHS
STRATEGIC FIT	EXISTING COMPANY STRATEGY/VISION
COMPETITION	PREFERRED COMPETITIVE ENVIRONMENT
SUPPLIERS/PARTNERS	BARGAINING POWER, QUALITY/AVAILABILITY OF SUPPLIERS/PARTNERS
EXTERNALITIES	ABILITY TO DEAL W/ EXTERNAL FACTORS (GOV'T REGS, LAWS, TRENDS, UNIONS, ENVIRONMENTAL)



Competitive Position Structuring



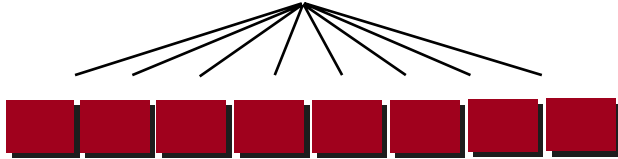
Competitive Position Drivers

MARKET SHARE	GROWTH RATE	PROFITABILITY	TECHNOLOGY FIT	STRATEGIC FIT	COMPETITION	SUPPLIERS/PARTNERS	EXTERNALITIES
Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125	Local: 0.125 Global: 0.125

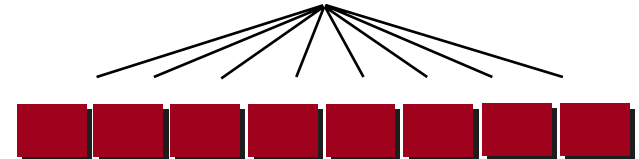
Elements	Description
MARKET SHARE	PERCENT SHARE OF THE MARKET COMPARED TO COMPETITORS
GROWTH RATE	% GROWTH RATE OF SHARE OF MARKET COMPARED TO COMPETITORS
PROFITABILITY	FINANCIAL SUCCESS COMPARED TO COMPETITORS
TECHNOLOGY FIT	FIT OF YOUR TECHNICAL COMPETENCIES COMPARED TO COMPETITORS
STRATEGIC FIT	FIT OF YOUR EXISTING STRATEGY/VISION COMPARED TO COMPETITORS' STRATEGY
COMPETITION	ABILITY TO DEAL WITH COMPETITIVE ENVIRONMENT COMPARED TO COMPETITORS
SUPPLIERS/PARTNERS	ABILITY TO GAIN ADVANTAGE WITH SUPPLIERS/PARTNERS COMPARED TO COMPETITORS
EXTERNALITIES	ABILITY TO DEAL WITH EXTERNALITIES COMPARED TO COMPETITORS

Market Assessment Weighing Process

Market Attractiveness



Competitive Position



Name	Wt
MARKET SIZE	0.279
GROWTH RATE	0.199
STRATEGIC FIT	0.147
PROFITABILITY	0.134
TECHNOLOGY FIT	0.094
SUPPLIERS/PARTNERS	0.066
COMPETITION	0.047
EXTERNALITIES	0.034

Name	Wt
MARKET SHARE	0.282
GROWTH RATE	0.225
STRATEGIC FIT	0.141
TECHNOLOGY FIT	0.113
COMPETITION	0.085
SUPPLIERS/PARTNERS	0.070
PROFITABILITY	0.056
EXTERNALITIES	0.028

Prioritized market attractiveness criteria

- EPP management determines the relative importance of the attractiveness criteria.
 - Paired comparison process identifies high impact decision elements and focuses discussion of the team.
 - Communicates strategic direction throughout the organization.

Prioritized competitiveness criteria

- EPP management determines the relative importance of the competitiveness criteria.
 - Identifies the organization's most effective weapons to win in this marketplace.
 - Determines how the organization positions itself in the marketplace.



AHP Model Hierarchy

1.0 Goal

- Goal
 - Market Attractiveness (L: .423 G: .423)
 - Market Size (L: .280 G: .118)
 - Growth Rate (L: .225 G: .095)
 - Strategic Fit (L: .118 G: .050)
 - Profitability (L: .106 G: .045)
 - Technology Fit (L: .070 G: .030)
 - Suppliers/Partners (L: .034 G: .014)
 - Competition (L: .118 G: .050)
 - Externalities (L: .050 G: .021)
 - Competitive Position (L: .577 G: .577)
 - Market Share (L: .080 G: .046)
 - Growth Rate (L: .098 G: .056)
 - Strategic Fit (L: .192 G: .111)
 - Technology Fit (L: .199 G: .115)
 - Competition (L: .331 G: .191)
 - Suppliers/Partners (L: .043 G: .025)
 - Market Familiarity (L: .013 G: .007)
 - Profitability (L: .036 G: .021)
 - Externalities (L: .010 G: .006)

Objectives and structure determined by the management team

Facilitated through structured collaboration: pro/con assessments, affinity diagramming

Team Expert Choice software used for model management



Group Weighing of Market Attractiveness

“It’s the process not the product – most of the time...”

Compare the relative importance with respect to: Market Attractiveness (L: .423 G: .423)

File Edit Assessment View Options Move Wave Help

Geometric Av. 1.90
Geometric Var. .428

Votes: 14
Of: 14

Market Attractiveness

Market Size **Growth Rate**

	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Craig Cartwright	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Andrea Copeland	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Bob Cortese	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Michael Gurny	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Don Hudson	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Jerry LaReau	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Mike Long	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Rob Lovegrove	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Tony Mazany	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Jim Pollock	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
John Robinson	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Bret Smith	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Max Ware	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Patricia Wolfe	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9

Goal

- Market Attractiveness (L: .423 G: .42)
 - Market Size (L: 0.000 G: 0.000)
 - Growth Rate (L: 0.000 G: 0.000)
 - Strategic Fit (L: 0.000 G: 0.000)
 - Profitability (L: 0.000 G: 0.000)
 - Technology Fit (L: 0.000 G: 0.00)
 - Suppliers/Partners (L: 0.000 G: 0.000)
 - Competition (L: 0.000 G: 0.000)
 - Externalities (L: 0.000 G: 0.000)
- Competitive Position (L: .577 G: .577)

Individual Judgments 12:52 PM

EPP Representatives

- R&D
- Finance
- Manufacturing
- Sales & Marketing
- Management

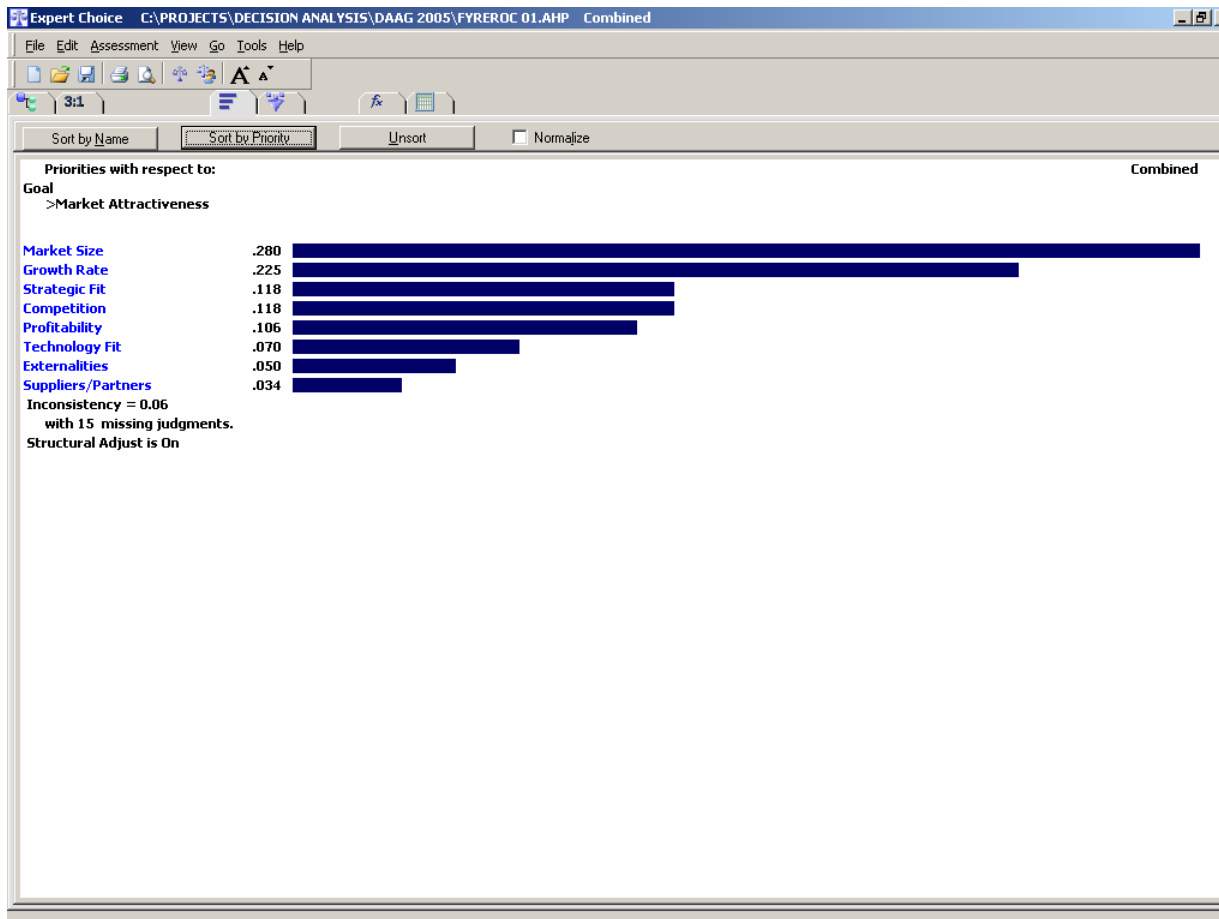
Pairwise comparisons derive individual and collective weights – isolates contention for resolution

Group Polling





Weighed Market Attractiveness Objectives

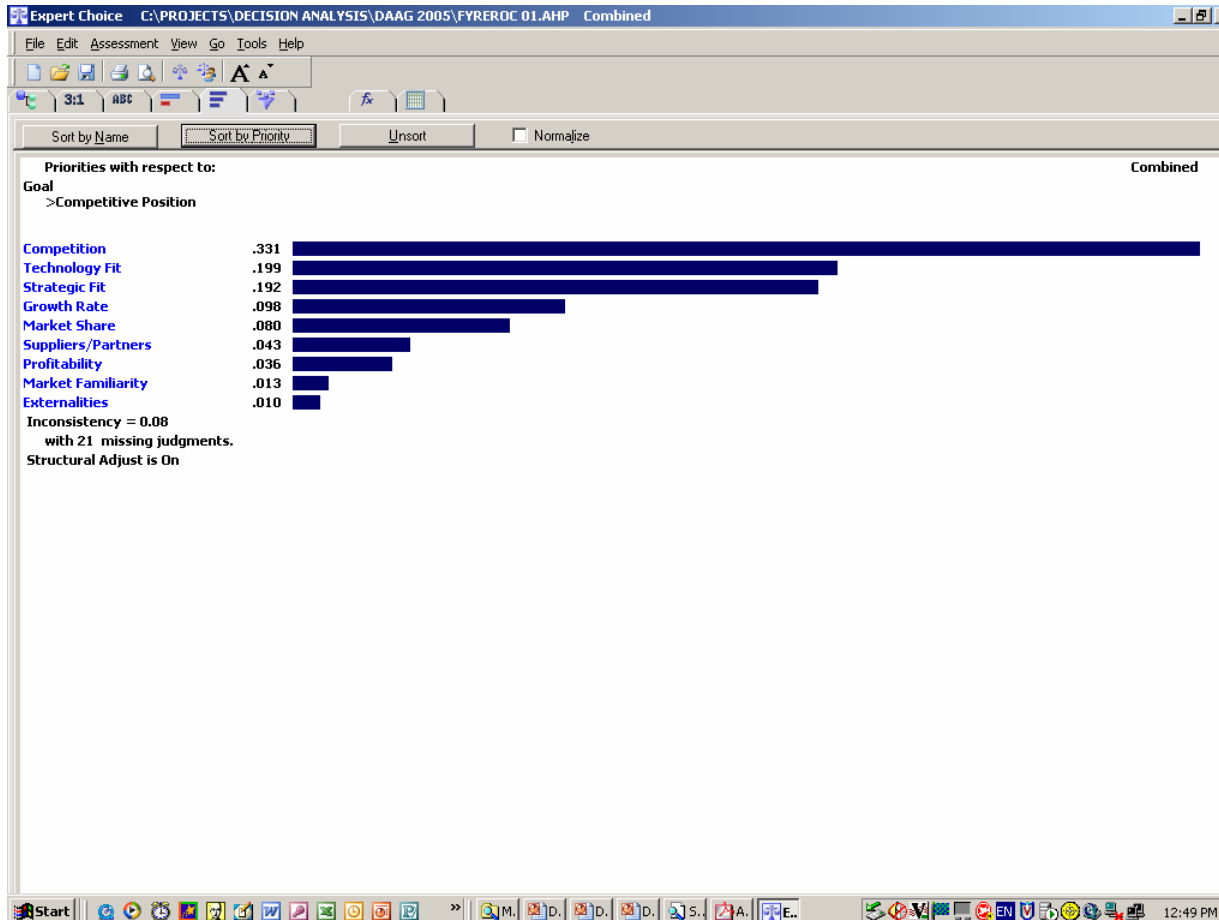


Weighed average of group inputs

Individual models automatically generated and maintained

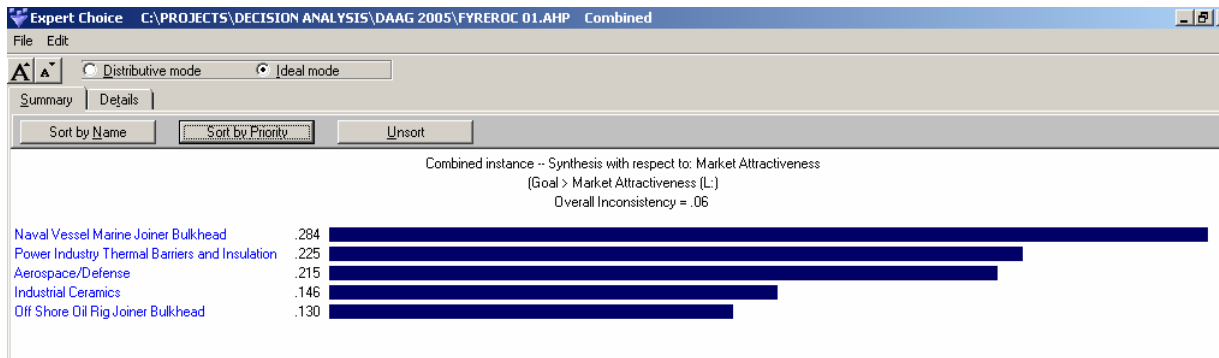


Weighted Competitive Fit Objectives



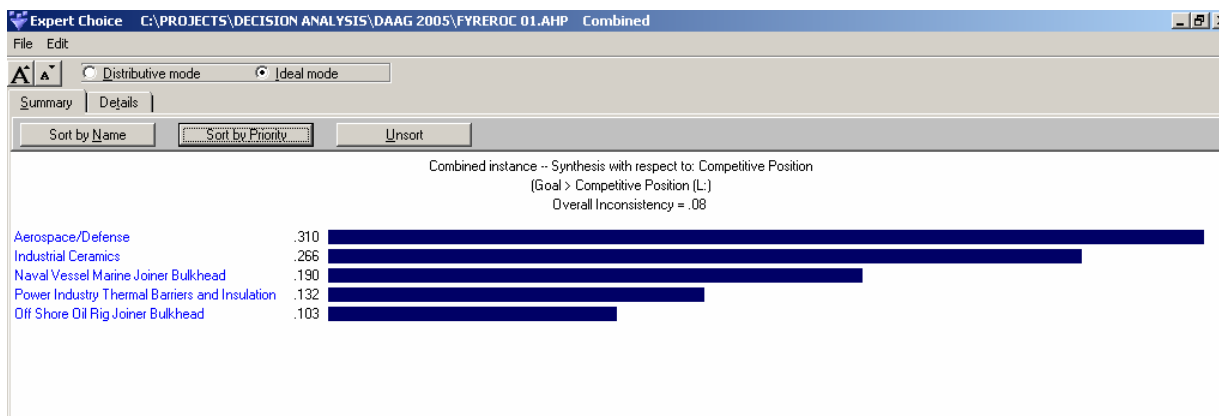


Attractiveness/Competitive Rankings



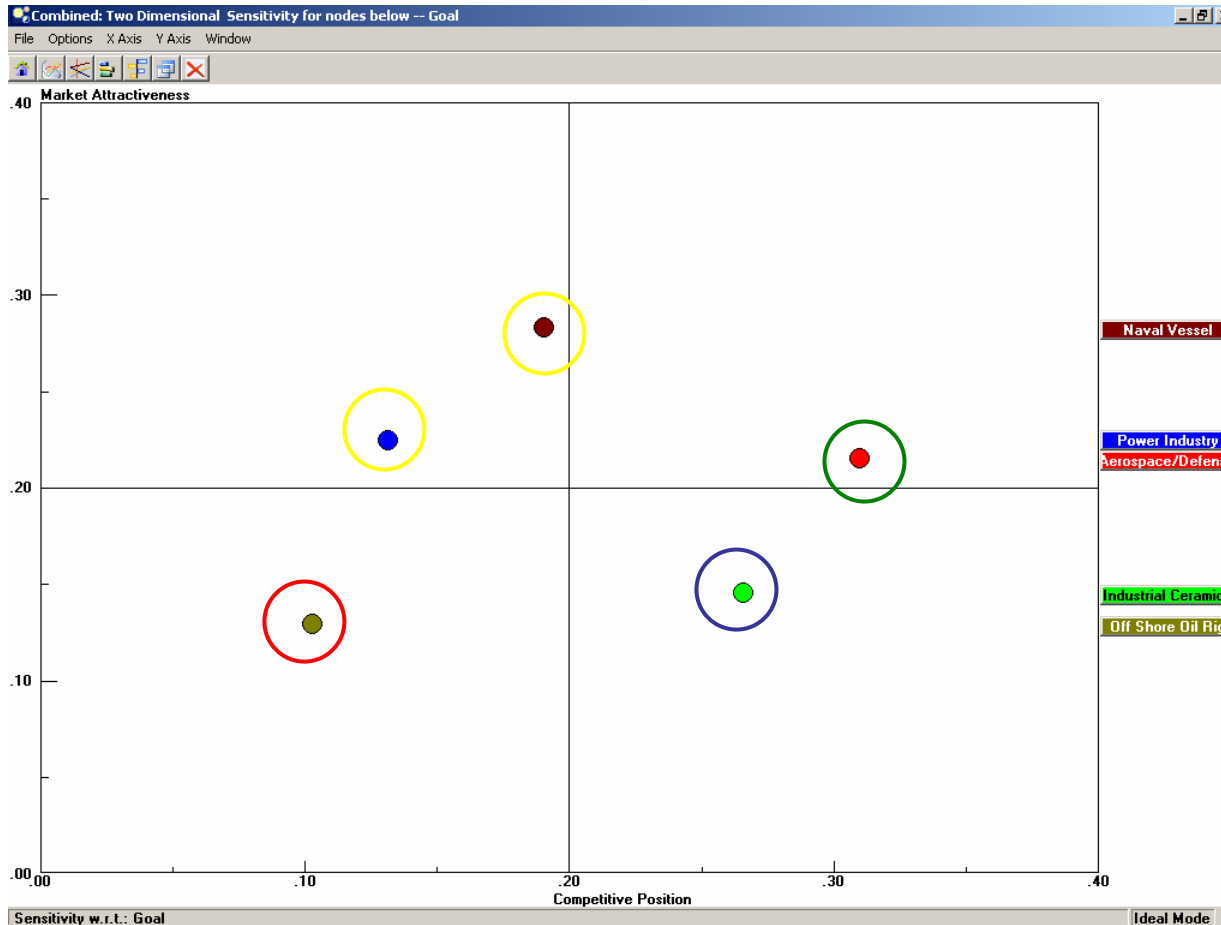
Market Candidates

- Aerospace/Defense
- Industrial Ceramics
- Naval Vessel Bulkheads
- Commercial Marine
- Power Industry Thermal





Competitive Position vs. Market Attractiveness



2 D Market Assessment

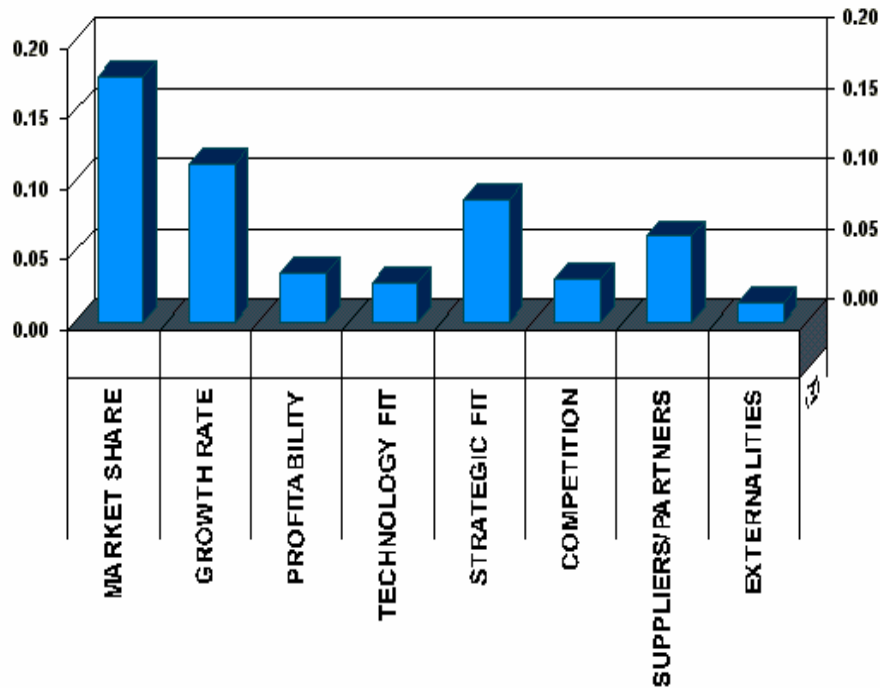
Quads

1. Dogs
2. Low Hanging Fruit
3. No Brainers
4. Tactical Opportunities



Competitive Fit - Leveraging Opportunities

Opportunity Chart For each Market Segment

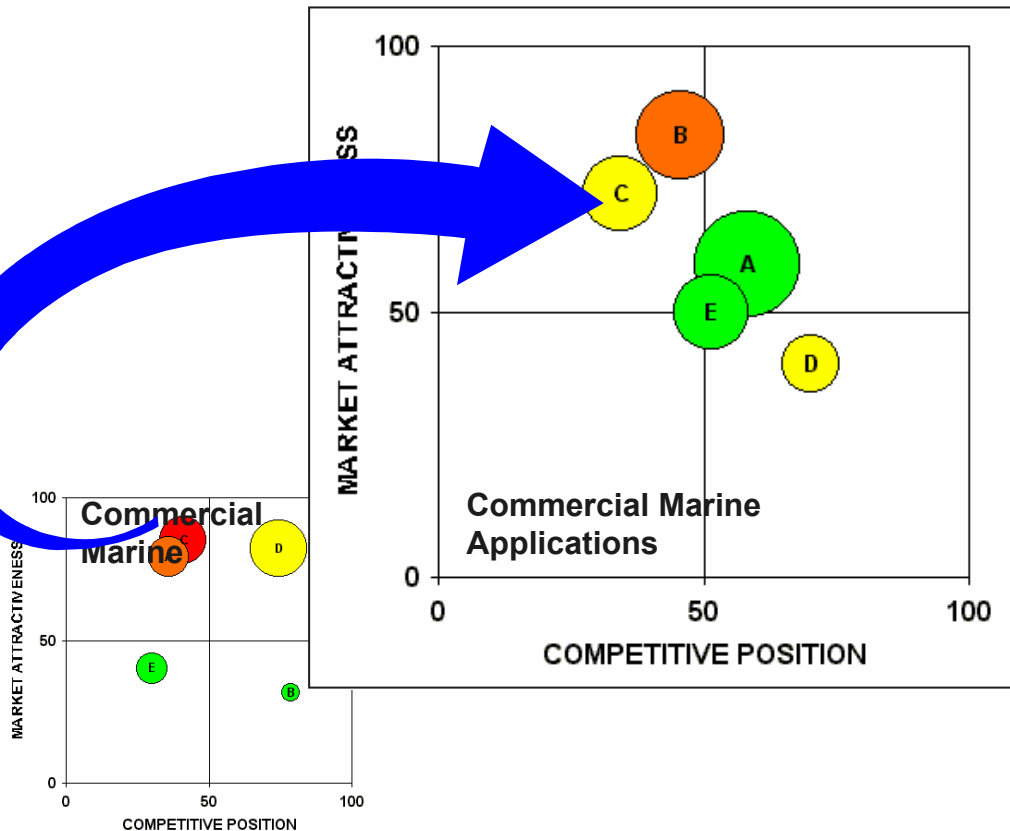


- Illustrates the opportunity to improve EPP's competitiveness in each market relative to each competitiveness criterion.
 - The longer bars indicate the attributes that should be emphasized in the market communications strategy
- Provides the necessary direction to formulate strategies in the individual sectors.
 - The shorter bars pinpoint areas of opportunity to improve EPP's competitive position.



Market Segmentation Profiles

FyreRoc Position Analysis Chart - Commercial Marine Product Application

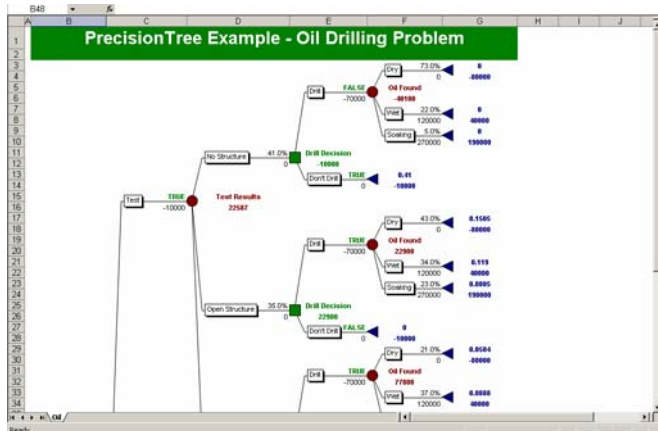


- The same template can be used to further segment each market sector to determine a sub-segment's attractiveness and competitiveness.
- For example, The FyreRoc Commercial Marine market can be segmented into Bulkheads, Engine Room Fire Barriers, Piping and Exhaust Stacks applications



Decision Trees to Value Opportunities

Decision Tree



Max $f(\$)$

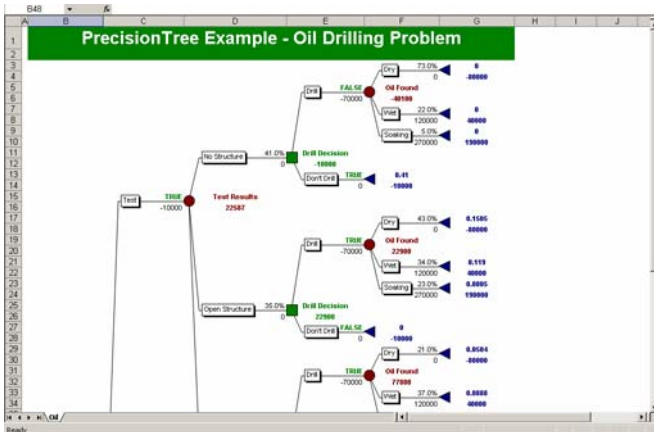


Recommendation

- Explicitly monetize decision elements
- Explicitly incorporate risk
- Convert \$\$ returns to "Utils" if required – not easy

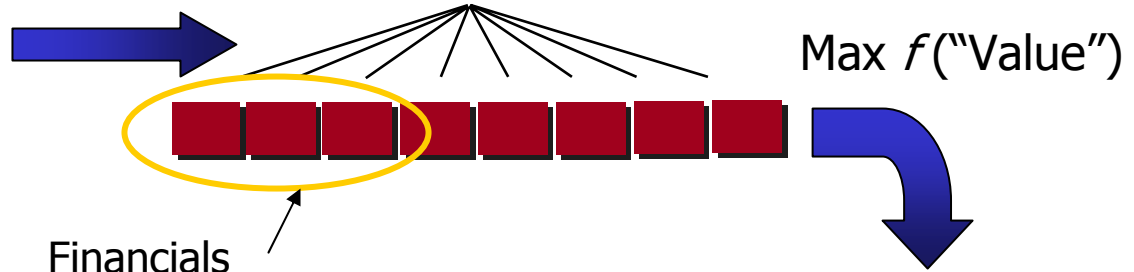
Decision Trees and Multi-Objective Modeling to Value Opportunities

Decision Tree



Monetize what you can
 Incorporate financial metrics into a weighted multi-objective model
 Consider non-financial objectives
 Evaluate alternatives against the objectives
 Recommendation based on total "Value"

Multi-Objective Model



Financials

- Min ENPV
- Max Upside Potential
- Min VaR

Recommendation



Observations

- Most important decision problems have objectives that cannot be directly monetized
- All Trade-offs are subjective
 - Management needs a trade-off mechanism
- Multi-objective recommendations are theoretically normative and prescriptive but in reality “approximate” and advisory
- Decision management interventions should be flexible
 - Integrate qualitative/judgmental factors with the analytics
- Partner with the client early in problem definition and solution design
 - The client wants a process that is temporally and intellectually accessible
 - Recommendations are often rejected because something was left out
 - Iterate until clarity is reached
- Active selling/marketing a complement of decision management solutions should be a core competency of both an internal and external consulting practice



Other Applications

- Marketing
 - Value Based Pricing
 - Resource Allocation – Media Selection
 - Regional Analysis
- Procurement
 - Vendor Selection
 - Capital asset selection
- R&D
 - Project Portfolio Analysis
 - Employee Candidate Assessments
- Decision Analysis
 - Subjective Probability Assessments

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Backup



Notes on Expert Choice[®] and the AHP

- Rank reversal is *not* an issue with the EC implementation of AHP analysis
 - Enhanced algorithm introduced 8 years ago to preclude rank reversal
- Expert Choice has a very large user base
- The AHP process is more intuitive for many clients than other methods
- Group enabled EC builds individual traceable models for all participants
- Utility curves can be constructed for assessment
- The pair-wise process isolates specific points of contention
- It is not always necessary to complete an exhaustive pairwise process
- The axioms of AHP (and every compensatory method) are sometimes violated
 - "All model are wrong – some are useful."