MEASURING THE VALUE OF R&D IN INDUSTRY

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OVERVIEW

- Current focus of industry is to manage for growth
- Growth is driven by innovation
- Various techniques for improving the innovation process
- IRI/CIMS R&D Database
- IRI Technology Value Program

TECHNIQUES FOR IMPROVING THE INNOVATION PROCESS

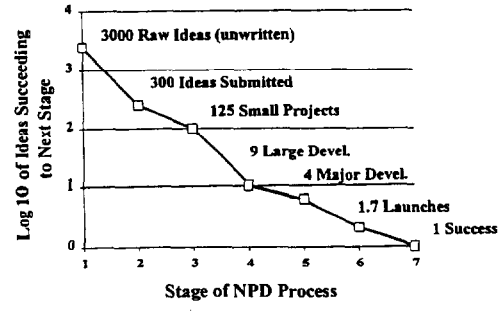
- Competitive Intelligence
- Stimulate Creativity and Idea Generation
- Enhance Intellectual Capital
- Integrate Technology Planning with Business Strategy
- Evaluate R&D Portfolios
- "Change the Rules of the Game" through Discontinuous Innovation
- Measure Effectiveness with Metrics

BUSINESS AND TECHNICAL INTELLIGENCE

- Company vision depends on current and potential competencies
- R&D leaders must continuously assess competencies of scientists and engineers and the stock of intellectual property
- Important to protect this intellectual property

BUSINESS AND TECHNICAL INTELLIGENCE (cont'd)

- Must also provide continuous upgrading of skills and knowledge
- Supplement internal assessment by an evaluation of the current competencies of one's competitors, suppliers, and customers
- These assessments provide competitive intelligence that is beneficial when new lines of business are being considered



"Universal" Industrial Success Curve for Substantially New Products

Source: "3000 Raw Ideas = 1 Commercial Success!," Stevens & Burley, RTM, May-June 1997

INTEGRATION OF TECHNOLOGY PLANNING (R&D PORTFOLIO DEVELOPMENT) WITH BUSINESS STRATEGY

- Strategic planning is conducted at the business-unit level as well as the corporate level
- Challenge for technical leaders is to be effectively involved in the planning process at both levels
- Requires credibility as well as leadership
- Technology planning must be integrated with both the long-range vision as well as the short-term plans of business units

INTEGRATION OF TECHNOLOGY PLANNING (R&D PORTFOLIO DEVELOPMENT) WITH BUSINESS STRATEGY (cont'd)

- Process involves teamwork-- cross-functional teams that work together to create "seamless innovation" process
- Organizational structure of the technical function can have a significant impact on a firm's capacity for innovation
- A sophisticated information system is a critical element in innovation processes

R&D PORTFOLIO EVALUATION

- Ensure that projects support either the short- or long-term strategy of a business unit or the corporation
- Align focus, risk level, investment requirements, sales/profit potential, capital availability, production capability, etc. with these strategies
- Strategic approaches found more effective than financial models

EVALUATION OF R&D USING OPTIONS THINKING

- Approach brings a new view of uncertainty versus NPV from DCF
- More uncertainty, thus more opportunity for value creation
- Helps identify potential for future gain rather than risk of loss
- DCF focuses on most likely outcome sequence
- Options thinking encourages adaptive course adjustment that can demonstrate substantial value

DISCONTINUOUS INNOVATION

- Intent is to change the rules of the game
- Current equivalent of skunk works being used
- Time for independent research allowed by many companies
- Usual management practices can stifle radical thinking and approaches

DISCONTINUOUS INNOVATION SUCCESS KEYS

- Clearly articulate strategic intent to persons at all levels
- Establish virtually unreachable goals
- Deliberately target rich domains
- Rotate people between R&D and business units
- Expose people to the marketplace

METRICS TO ASSESS R&D EFFECTIVENESS

- Major barrier to effective use is collection of data required for input
- ROR Committee initiated industrial R&D database project with CIMS in 1993
- Data on R&D inputs and outputs collected at the firm, laboratory and business-segment level
- Also developed a "Technology Value Program"(TVP) to measure effectiveness of innovation process

METRICS TO ASSESS R&D EFFECTIVENESS (cont'd)

- Metrics included percentages of new sales and cost savings from products or processes introduced in the previous 3 to 5 years
- projected value of the R&D pipeline
- rating of product-technology benefits
- efficiency of internal technical processes
- project championship
- management support

*TVP is available as a software package and can be correlated with IRI/CIMS database.

MEMBERS CHOICE METRICS

IRI SURVEY RANKING

11.5	Strategic Alignment
10	Financial Return
9	Projected Value of the R&D Pipeline
7.8	Distribution of Technology Investment
6.8	Use of Project Milestones
5.5	Development Cycle Time
5.5	Customer Satisfaction
5	Number of Ways Technology is Exploited
5	Number of Projects Having Bus./Mkt. Approval
3	Market Share
2	Goal Clarity
2.3	Development Pipeline Milestones Achieved
1.8	Use of Cross-Functional Teams
1.5	Comparative Technology Investment
0.7	Project Championship
0.25	Sales Protected by Proprietary Position
0.2	Management Commitment & Accountability
NS	Use of Stage Gates Process
NS	Quality of Technology Plan
NS	R&D Climate
NS	Adequate Resources
NS	Quality of Technical Team

NS = Not Surveyed

Red = Benchmarked in CIMS Survey