Current Issues in Technology Management

SATM-ELI

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STEVENS ALLIANCE FOR TECHNOLOGY MANAGEMENT
EXECUTIVE LEADERSHIP INSTITUTE

Director's Note

The Stevens Alliance for Technology Management is partnering with the Executive Leadership Institute (ELI), which was founded in 2002 at Stevens. SATM and ELI focus on the intersection between business and technology management, and have in common the objective of improving the business impact of technology.

Our 2003 Conference on Business Process Redesign is being jointly sponsored by SATM and ELI. Another manifestation of this partnering initiative is visible in this issue's masthead. Henceforth, Current Issues in Technology Management will be published jointly by SATM and ELI.

ELI's mission includes building an international knowledge base defining the impact of technology confidence on business, and providing global technology management tools and databases to address business issues. ELI focuses on senior executives from global businesses, and in particular on the interrelationships of general management and technical management. Dr. Michael Cooper is the ELI Dean, and Dr. Larry French is Director, Technology.

A future issue will feature a contribution from ELI about their database development, along with early results. In the meantime, you can learn more about ELI by visiting eli.stevens.edu.

A second important association to report is with Columbia University's Fu Foundation School of Engineering and Applied Science, which has joined the list of SATM Sponsors. Several jointly sponsored events are in the planning stage, and details will be announced shortly.

I am certain that both these recent affiliations will broaden the reach of SATM and enrich the base of intellectual property we can bring to our Sponsors.

Portfolio Management of Technology Projects at ExxonMobil Chemical Company

Carol Fitzpatrick and Allen Clamen

INTRODUCTION

In 1996, ExxonMobil Chemical engaged in a systematic review of its practices in new product development and identified project portfolio management as a significant opportunity for improvement relative to recognized best practices. Though well experienced in the execution of the Stage-Gate process (1), having adopted this process in 1989 before it was in common usage, a comprehensive review of projects in polymer businesses showed a number of problems. There were far too many projects relative to resources, resulting in projects staffed with fractional resources. This led to lengthy development times, estimated to be over four years, on average. In addition, nearly half of all projects were terminated short of commercialization, but only after significant development resources had been invested. Project portfolio management practices were examined and composite case studies of a number of major companies suggested that new project starts could be reduced 10-20%, cycle times improved by 40-50%, and project

Continued on next page

Our last issue featured a summary by Robert Cooper of state-of-the-art techniques for maximizing the value of the firm's new product portfolio. This issue follows up with a contribution by Carol Fitzpatrick and Allen Clamen of ExxonMobil Chemical Company, who describe the application of portfolio management techniques across a large organization consisting of eleven independent businesses and a company-wide central R&D function.

This paper is based upon their well-received presentation at the 2002 Alliance Conference. Also summarized within are the "takeaways" from two SATM Roundtable meetings dealing with portfolio management.

Larry Gastwirt

STEVENS Institute of Technology

completions increased by about 30%. It was recognized that realization of even a fraction of these benefits would translate to significant earnings improvement for the company.

It's not surprising, in light of these statistics, that ExxonMobil Chemical took the step of identifying industry best practices in new product portfolio management, assessed gaps, made plans to close gaps, and implemented a new process. It is unusual, however, to have found a process with true staying power that delivers the promised results. The company has found its portfolio management process to be such an improvement. Of the eleven separate business units within ExxonMobil Chemical, four have model portfolio management practices, and most of the rest have systems in place or are in the process of putting a system in place. As a result, cycle time has been reduced between 30 to 45% within 1-2 years of each implementation, and these improvements have been sustained.

The scope of this paper is project portfolio management, as opposed to portfolio management in its broader sense, life cycle portfolio management, which has already been described in this publication (2). Even within this narrowed scope, however, a great deal is already understood about best practices (3) and, in fact, ExxonMobil Chemical's processes closely resemble published methods for the most part. Particular strengths, as reflected in comments by experts outside the company (4, 5), are management involvement, use of metrics, and the company's ability to apply both stage-gate and portfolio management principles to early-stage, pre-development efforts.

There is also a considerable amount of art in applying portfolio management across a large organization consisting of eleven independent businesses and a company-wide central R&D function. Enough consistency must be achieved at the framework level to insure common language and understanding, yet each business has a slightly different context for portfolio strategy, commercial and technical risk, and potential rewards. A general overview of the company's processes is given, with emphasis on these aspects.

Objectives of Portfolio Management

The primary objective of the company's portfolio management process is to insure that resources are focused on the "right" collection of technology projects within a business or business segment, given resource constraints. Cross-functional business teams serve the role of portfolio management teams, making independent decisions about what the "right" projects are. These teams are aided by portfolio views of the degree of alignment with strategic targets, the expected return of the portfolio, the balance of short-, medium-, and longer-term growth-oriented projects, and the balance of risk within the portfolio.

FIGURE 1

The Stages and Gates

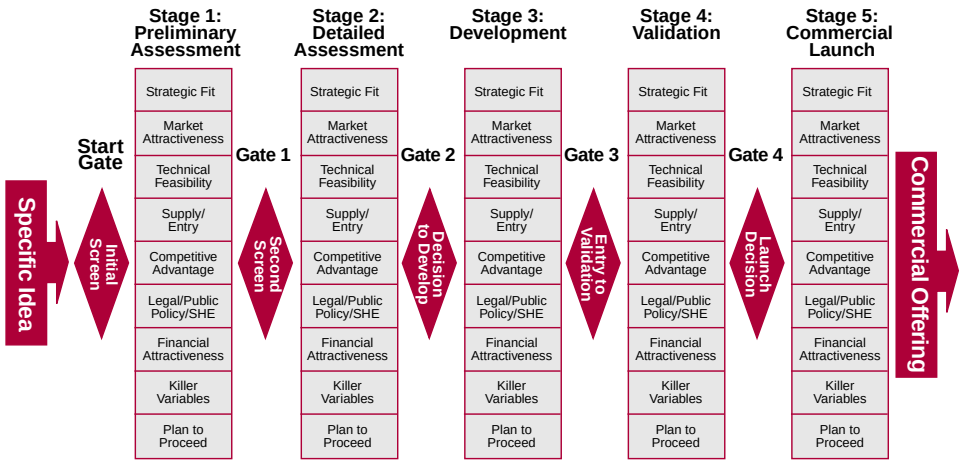
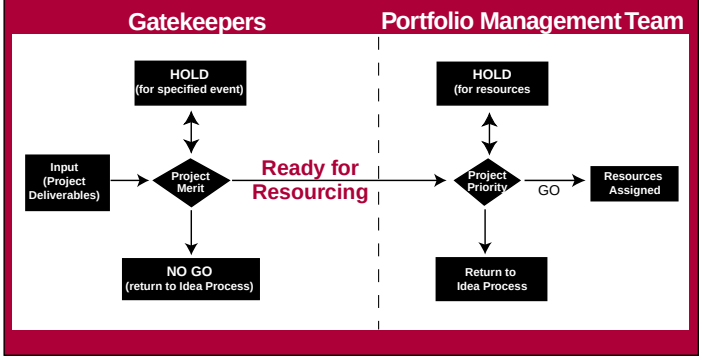


FIGURE 2

Gate Decision Flow Chart



We attribute much of the cycle time benefit, however, to the impact this process has on project management. Portfolio management teams help insure that project teams keep projects within scope and meet planned gate dates, much like gatekeepers. Improved project management is an important secondary objective of the company's process. Lastly, portfolio management is intended to impact the degree of organizational alignment around the technology pipeline. In the best cases (and we have several examples of portfolio teams working this way), sales, marketing, technology, manufacturing, and supply all understand the pipeline in about the same way, and actively contribute the right resources at the right times to insure timely commercialization.

Scope of Portfolio Management within ExxonMobil Chemical

The scope of ExxonMobil Chemical's portfolio management process includes the development of both new products and new manufacturing processes. It includes pre-development initiatives "fuzzily" defined by broad concepts of market opportunities and technical routes, through development activities aimed at commercialization of specific products for specific end-uses. Most, but not all, of these projects are in formal pre-development or development Stage-Gate systems.

The exceptions are projects being managed on annual cycles, rather than by stage of development. Though preferable to have all projects defined by stage, in practice, this only complicates portfolio management slightly. For example, the pipeline view can be recast in terms of years from commercialization instead of stage. By defining the scope broadly, the company has been able to assemble a complete picture of technology developments within and across its chemicals businesses.

Integration of project and portfolio management was carefully considered in the design of the current process. Stage-Gate project management provides decision-quality information, with the degree of detail tailored to the specific stage. on strategic fit, market attractiveness, technical feasibility, supply/entry pathway, competitive advantage, legal/public

policy/safety/health/environmental impacts, financial attractiveness, critical success factors, and expected development schedule and cost. See Figure 1 for an outline of the Stage-Gate process when beginning with a specific idea (as opposed to a "fuzzy" idea, which entails several pre-stages).

Gatekeepers make "ready for resourcing", "no go", or "hold" decisions on individual projects. When gatekeepers determine that new projects are ready, based on the absolute merits of the projects, to have resources allocated to them, cross-functional business teams (portfolio management teams) make real-time decisions on whether the new projects should break-in to the existing portfolio, based upon their priorities relative to existing projects. In addition, comprehensive portfolio review is done on a periodic basis by portfolio management teams, technology and business vice presidents, and the ExxonMobil Chemical president.

For small businesses, portfolio management teams and gatekeepers are often one and the same. In this case, gate reviews and subsequent resource decisions can usually be made at the same meeting, making an efficient process. For large businesses and the central R&D organization, gatekeeping and portfolio management teams are usually separate entities, and a two-step process is required to review a new project and determine whether it merits resources. This is illustrated in Figure 2.

Building and Sustaining a Quality Work Process and Tool

Two critical elements of building and sustaining this process are a quality work process and a quality tool to enable consistent project evaluation. Both are supported by a small, central group of experts, the Innovation Center of Expertise. More importantly, there has been a growing number of experienced portfolio planners residing in each business and in central R&D who contribute to the improvement of the overall process and transfer best practices among the different businesses.

The primary tool used by most portfolio planners is a central, web-based project portfolio management database. This custom-built system aids in the computation of project Net Present Values (NPVs), risks and fit with strategy.

In the computation of NPV (Figure 3), costs and expected revenues are determined for each project. All costs through commercialization are included, both capital and development costs. Development costs include, for example, technology, manufacturing and marketing efforts. Expected revenues for new products are computed from anticipated margins and volumes in cases where production is not already at maximum capacity. In cases where production is at maximum capacity, credit is only taken for improved margins on replacement products. For manufacturing improvements, benefits are typically computed from anticipated savings in production costs.

Risk is broken down into two types, commercial and technical. Best practice groups within the company assess technical risk from a series of qualitative questions about the complexity of the project (newness vs. familiarity), manufacturing capability (current capability vs. new), availability of pilot facilities and expected time to commercialization. (Figure 4). Based upon the answers, a quantitative estimate is derived for the probability of technical success of the project.

Similarly, commercial risk is assessed from a number of key questions such as the degree of market or customer interest, advantage to the customer, ease of customer implementation, competitive situation and market complexity. (Figure 5). This leads to a quantitative estimate of the probability of commercial success. Fit with strategy is typically judged by the degree of alignment of portfolio projects with market segment and project-type targets.

Effective work processes require appropriately defined roles and responsibilities, management involvement and the use of metrics to drive improvement. Portfolio management teams, typically led by a business' marketing manager, include a cross-section of managers from key functions involved in the development, testing, marketing, manufacturing and sale of new products. Portfolio planners insure data quality and consistency and provide graphical views of the portfolio and alternative portfolios under consideration. Common graphical views include portfolio risk vs. reward (NPV vs. probability of success) (Figure 6, where the probability of project success is represented as the product of the probabilities of commercial success, Sc, and technical success, St), and cumulative reward vs. cumulative go-forward development cost (Figure 7), for example.

Results are reviewed annually, at a minimum, by each business vice president and the company's president. Many of these same managers have detailed knowledge of the projects from their roles as gatekeepers and, in fact, vice presidents and the company's president have served as gatekeepers on some of the company's larger projects. Senior management is clearly engaged in portfolio management as a method of insuring the long-term health of the company's businesses, and these same managers are driving data quality and portfolio performance improvements.

Continued on page 6

FIGURE 3

Determination of Project NPV

Costs and expected revenues are determined for each project to calculate its Net Present Value (NPV), including:

- Development Costs (Technology, Mfg, Mktg)
- Capital Costs
- Product volume/margin over time

NPV is adjusted for probability of :

- Commercial success
- Technical success

FIGURE 4

Factors Impacting Technical Success

- Project complexity (newness vs. familiarity)
- Manufacturing capability (or capital requirement)
- Availability of pilot facilities (if new platform)
- Expected time to commercialize (go-forward)

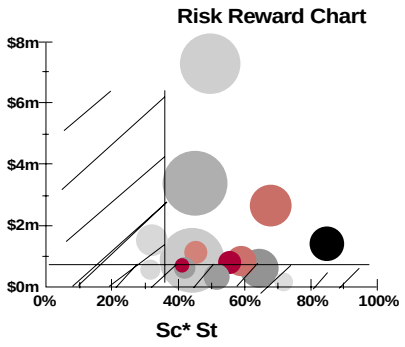
FIGURE 5

Factors Impacting Commercial Success

- Degree of market or customer need
- Recognition of customer advantage
- Ease of customer implementation
- Competitive situation (no./intensity)
- Market complexity (maturity vs. familiarity)
- Duration of competitive advantage
- Regulatory/environmental impact

FIGURE 6

Risk-Reward Chart (NPV vs. Probability of Success)



Roundtable Meeting Take-Aways

PORTFOLIO MANAGEMENT

The Alliance conducted two Roundtable Meetings in 2002 specifically focused on portfolio management.
The first was held at Unilever Bestfoods in Somerset in February. Following five meetings devoted to the general theme of managing individual projects, this session initiated an extension to the topic of managing the portfolio of projects. The speakers/facilitators were Aaron Shenhar, Professor at the Howe School of Technology Management at Stevens, and William Ausura, formerly Director, Product Marketing & Product Management Practices Group of Lucent Technologies' Bell Laboratories.

Following the June Conference on Portfolio Management, the August Roundtable provided the opportunity to discuss the significant learnings from the Conference presentations. Audrey Curtis, formerly of AT&T and currently director of the telecommunications management graduate program at the Howe School of Technology Management, led a highly interactive discussion. Ron Eilertson and Keith Saunders of Teknor Apex discussed their company's efforts in developing/implementing a portfolio management process based on the materials presented by Bob Cooper at the Conference.

Here are summary highlights from each of the four facilitators presenting in the February and August Roundtable sessions.

Aaron Shenhar

- Activities involved in portfolio management are project selection, setting priorities, organizing for multiple projects, allocating resources, portfolio review and assessment, and project termination.
- The most critical step in portfolio management is to prioritize the project list. Conventional methods of either choosing the easiest and lowest risk projects first ("Pick-Up Stix" approach) or the "string" method of selecting the most attractive projects first are a good first step, but not sufficient.
- Recommends adopting a step-wise process: list all projects in a comprehensive database; segregate the projects into project types; establish a policy for project prioritization; prioritize projects in the database according to the policy; allocate resources appropriately; and establish a dynamic process for adding and removing projects.
- Suggests two different methods for defining (classifying) project types:
  - Strategic Goal Classification – divide projects into four major types: extensions, strategic, problem solving, or utility
  - Project Analysis Framework– classifying based upon Shenhar's UPC (Uncertainty-Complexity-Pace) model
    - Uncertainty
      - Market (derivative, platform, breakthrough)
      - Technology – can use technological difficulty vs. system scope
    - Complexity
    - Pace – regular, fast, blitz
- By classifying projects according to these frameworks – and/or others – management can make strategic prioritization to optimize outcomes.

Bill Ausura

In summary, Bill recommended eight steps in implementing a portfolio management process:

1) Decide what business you're in and clearly communicate the high level vision and strategy to entire corporate population so everyone gets same message and outline from the start.
2) Segment target markets to define and prioritize opportunities and set portfolio level directions. This begins to focus development priorities at a high level.
3) Develop Technology and Product Technology Roadmaps in the prioritized product portfolio areas, based again on vision, strategy and segmentation.
4) Analyze portfolios against 1-3, and define required portfolio actions (purge, merge, leverage).
5) Develop product/service platform plans & architectures based on 1-4 for multiple timeframes (e.g. 10 year planning

horizon, 5 year, 1 year). Budget based on these views.

6) Execute projects according to these plans within a cross-functional product and project team structure – NOT in functional silo mode.
7) Dictate that all major projects (products/services/solutions) must have business cases with defensible financial analyses, and follow basic stage-gate discipline to deliver complete and supportable products and services that are ready for deployment. Cases are the responsibility of cross-functional team leaders/members in a matrixed environment.
8) Track all product/service results in standard, disciplined manner within teams and General Manager units on monthly, quarterly, annual basis such that results roll up, down, and horizontally. The business enterprise should be scalable vertically and horizontally, and all business processes should be designed and implemented to support this structure.

Audrey Curtis, *Stevens (formerly AT&T)*

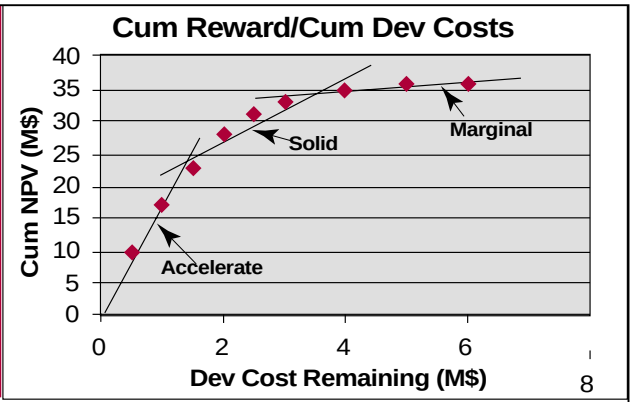
- To define portfolio management for the purpose of our discussion, Audrey drew upon concepts used at the Conference:
  - It is about resource allocation -- which projects shall the firm fund from among many opportunities, and the relative prioritization of these; it is the operationalization of business strategy (Cooper)
  - It is the balancing of all your product management skills and resources to achieve optimum strategic, financial and operational impact across all product lines in all life cycle phases (Ausura)
- Audrey asked the organizations present if/how they were using portfolio management techniques.
  - ARDEC – is looking for an event to start a formal process – they have been using forms of portfolio management for new business initiatives, cost analyses, and in R&D prioritization.
  - Teknor Apex – (see Eilertson/Saunders comments below.) They have a clearly defined "change agent" in John Andries, their chief technology officer, and are working to get strong support from their business units for initiating formal portfolio management.
  - Unilever Bestfoods – having been recently acquired, Bestfoods is considering adopting Unilever's established formal, computerized process for portfolio management. The process is used for communications and as a tool for decision-making. From a portfolio management perspective, Ned Jarmas expressed the view that the process may not emphasize cost reduction projects adequately, and Bestfoods is still evaluating the process for its applicability to them.
  - ISO – Roy Nicolosi stated that ISO uses a process that combines acquisition strategies with new software product development. ISO is trying to make the process work but is impeded by having decentralized business units.
  - AT&T – Bob Kostelak commented that the major area where portfolio management is employed is when projects must be killed -- it is a "political" way to cut projects. The process works well in the Labs. Employee longevity in position is a key issue in maintaining a portfolio management process.
- One of the key learnings from Cooper's presentation is that the value of a portfolio management process is to decide "are we doing the right things?" This is in contrast to a new product development process such as the "stage-gate" process, that addresses the issue "are we doing things right?"
- Another key learning is that it is critical that a portfolio management process be driven by a solid business strategy.
- It is necessary to make certain when instituting portfolio management, as with any management process, that the process is not made too enslaving or cumbersome.
- As with so many processes, steadiness in implementation is a problem. For example, employee turnover is a major issue in maintaining a process.
- Audrey reiterated the management practices for a successful portfolio management process:
  - Develop clearly-articulated business strategy
  - Assemble cross-functional team to prioritize projects
  - Establish clear accountability for results
  - Ensure organizational alignment and commitment
  - Require business unit ownership of process
  - Provide high-quality data (especially in financial/cost area)
  - Establish centers of expertise for process implementation

Ron Eilertson and Keith Saunders, *Teknor Apex*

- Teknor Apex has learned from their implementation of the State-Gate process that their process is too rigid, and that they suffer from not having a vehicle (process) for comparing/prioritizing among projects. They were experiencing "tunnel", not "funnel", and want more good ideas to come through and be prioritized.
- They have elected to implement a portfolio management process to allow them to select the "right" projects that follow their corporate strategy, which they feel they are not doing well today. They also need a good method for prioritization to avoid overloading, especially with respect to their technical resources.
- They have started to develop/implement a formal portfolio management process based upon the concepts of Bob Cooper.
- They have assigned both technical and business unit managers to manage the process, with business unit managers as the primary champions of the process.
- Their three adopted tenets include:
  - Utilize Hoechst scoring method based upon four factors that include both strategic and financial measures;
  - Establish portfolio balance by contrasting probability of technical success and potential reward to the company, as measured by economic value added;
  - Assure link to strategy utilizing "strategic buckets".
- They discussed the factors they are taking into account to attach quantitative ratings to the probabilities of technical and commercial success, as well as to fit with business strategy. ■

EXHIBIT 7

"Valuation" Graphic Facilitates Project Selection



Project Rating	Recommended Responses
Accelerate	Take action to assure success: • Add resource if it will speed completion or reduce risk • Remove barriers to rapid progress (e.g., PIP streamlining) • Gatekeepers take more active role in encouraging success
Solid	Continue on plan
Marginal	Consider "holding" project and re-deploying resources

Metrics

Performance metrics most commonly used include cycle time, total NPV of projects launched during the most recent period, and late "no go's", which are decisions to stop providing resources to a project after a decision to develop had previously been made. Metrics are obtained on a company-wide basis every six months by the Innovation Center of Expertise and on an as-needed basis by the businesses.

Metrics are used in a variety of different ways. In an obvious example, they are used to track progress toward improvement goals. In one recent portfolio management launch, the technology manager introduced each training session with explicit targets for cycle time reduction and earnings improvement. Perhaps less obvious is the utilization of metrics for identifying best practices in a large, dispersed organization. Follow-up interviews with business groups demonstrating relatively high NPV delivery with relatively short cycle times or low levels of late "no go" decisions have invariably shed light on previously unrecognized exemplary practices.

Portfolio Management and Stage-Gate Management for Projects in Early Stages

Portfolio management and stage-gate principles have been adapted to pre-development work as well. One critical success factor for applying the stage-gate process to very early stage work is the insertion of gates at points consistent with the natural work process. This usually includes an "expansion" stage where alternative solutions to the problem are explored, followed by a stage where solutions are tested for feasibility and prioritized.

A second key success factor has been the development of ground rules for gatekeeping and criteria for "go" and "no go" decisions that are appropriate to early stage work. Portfolio management of the primarily pre-development, central R&D portfolio is done in partnership with both technology and marketing contacts from the business units, and is given a significant amount of oversight by senior management in the company.

Guiding Principles and Effective Management Practices

These have been summarized by Clamen, et. al. (6, 7). An essential principle (Figure 8) is providing clarity in team and individual responsibilities and backing up the assignment of responsibilities with training, facilitation, and use of metrics. Ownership can be achieved by engaging all resources involved in the commercialization of new technologies. Leadership must be established to insure accountability, provide rewards and recognition, and to provide opportunities to learn from failures. Portfolio management processes should be well integrated with existing company processes and flexible enough to be customized, incorporating the knowledge gained with experience.

Special responsibilities for management include developing clearly-articulated business strategy, assembling cross-functional portfolio management team(s), insuring organizational alignment and commitment, requiring business ownership of the process, insuring high-quality data (especially financial and cost data) and establishing centers of expertise for process implementation.

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1. Cooper, R. G. Winning at New Products; Perseus: Cambridge, MA, 2001
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3. Cooper, R. G.; Edgett, S. J.; Kleinschmidt, E. J. Portfolio Management for New Products; Perseus: Cambridge, MA, 2001
4. Cooper, R. G.; Edgett, S. J.; Kleinschmidt, E. J. Research Technology Management 2002 Sept.-Oct., 26.
5. Wright, S.; Brown, M., APQC Final Report on Improving New Product Development Performance and Practices, October 29-30, 2002, personal communication.
6. Davidson, Clamen and Karol, Research Technology Management 1999 July-Aug. 12-18.
7. Clamen, A. Presented at the SATM Conference on Portfolio Management, June 20, 2002.

FIGURE 8

Guiding Principles for EffectivePM Implementation

Source: Davidson, Clamen & Karol, R-T Mgmt July-Aug.1999

Clarity
- Define team/individual responsibilities
- Provide training/facilitation/metrics

Ownership
- Engage all resources, ensure buy-in, train project mgrs
- Co-locate all team members, whenever possible

Leadership
- Ensure gatekeeper/PM team commitment/accountability
- Provide rewards/recognition, learn from failures

Integration
- Provide linkages to all internal processes

Flexibility
- Leverage learnings/experience to customize process

The authors:

Dr. Carol Fitzpatrick has been with ExxonMobil since receiving her Ph.D. in Analytical Chemistry from Purdue University in 1990. She spent the next ten years in analytical characterization studies supporting the development of advanced catalysts, processes, and products. In 2001, she became Manager of ExxonMobil Chemical Company's Technology Innovation Processes.

Dr. Allen Clamen retired from ExxonMobil Chemical Company in 2001, after a career spanning 35 years. His last position prior to his retirement was senior advisor, marketing/technology value creation. In this role he led teams responsible for developing improved marketing and technology processes, specifically for idea management, portfolio management, and the stage-gate management of new product development projects. Allen holds a Ph.D. in chemical engineering from McGill University.

Book Review

SERIOUS PLAY: HOW THE WORLD'S BEST COMPANIES SIMULATE TO INNOVATE

AUTHOR: MICHAEL SCHRAGE

PUBLISHED BY HARVARD BUSINESS SCHOOL PRESS IN 2000

By Jack McGourty

Recommendation: Take this book seriously. Serious Play by Michael Schrage is a book that can be easily read in one sitting, but the learning and guidance applies throughout one's technology career. What is the book about? The easy answer - how prototyping enables sustained innovation in an organization.

Schrage's search for organizational models of collaboration has led him into rapid prototyping. He has authored several books on teams and new models of collaboration including the critically acclaimed, *Shared Minds: The New Technologies of Collaboration* [Random House 1990]. He believes that prototyping becomes a key to collaboration and, with that, to the vocabulary of sustained innovation. Each successive prototype enlarges that vocabulary and deepens both designer and customer understanding. However, the book has a more profound message based on turning upside down many assumptions that most project leaders currently hold. For example, did you ever consider how your use of prototypes and models drive your innovation process rather than the other way around?

Before you consider, let's review some of the book's highlights. The book focuses on how many of the world's leading companies model, prototype, and simulate to generate a climate of sustained innovation. Through performance data and anecdotes from well-recognized organizations, the author makes a strong argument for how the process of prototyping has become a key mechanism for creating value and managing risk. Models and simulations, completely revolutionalized by digital technologies, allow for cost effective idea generation and creative collaborations. With today's technologies, designers can readily simulate and test new ideas.

In fact, the book wisely warns organizations that managing their prototyping processes effectively is not enough. One must also deal with resulting large portfolios of models, similar to managing product portfolios, in order to capitalize on their true value. The author takes a step further by suggesting that one can learn much about an organization's culture for innovation by what models and prototypes are not developed--which ones are considered taboo.

Here is how the book is organized: Part I: Getting Real, Part II: Model Behavior, and Part III: S(t)imulating Innovation. Schrage then provides a User's Guide and Bibliography. There are many practical suggestions and practices throughout the book with helpful sidebars along the way.

Through performance data and anecdotes from well-recognized organizations, the author makes a strong argument for how the process of prototyping has become a key mechanism for creating value and managing risk.

Beginning with a valuable description on how low-cost spreadsheets launched " the largest and most significant experiment in rapid prototyping and simulation in the history of business", the book is replete with interesting case studies and short stories drawing from organizations as diverse as Walt Disney, Boeing, Merrill Lynch, General Electric, Sony, Microsoft, IDEO and MIT's Media Lab, where the author has served as a research associate. Their stories provide the reader with insight into the common practices and behaviors that distinguish productive prototyping organizations from those that actually hinder innovation due to their "pathological" modeling culture. The core theme of these stories: an organization can dominate an industry when it manages prototyping processes effectively and uses its innovations to continually transform itself and its relationships with its customers.

Now consider the earlier question: Does prototyping behavior influence the organization's overall innovation process? Well according to Schrage, it sure does. In fact, it takes cultural change for an organization to embrace prototyping as a way to stimulate new product and process development. Part of the cultural change is a shift to prototype-driven product specifications rather than specification-driven prototypes. Schrage believes that this approach can transform how people approach product and process development. He states that prototypes can drive and manage the innovation process by forcing design and development teams to better understand themselves via introspection rather than focus on the problem itself. "Innovative prototypes generate innovative teams," he argues.

In the preface, Schrage states that "…prototyping is probably the single most pragmatic behavior the innovative firm can practice…" It is about "…improvising with the unanticipated in ways that create new value…The ability to align those improvements cost-effectively with the needs of customers, clients, and markets dramatically boosts the odds for competitive success. That is the essential message of this book." -- a message worth playing with seriously.

About the author: Michael Schrage, MIT Media Lab, New York and Boston, is a widely published journalist and management expert. He writes and consults on the ways technology reshapes business relationships. He explores collaborative design issues and new media technologies as a research associate with the MIT Sloan School's Centre for Co-ordination Science and the MIT Media Lab. ■

SATM-ELI

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UPCOMING EVENTS

The **2003 SATM-ELI Conference** on **Business Process Redesign** will provide fresh insights into the next wave of process and management innovation. It will bring you up to date on new ways of managing and new process methodologies, focusing on the implementation of effective new business processes in the context of a system of management.

The keynote speaker is **Martin Stankard**, whose 2002 book, "Management Systems and Organizational Performance," redesigns and simplifies the Baldridge Criteria for use in boosting business performance.

The Conference is being held on Tuesday, May 6, 9:00 AM-4:00 PM, at AT&T in Bedminster, NJ. You can download the Conference announcement and application from the SATM web site or phone Sharen Glennon at 201-216-5381.

The next **Roundtable meeting**, following up on the topic of achieving breakthroughs, will focus on keys to developing "blockbuster" new products.

Professor **Gary Lynn** will be the principle facilitator, summarizing the learnings discussed in his 2002 book, "Blockbusters." The meeting will be held on Thursday, July 17 from 2:00-5:00 PM, at the Unilever Bestfoods facility in Edgewater Cliffs, NJ

The first **SATM-ELI Seminar** in a new series on current topics in technology management will be devoted to exploring frontiers in project management. The seminar series will be held at Columbia University in the near future: Details forthcoming.

For further information on these and other Alliance activities, contact Dr. Lawrence Gastwirt: **212-794-3637 • lgastwirt@aol.com**

INFORMATION

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