

Diamonds are forever

project type profiling (PtP) based on the ideal company project

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Abstract

“Best practices” are those techniques that provide consistent success in an organization and are used as a benchmark. However, due to the diverse nature of projects, identifying the most appropriate practices for a project is not an easy task. In the current paper, we present a method to develop and implement best practices in a high-tech project-based company. One of the company's best projects is identified, modeled, and used as reference for further projects. The process starts with an analysis of this “Ideal Project” based on the Diamond Model (Shenar & Dvir, 2007) to classify the appropriate management style and processes. The final phase involves a comparison of new projects to the company's ultimate project to define the management approach that promotes project success. Project Type Profiling (PtP) is demonstrated based on a 'WOW' project in an Israeli high-tech company.

Introduction

As the project management world proceeds from the traditional methodology to advanced iterative approaches, several management styles related to innovation, creativity, and learning are adjusted and adopted (Leybourne, 2008). Although a project is still defined as “a temporary endeavor undertaken to create a unique product, service, or result” (PMI, 2008, p.5), the concept of “a project is a project is a project” is no longer sustainable. This means that, even though every project is initiated, planned, executed, controlled, and closed, it is crucial to identify the project type and find the fitting project manager and appropriate management style in order to succeed (Dvir et al., 2006). This concept, which is best expressed by the idiom that “one size does not fit all” (Shenhar et al., 2005), is based on the understanding that not all projects have similar attributes; hence, they should be managed with different approaches and styles. Finding the right management style for a specific project and choosing the proper procedures, are not trivial tasks.

In the current paper we suggest using the organizational knowledge as related to best practices in project management methodologies to increase the probability of project success. We base our study on the assumption that modern organizations are constantly moving towards achieving their vision by managing a portfolio of projects. Every one of these projects is a separate entity that presents a well-defined task with a set of constraints, including a given budget and a binding schedule. However, because the organization has a history of managing projects, either successfully or unsuccessfully, it accumulates lessons, insights, and knowledge that can be used effectively in current and future projects (Andersen & Jessen, 2003). The process of learning from past experiences for future endeavors provides an organization with specific and relevant knowledge that fits the organizational core business activities, its professionals' capabilities, and its standards, procedures, and culture. Therefore, we suggest that an organization should review its previous projects and carefully select a project that was executed successfully and can fulfill the role of an exemplar. The Diamond Model, presented by Shenhar and Dvir (2007), offers an effective tool for analyzing projects based on four dimensions: Novelty, Technology, Complexity, and Pace. The analysis of the organizational Ideal Project, using the Diamond Model, provides an organization with a set of best practices and management guidelines for successful projects.

The following sections of this paper describe the Diamond Model and its theoretical background with respect to each one of the four dimensions. A case study is presented, starting with a general description of the company and a detailed description of the organizational Ideal Project. Following that is an analysis of the exemplar project based on the terminology of the Diamond Model, to identify organizational best practices and their implementation on other company projects during the following years. We conclude with several insights concerning the process of identifying the company's best practices and applying them to projects, and finally, practical guidelines on how to implement PtP in technological organizations.

The Diamond Model

Shenhar and Dvir (2007) suggested an approach for successful management of projects by presenting the Diamond Model, a management approach representing four dimensional aspects: novelty, technology, complexity, and pace. They argue that "the diamond is designed to provide a disciplined tool for analyzing the expected benefits and risks of a project and developing a set of rules and behaviors for each project type" (p. 13). Exhibit 1 displays the Diamond Model.

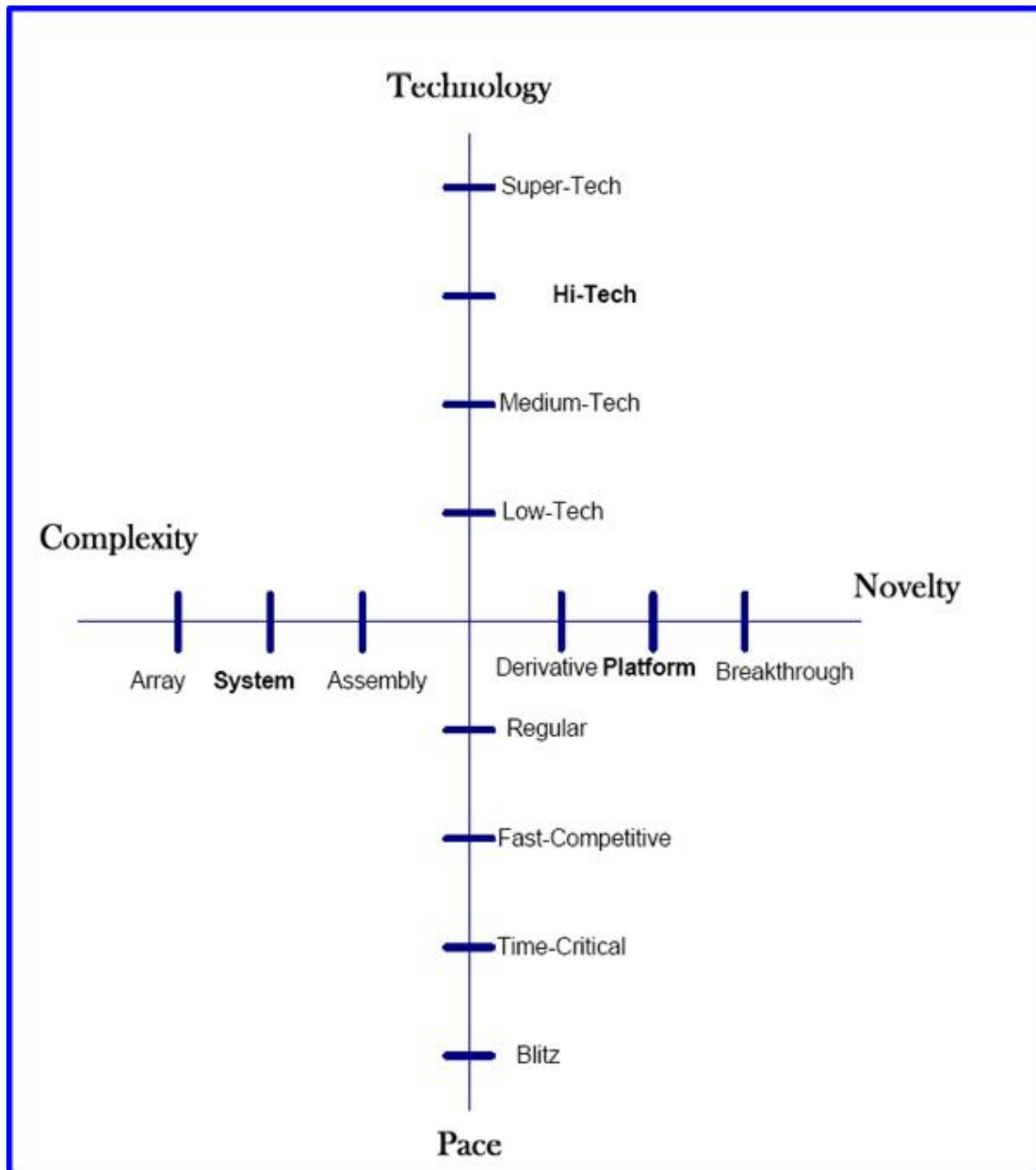


Exhibit 1: The Diamond Model (Shenhar & Dvir, 2007)

In the following subsections we briefly present each one of the diamond's dimensions and discuss the appropriate management styles.

Novelty

The novelty dimension is related to the marketing aspect of project management as reflected by the level of innovation of the product. As a result of assessing how new the product is to the customers and users, it is categorized as derivative, platform, or breakthrough. Derivative novelty is assigned to projects that offer an upgrade or improvement of an existing product, platform is assigned to projects that are targeted to develop a new line of products,

and breakthrough is assigned to projects that aim to develop an unknown product that is totally unfamiliar.

Novelty, newness, or innovativeness is defined in a subjective way as the product perceived by the project management team and prospective customers and users (Brockhoff, 2006). Its significant impact on project management, however, is acknowledged by many researchers, as it impacts the processes of market analysis and product definition, and product marketing. For example, in new product development (NPD) projects, the level of ambiguity or 'fuzziness' is usually high as derived from the level of product novelty. Hence the project manager administers the ambiguity by a constant harmonizing of the need for clarity and for novelty and flexibility (Brun & Saetre, 2009).

Technology

The technology dimension concerns the technical activities, including design, developing, testing, and prototyping. It ranges from low-tech projects, which are based on known and established technology, through medium-tech and high-tech projects to super-high-tech projects that are based on technology that is still not available and is developed as part of the project (Shenhar et al., 2005). The project lifecycle is affected by the level of technology applied, because higher technology requires additional design cycles. Therefore, innovative projects tend to use adaptive, dynamic, and agile methodologies, such as Scrum or XP (Extreme Programming) that allow multiple design cycles (Collyer & Warren, 2009). In these types of projects, the freezing stage is usually delayed to an advanced phase of the project lifecycle in order to enable changes and modifications. Another managerial aspect of managing high-tech and super-high-tech projects is related to formality and communications. Several research studies recognize formality and performance as distinct constructs of project execution, where a positive relationship was found between formality and the performance achievements in R&D projects that allow a high level of discretion (Naveh, 2007).

Olausson and Berggen (2010) argue that the development of high-tech and super-high-tech projects requires an integration and balance of formal organizational control and project flexibility. They studied R&D projects and found four key elements of such an integrated approach: hybrid formal systems, structured interaction in public arenas, transparent visual communication tools, and a system of participative reflection.

Complexity

The complexity dimension represents the system scope of the project and affects the organizational structure and formality of project management. The product complexity can be classified according to several levels, starting with a material that is a physical substance, continuing with a component that is an element of a subsystem that cannot work alone, through a subsystem and system that are integrated collections of components or units, a platform that is a base for other systems, and an array or system of systems that is a network

of systems functioning together (Shenhar & Dvir, 2007). As the product complexity level defines the hierarchy of project complexity, there are only three levels of project complexity that represent different management styles: assembly projects, system projects, and array projects.

While assembly projects are performed by a single organization using simple tools for planning and control, system and array projects require advanced tools and sophisticated 'soft skills' such as managerial focus and leadership. For example, Rietsema & Watkins (2012) discuss the leadership style that correlates to the management of complex projects and suggest that complex systems require holistic and comprehensive leadership that applies collaborative and cooperative functions. A similar approach, called project management system pragmatics, is presented by Cavaleri & Reed (2008) for management of dynamic complex systems. This approach is based on the concept of being a project leader as well as project manager in guiding projects to higher levels of effectiveness. To conclude, assembly projects need simple management tools and techniques, while system and array projects necessitate multipart organization that functions with advanced procedures for planning, reporting, controlling, and managing, and project managers that are also motivating leaders.

Pace

The pace dimension of a project depicts the timeframe and the schedule by answering the question: How urgent is it to finalize the project and deliver the product? There are four levels of project pace: regular, fast/competitive, time-critical, and blitz (Shenhar & Dvir, 2007). In regular projects, the time factor is not critical to organizational success, while in fast/competitive projects, project completion is important to achieve organizational competitive advantage, and hence the focus is on time to market. The procedures are structured and top management is involved in approvals at major milestones.

Time-critical projects are those endeavors that are centered on a specific window, and any delay means project failure. Thus, the organizational structure is usually project-based and the personnel are specifically selected. Van Aken et al. (2010) introduced a framework for the design and management of short-term improvement projects, and suggested to focus on the clear definition of goals, schedule extended follow-up activities, define measures to track results, and share relevant knowledge. Other research, aimed at identifying key team factors associated with fast implementation of capital projects, found that strategic management of project personnel can drive project speed, mainly by continuity of project leadership and the use of cross-functionality integrated teams (Scott-Young & Samson, 2009). These managerial activities are aligned with short and focused processes executed in a tight schedule with high involvement of top management, as presented by the Diamond Model. The most intense project type as far as pace is concerned, is the blitz type. These are crisis projects that have to be completed as soon as possible. Due to the urgency of completing the project, no bureaucracy or documentation are applied, and top management is involved at all times.

Summary

The Diamond Model, as presented by Shenhar & Dvir (2007), offers a four-dimensional infrastructure to analyze a project and apply the most appropriate management style. It is important to identify the correct level of the project in every one of the dimensions in order to adapt the fitting leadership form, managerial activities, and operational processes and procedures (Shenhar, 2001a, 2001b). In the following section, we describe what is perceived as the “Ideal Project” executed in a high-tech company and subsequently is the ultimate archetype in this company for future projects.

A Case Study

The Company

ECI Telecom delivers advanced communications platforms to carriers and service providers worldwide. ECI provides innovative platforms and solutions that enable customers to rapidly deploy cost-effective, revenue-generating services.

Founded in 1961, Israel-based ECI has consistently delivered customer-focused networking solutions to the world’s largest carriers. The Company provides scalable broadband access, a transport and data networking infrastructure that provides the foundation for the communications of tomorrow, including next-generation voice, IPTV, mobility, and other business solutions.

ECI is a global company headquartered in Israel, with R&D centers in China, India, and Israel.

The Ideal Project

An outstanding project is the DTX360A executed by ECI in the early years of 1990. Since it met complex functional requirements and project scope and led to a phenomenal financial and business success, this project is selected as an Ideal Project. The DTX360A is a second-generation telephone line doubling communication system (aka DCME – Digital Circuit Multiplication Equipment).

What is a Telephone Line Doubling System?

At the end of the seventies, ECI developed an innovative line of products called Telephone Line Doubler (TLD), later named Digital Trunk eXpander (DTX). The product was based on a prototype originally developed for the signal corps to scramble telephone calls, and enabled the number of calls on analog lines to be doubled. The underlying concept was that, since average utilization of voice capacity on a telephone channel is only 37%, the “quiet” times during calls (“quiet” spaces of the channel) could be identified and used for additional calls. This initially, on average, doubled the utilization of the lines and later, the

development of DCME, a system with advanced compression technologies, increased the capacity of the lines even more.

The TLD Project hailed an innovative and very important breakthrough in the world of telecommunications. ECI showed creativity in identifying the potential of and implementing existing technologies, also known to its competitors, to create a working product that changed the face of telecommunications.

Marking 60 years of Israeli independence, the Office of the Chief Scientist granted Outstanding Achievement Awards to prominent R&D projects that led to technological breakthroughs with an important impact on our lives. ECI's Telephone Line Doubler System was selected as one of nine projects (out of 40,000 (!) nominated projects), to win this prestigious award.

Analyzing the Ideal Project Using the Diamond Model

The DTX360A project classification according to the Diamond Model is described in Exhibit 2.

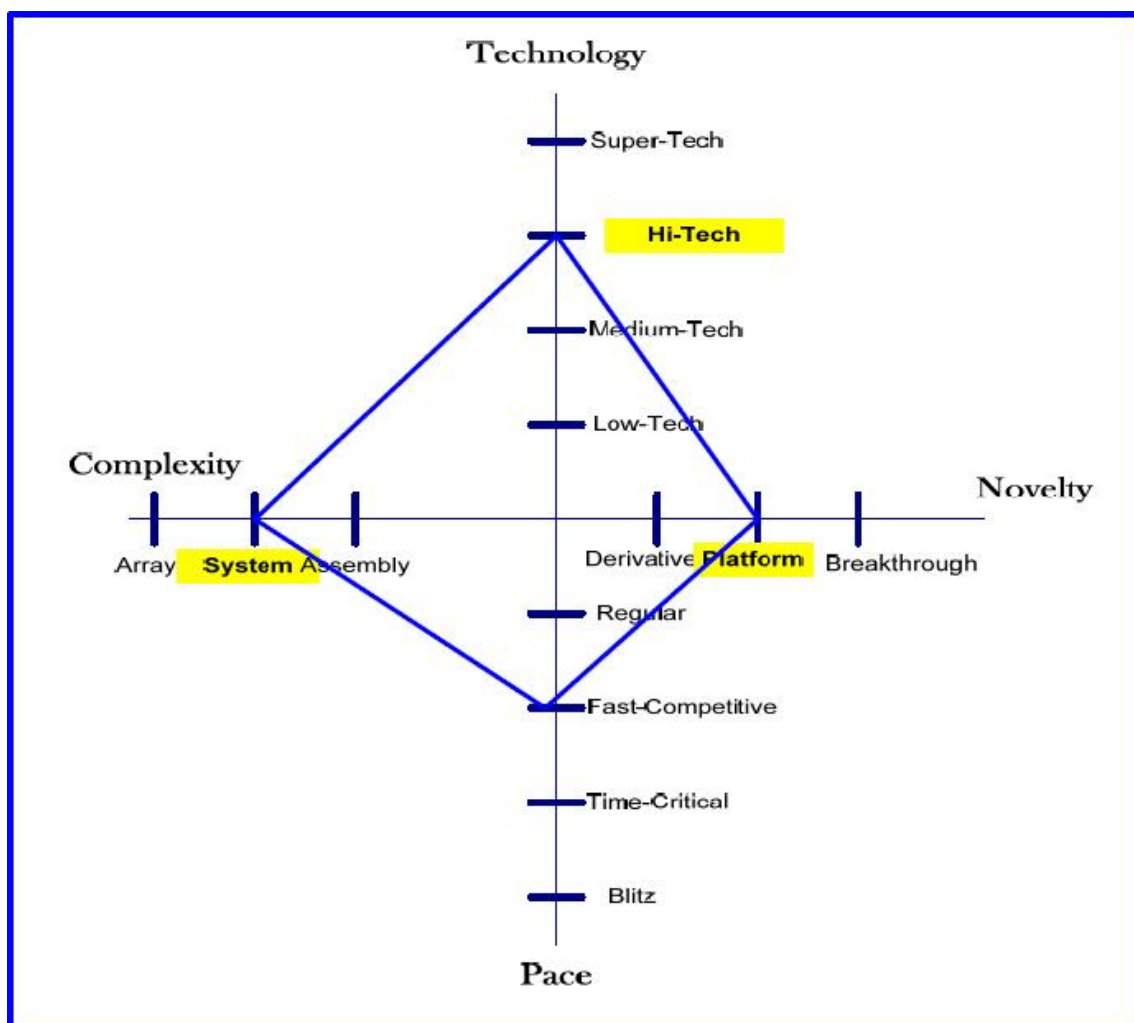


Exhibit 2: DTX360A project according to Diamond Model

Novelty

As the project is a redesign of a first-generation DCME system, the concept is not entirely novel to ECI or to the world. However, since this new DCME system incorporates new system requirements addressing nearly all aspects of a DCME system, and necessitates a challenging software design and totally new hardware backplane and cards, the project is classified as a new platform.

Technology

This project fits into the “Hi-Tech” position on the technology scale. It is based primarily on new compression technologies, new central processing units, and new data and facsimile signal processing technologies, where the software is required to meet strict real-time requirements.

Complexity

The project is classified as complexity ‘System’. The new DTX360A is constructed from multi-disciplinary subsystems involving many groups, including but not limited to the following functional teams:

- System engineering
- Simulation
- Hardware
- Digital signal processing
- Real-time embedded software groups
- Network management
- Validation and verification.

In total, more than 60 people were assigned to the project.

Pace

When examining the pace at which this project had to proceed in order to be successful, it would be rated as a “fast-competitive” project. ECI came out with a great first-generation DCME, the market demand for such equipment could be defined as extremely ‘hot’, and, therefore, ECI had to be ready to deliver the advanced system before competitors could ‘catch up’ and seize parts of the world market.

Insights and Practical Guidelines

DTX360A Project Management Approach

When listing best practices experienced in the DTX360A project, two levels of management techniques are identified. The first level refers to standard managerial and operational aspects of project planning, execution, and monitoring. The second level addresses more subtle ‘soft’ areas of Project Management that are associated with the special project spirit.

Examples of both levels of management techniques practiced in the DTX360A are mapped to the NTCP Dimension in Exhibit 3 and Exhibit 4.

DTX360A Standard Project Management

Classification	DTX360A – Management Approach
Platform	Allocating time to get requirements right! Doing extensive market research to assure competitive advantage Being active in standards bodies to guarantee standards are in accordance with ECI’s view Creating product image emphasizing product advantage
Hi-Tech	Expecting overruns/surprises Early planning for proof-of-concept
System	Complex and detailed planning Advanced and new computerized tools Tight formal control on technical and schedule issues Formal and highly professional documentation Risk involving difficulty in integrating all subsystems in an effective and efficient manner, while assuring that the new technologies are tested as early as possible in the project timeframe
Fast Competitive	Strong coordination of teams Partial integrations and clear monitoring and approval points

Exhibit 3: DTX360A Best Practices – Level 1

DTX360A Project Management Spirit – The ‘Spice’ that Made It All Work

“Project Spirit” is the unique culture and climate that is built into a project by the project leadership. It is the ‘extra mile’ that management and engineer teams go in order to ‘make all things click’.

The DTX360A experienced electrifying project atmosphere. The development of the DCME systems cultivated an innovative culture in ECI for years to come. The unique project spirit and ‘can-do’ ‘we are number 1’ attitude experienced during the project, formed a lasting company DNA of innovation and technical expertise.

Exhibit 4 lists examples of best practices related to inspiration and vision, mapped to the NTCP dimensions that were part of the ongoing processes during the DTX360A project.

Classification	DTX360A Management Approach
Platform	Managing by walking around Marketing R&D good communications, trust Maintaining a continuous, end-to-end system view World leader in DCME systems
Hi-Tech	Early detection of tough problems 'Don't kill the messenger' policy Technical leadership Passion from the top Senior project sponsorship Leadership by example, taking responsibility for delays Adopting new tools that help facilitate end results Ready for surprises Identifying and developing generic solutions
System	High quality deliverables Efficient and quick conflict resolution Open-minded 'We're all in the same boat' approach 'Pinball' principle (reward for a job well done) being assigned to new challenging tasks/projects Reuse/Don't invent the wheel – learning/copying available solutions from other teams
Fast Competitive	Representatives of all key groups during integrations No by-the-book stringent rules

Exhibit 4: DTX360A Best Practices – Level 2

Applying the Ideal Project Best Practices to Company Projects

In this section, we show how best practices observed in the Ideal Project were incorporated in later company projects.

Five diverse projects performed over the span of thirteen years were examined. Needless to say, the project's 'external' environment totally changed over the years. Moving from a project organization to a matrix organization, and from single-site development to worldwide multi-site development are only two examples among many of changes that occurred in a project's 'ecosystem' and overall conditions in which projects are done. Nevertheless, when examining these five sample projects, we observe that some fundamental issues are common to key success factors.

These fundamental issues are:

- The projects can be classified as having a high overlap of common dimensions of the NTCP Diamond Model.
- The projects have adopted lessons and values experienced in the company's Ideal Project.
- Each lesson can be associated with one of the NTCP dimensions.
- Projects whose Diamond Model had the highest deviation from the Ideal Project Diamond Model experienced the most problems and their objectives were not fully met.

A brief description of the projects and the project type classification follows.

Diamond Classification: Hi-Tech, System, Fast Competitive,
Platform/Derivative

- **Project Outcome:** Highly successful
 - 1993 - Project DTX360A - Ideal Project – Outstanding!
 - Next-generation, TLD System, DCME
 - 1995 - Project A
 - New compression technology replacing the compression technology of the DTX360A product
 - 2004 - Project D
 - Providing multipoint-to-multipoint data services over transport networks
 - 2006 - Project E
 - Providing high quality and scalable multipoint-to-multipoint data services over transport networks
- **Diamond Classification:** Hi-Tech, System, Fast Competitive/Time Critical, Breakthrough
- **Project Outcome:** Partial Success, did not fully meet project objectives
 - 1998 - Project B
 - Providing high definition TV over broadband networks
 - 2002 - Project C
 - Providing point-to-point Ethernet services over transport networks

Exhibit 5 displays the Diamond Model of the Ideal Project and of the five projects that came later.

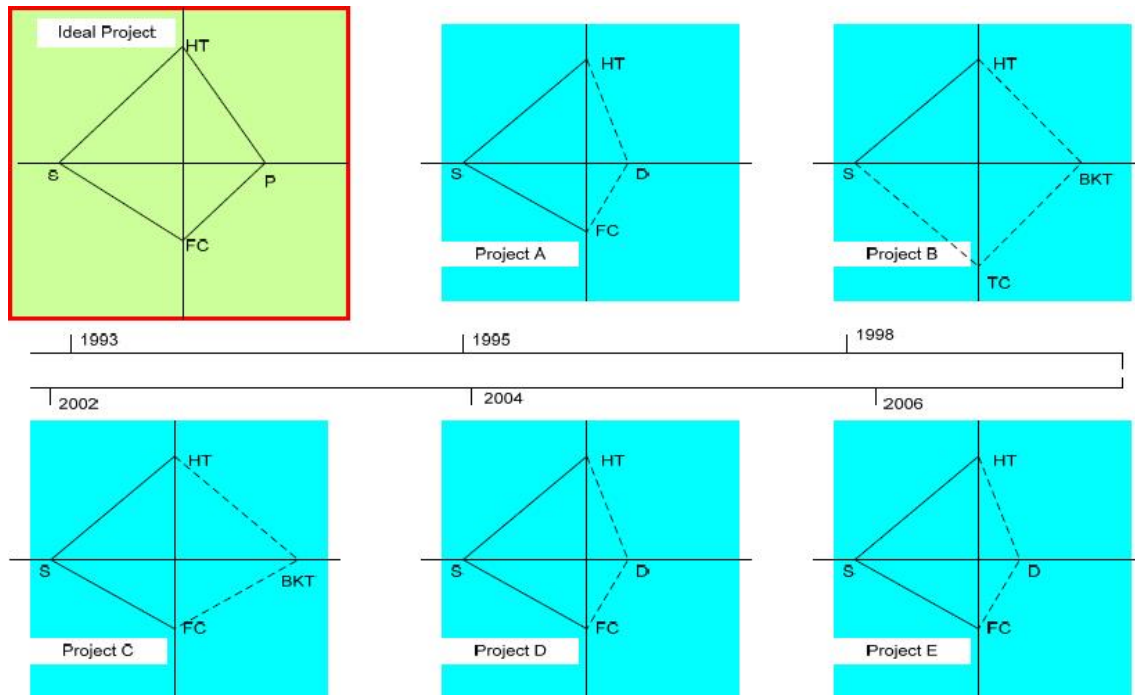


Exhibit 5: NTCP project classification: Ideal Project & five later projects

Exhibit 6 lists examples of best practices adopted in the five projects.

Project	Approach - Level 1 – ‘Standard’	Approach - Level 2 – ‘High Spirit’
Project A	World leader in DCME systems	Continuous, end-to-end system view
Project B	Reuse/Don’t invent the wheel – learn/copy available solutions from other teams	‘Don’t kill the messenger’ policy
Project C	Marketing – R&D good communication, trust	Complex and detailed planning
Project D	Managing by walking around	Plan out early proof-of-concept
Project E	‘Pinball’ principle (the prize of a good job done) assigned to new challenging tasks/projects	Passion from the top

Exhibit 6: Best practices in later projects

Conclusions

The assertion is that best practices learnt from an Ideal Project significantly facilitate the success of ongoing projects performed in the company. Projects classified as being significantly different from the Ideal Project experienced trouble and did not fully meet the project objectives. If more attention had been given to adopt practices suitable to the unique dimensions of each project, the results may possibly have been better.

We believe that PtP of an Ideal Project based on the Diamond Model, is both a useful and practical tool for incorporating best practices and cultivating a ‘yes-we-can’ spirit for further projects.

To conclude with a Call for Action: We propose going out and identifying a great project that was done in your organization, and classifying its unique Diamond Model and best practices. By doing so, your great diamond may just ignite your company, and last forever!

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